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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## Acute Hydrofluoric Acid Mass Exposure : Experience in Teaching Hospitals

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**Study/Objective**: The study objective is to share the experience of acute hydrofluoric acid mass exposure disaster in Korea, and to understand the response needed.
**Background**: There are many flat display panel and semiconductor factories in Korea, and hydrofluoric acid is an important chemical to make the panel and semiconductor. We investigated the clinical characteristics and demographics of patients who suffered from hydrofluoric acid chemical injury when mass exposure happens.
**Methods**: We retrospectively reviewed the medical records of patients who were exposed to hydrofluoric acid in a recent disaster in Korea, and who were seen at the emergency centers and ICUs in the university teaching hospitals. Multiple patients occurrence was included, and single patient occurrence was excluded.
**Results**: Seventy two patients out of 240 suffered from chemical burns, and the burn injuries of the remaining 168 could not be identified by the medical records - even though chemical exposure exists. A total of 72 hydrofluoric acid chemical injury patients were enrolled during the study period, and their mean age was 34. All the patients were accidentally injured by contact with the material, and none of them ingested the material. Only 28 patients wore appropriate protective equipment, and 24 underwent the water irrigation for more than 10 minutes. The most common exposure area was the hand and forearm. Less than 1% of all of the patients had their Total Body Surface (TBS) exposed to hydrofluoric acid. The mean time interval from calcium gluconate administration to pain relief was 28.6 hours.
**Conclusion**: When exposed to hydrofluoric acid, it was important to wear protective equipment and undergo massive water irrigation. After treatment, we concluded that administration of calcium gluconate and pain killers was successful in relieving pain. When mass exposure by hydrofluoric acid occurs, the severities of patients are various, and most of the patients were mild cases.

*Prehosp Disaster Med* 2017;32(Suppl. 1):s1
doi:10.1017/S1049023X17000310

## Strategies to Optimize Performance of Healthcare Workers in Hazmat Incidents

*Mark Leong*
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**Study/Objective**: To report the strategies that can be adopted to mitigate the challenge of climate/weather on decontamination personnel in the tropics/equatorial region. Data from a pilot study on use of a novel solution will be reported.
**Background**: Decontamination is a critical process and is an integral part of a medical defence against a hazmat/chemical incident. In an acute onset event, be it unintentional, eg. Industrial release or intentional, eg. terrorist incident, there is an urgent and critical need to establish reliable decontamination facilities both at the incident site and receiving health care facilities. Healthcare facilities face a huge dilemma that some may have to train, maintain competence, and deploy healthcare workers to work in decontamination facilities at the outset, while waiting for reinforcement. Communities in tropical and equatorial climates faces an additional challenge of heat and humidity, which can degrade the ability of workers who have to function and operate in Personal Protective Equipment (PPE).
**Methods**: A review of strategies and methods used in the past and present to optimize and improve performance of personnel working in decontamination facilities. A pilot study comparing the impact (quantitative and qualitative) of a novel personal body cooling device during a decontamination training exercise will be presented
**Results**: Strategies include a work rest cycle, formation of organic teams, health screening,and others. Use of novel body cooling device has helped to reduce the physiological impact. This is expected to increase the work cycle and enhance operational efficiency.
**Conclusion**: A combination of many different strategies can help mitigate the challenge of working in PPE in the tropics and equatorial regions.

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## Nanoemulsion for Nuclear and Radiological Decontamination of Skin

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**Study/Objective**: Nanoemulsion for skin decontamination of the radio nuclides. Decontamination Efficiency (DE) of the formulation was evaluated on the rat model using the Whole Body Counter. After application on the contaminated skin, there is a significant decrease in the net count of the gamma emitting radiation of the radioisotopes. Skin histopathology was also found to be compatible.

**Background**: Radioactive contamination can arise from accidents involving nuclear reactors, industrial sources, or medical sources. Uncontrolled chain reaction during nuclear reactor accident or nuclear bomb explosion results in the release of a number of radionuclides, especially the long-lived radioisotopes.
**Methods**: The Phase Inversion Temperature (PIT) method was employed for the preparation of nanoemulsion. Prepared nanoemulsion was found to be uniformly homogenous and stable. Dynamic Light Scattering (DLS) measurements were carried out using Nano-sizer/Zetasizer ZS (HORIBA La-900, UK). Globule size of the nanoemulsion is in the expected nano-range. The globules of nanoemulsion are in the expected nano-range, as determined by using the Transmission Electron microscope (Morgagni 268D, FEI, Holland). Te homogeneous phase of the nanoemulsion was determined by acquiring confocal microscopic images of the Rhodamine 123-treated nanoemulsion with an optical Leitz Confocal microscope (Leica TCS SP2 UV, Wetzlar, Germany) equipped with Coolsnap ES camera (Roper Scientific, Evry, France).
**Results**: Before and after each decontamination attempt, whole body counts were recorded with NaI(Tl) detectors mounted on chair geometry. The 1,026 channel acquisition time was kept as 10 minutes. A significant decrease in the radioactivity were recorded for 99mTc, 131I & 201Tl. The results obtained comply with the previously published results.
**Conclusion**: Developed nanoemulsion could be effectively used for decontamination of the radioisotopes from skin. To remove most of the contaminants, only one to two decontamination attempts are enough. Radioactive waste generation could also be limited. These studies show that the nanoemulsion of p-tertbutylcalix[4]arene could be used as a decontamination formulation against the broad range of radioactive nuclides.

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## Let There be Light: Evaluating Decontamination Effectiveness during a Large-scale Simulation of a CBRNe Disaster

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**Study/Objective**: Evaluate the effectiveness of patient decontamination during a disaster simulation using a visual tool.
**Background**: Chemical, biological, radiological, nuclear, and explosive (CBRNe) disasters have significant impact on affected populations. Health care workers (HCWs) must be prepared to execute a Disaster Plan in order to mitigate the negative health outcomes of such events. Decontamination constitutes a major component of disaster response. It optimizes health outcomes by limiting the incidence of secondary, contaminant-mediated injury. Maintaining a "locked down" of the decontaminated care area also reduces the risk of significant injury among exposed HCW and uncontaminated patients. This study proposes an objective assessment of decontamination effectiveness, which lacks in the literature.
**Methods**: We organized the largest documented pediatric, hospital-wide, disaster simulation with 64 simulated patients and 97 HCW participants. After a brief training, participating HCWs executed the decontamination procedure for the first time. Liquid-based *Glo Germ*$^{TM}$ was randomly applied on different body areas, and recorded in 30 simulated patients. Using an ultraviolet light, two independent raters evaluated the total contaminated body surface area before and after decontamination. Simulated patients triaged as contaminated went through a sequence of undressing, followed by low-pressure, high-volume water and soap washing. Effectiveness of decontamination was calculated using a prepared standardized diagram of body surface area. Inter-rater reliability was assessed with a two-way, mixed consistency, average-measures, intraclass correlation coefficient (ICC) using SPSS.
**Results**: Undressing followed by washing led to an average 80.6% reduction in total body contamination (95% CI [73.6-87.6]). The ICC was 0.91 (95% CI [0.81-0.96]), indicating that decontamination was evaluated similarly between raters.
**Conclusion**: A liquid-based visual tool, used as a way to determine decontamination efficacy, is easily obtainable and innovative, and it can help establish verifiable decontamination standards in disaster literature. Undressing followed by washing led to an average 80.6% decrease in total body contamination.

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## Preparing a Tertiary Medical Center for a "Dirty-Bomb" Threat

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**Study/Objective**: To review hospital preparations and drill design, of a tertiary medical center for a "dirty-bomb" scenario.
**Background**: Terror risk in general, and specifically the risk of terror related to a dirty bomb deployment has increased in resent years. Though the radiation injuries expected to occur in such a scenario are minor, in comparison to the conventional injuries, the psychological impact and the resulting area contamination are expected to be significant. The Israeli Ministry of Health guides and evaluates public hospitals preparedness measures, for a variety of conventional and none conventional scenarios; these include radiological threats. In April 2016 following 6 months of preparations, a "dirty-bomb" drill was conducted at the Beilinson tertiary medical center.
**Methods**: Descriptive analysis of the drill design and the preparatory actions.

**Results**: Preparations included training radiation monitoring personnel, decontamination station's staff and training of ED, and ED reinforcement medical and ancillary staff. The main sites that were prepared and later drilled included: The decontamination site in which patients with possible radiologic contamination were decontaminated and received emergency care, The staff radiation clearance stations, The designated ED areas for care of potentially contaminated patients, The uncontaminated ED areas including areas for acute stress reaction victims, The ED imaging facilities and a designated OR for care of contaminated patients requiring surgical decontamination, or other urgent surgeries, in patients of whom routine external decontamination was insufficient. A total of 220 hospital employees participated in formal training sessions, preparatory internal drills and the final full scale drill.
**Conclusion**: The "dirty-bomb" scenario for a receiving hospital is challenging. It requires identification of radiological contamination in terror related bomb explosion victims, safely decontaminating the victims while minimizing staff exposure, and allowing prompt care of both conventional and radiation related injuries. A successful response also requires designated radiation detection and monitoring equipment, and vigorous training of a large proportion of the hospital's staff.
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## A Cost-effective Prescription for Radiological Emergency Preparedness in Community Hospital Emergency Departments

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**Study/Objective**: To present a cost-effective approach for community hospital emergency department (CH-ED) personnel, trained at the first receiver operations level, to deploy a radiation screening, detection, and decontamination capability.
**Background**: Few CH-ED are prepared to treat victims with external radiation contamination who might be seen after a terrorist attack using a radiological dispersal device. Furthermore, hospital staff or facilities may become secondarily contaminated if such victims are not identified and decontaminated immediately upon arrival. Demonstration of five actionable objectives defines CH-ED hazmat/WMD preparedness: recognition/identification, notification, isolation, protection, and decontamination.
**Methods**: An operational system description which includes education, technical training, technology acquisition, and hazard-specific strategy and tactics is presented.
**Results**: Recognition (detection) requires a radiation area monitor ($6,000) to alert CH-ED staff that external contamination exists, prior to patients entering the treatment area. Staff then activate the emergency operations plan, notify the authority handling jurisdiction emergency services, and initiate the hospital incident command system. Hospital emergency response team members protect themselves by donning appropriate PPE (universal precautions) commonly used in CH-ED. Contaminated patients are isolated in the decontamination room or placed into a decontamination corridor and individually scanned for the exact location, type, and severity (current dose rate) of radiological contamination; using a hand-held pancake-type survey meter ($600 each x 2) by mid-level providers (MLPs) who have completed the Advanced Hazmat Life Support course ($500 each x 5). Decontamination is performed by nurses who have received in-house training using basic equipment and supplies which already exist in the decontamination room. Sustainment costs focus on educational needs and drills.
**Conclusion**: CH-ED capability to screen, detect, and decontaminate patients externally contaminated by radiation can be implemented for as little as 10 thousand US dollars and can be sustained for a fraction of the start-up cost.
*Prehosp Disaster Med* 2017;32(Suppl. 1):s3
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## Comprehensive Disaster Medical System to Threat of Nuclear Emergency and Disaster

*Soon-Joo Wang*
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**Study/Objective**: To develop a new comprehensive disaster medical system.
**Background**: The Government has developed the National Radiation EMS.
**Methods**: EMS for nuclear disasters were reviewed and re-organized.
**Results**: The primary emergency medical system around the nuclear plants was considered to be good, but there are problems during nights or holidays, for severe injury, and for many injured victims. The systems for decontamination in receiving facilities were not prepared enough. Personal protection devices for medical teams are less equipped. So, the new system is based on the assumption of nuclear disaster anywhere, any situation. It includes scenario of urban radiological material leakage, nuclear contamination from neighboring region, and mass panic state after perception of nuclear threat. National Radiation EMS developed a survey, an evaluation index of infrastructure, a prediction program for medical demand according to radiation disaster scenarios, and development plans. Evaluation indicators were composed of the seven domains: on-site response, ER, psychiatric support, radiation burn, bone marrow transplantation, internal contamination, and acute radiation syndrome. Each domain was measured by six grade levels. If 1,000 patients occur in the situation of combined disasters, according to the simulation analysis, the medical demand exceeds the capacity of the national radiation emergency medical response system. If 250 patients occur in case of a radioactivity leakage accident, it is expected to have some difficulty within the capacity of the regional response system, but it would be possible to respond within the national level.
**Conclusion**: The current level can be evaluated by comprehensive indicators and it is possible to plan the further development. For the adequate response to newly emerging threat of

various nuclear disaster, new concept and new comprehensive disaster medical system is necessary as well as effective utilization of pre-existing resources.

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## The New Radiation Emergency Medical System in Japan: Lessons from the Fukushima Nuclear Plant Accident

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**Study/Objective**: Our aim was to clarify the new radiation emergency medical system in Japan, and the related activities at our hospital after the Fukushima No. 1 Nuclear Power Plant accident.
**Background**: The radiation accident at Fukushima No. 1 Nuclear Power Plant occurred on March 11, 2011. After this accident, the Japanese radiation medical system was in a state of confusion because health care workers had no knowledge about radiation emergencies and there was no appropriate organization to handle the control of a radiation disaster.
**Methods**: The Japanese government created two special radiation medical centers after the accident. First was a Radiation Disaster Medical Care and general Support Center comprised of four hospitals, with the role of coordinating the radiation emergency medical assistant teams, treatment of radiation exposure patients, and training of the hospital staff in Radiation Emergency Medicine (REM). Second was an Advanced Radiation Emergency Medical Support Center comprised of five hospitals with an advisory role in dispensing advice about professional REM dissymmetry for internal exposure, special training for professional research, and knowledge about REM. Our hospital was designated as a member of the above two centers, and we investigated our related activities.
**Results**: Since our designation, we have rebuilt the REM system in our hospital. Our achievements mainly include education, the development of training contents for activities in our hospital, and lectures on REM for the hospital staff including the doctors, nurses, radiologists, laboratory technicians, and office employees. Hands-on training and lectures were given on REM for medical students. We have also participated in REM training on the national and prefatory levels.
**Conclusion**: It is important for us to educate all of the health care workers in our hospital about radiation emergencies, and to train professional staff who are familiar with both general disaster medical care and radiation emergency medical treatment.

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## Development and Effect of Personal Protective Equipment, Train-the-Trainer Program for Hospital Nurses

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**Study/Objective**: To develop a standardized Personal Protective Equipment (PPE), Train-the-Trainer Program for hospital nurses and to investigate the effect of the program.
**Background**: Despite the importance and perception of nurses in preparation for contaminated and/or infectious crisis, a standardized program to develop competencies is still lacking in Korea. Many hospitals train for protective equipment through large group lectures. Some institutions conduct hands-on training, but the educational contents and assessment tools are not standardized. PPE training is needed for all hospital personnel that has the potential to be in contact with patients. The number of hospital personnel mounts to more than 1,000, and it is very difficult to train everyone in a single place by few trained instructors. Therefore, it is important to train trainers to be competent in training PPE.
**Methods**: Staff from the Office of Infection Control, Office of Quality Improvement, Department of Emergency Medicine, Department of Nursing, and Center for Disaster Training gathered to develop a standardized training content and assessment tool. The tools were validated through the content validity index. After pilot testing, 44 nurses from five different departments were selected to become trainers. The educational intervention consisted of a 2-hour workshop. A pre- and post-survey was conducted to evaluate the differences in perception and performances in personal protection (paired t tests). The statistical level of significance was set at 0.05.
**Results**: Pre- and post-survey differences in perception for PPE knowledge and confidence were 5.3 to 8.4 and 5.3 to 8.3, respectively. Average performance points out of 10 was 9.1, and the observed points in the role of trainers was 9.0 out of 10. All 44 participants passed the minimum passing score of 90 percentage.
**Conclusion**: A standardized train-the-trainer program for PPE was successfully developed, and the newly trained trainers will be performing their roles as trainers for PPE.

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## Middle East Respiratory Syndrome Coronavirus (MERS-CoV) Outbreak and National and Hospital Response in Korea

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**Study/Objective**: The study objective is to understand the MERS-CoV outbreak outside the Middle East.
**Background**: The outbreak of Middle East Respiratory Syndrome Coronavirus (MERS-CoV) infection in the Republic of Korea started from the index case who developed fever after returning from the Middle East. He infected 26 cases in Hospital P, and consecutive nosocomial transmission proceeded throughout the nation. The author provided an epidemiologic description, the hospital response, and the first case of mortality from the outbreak.
**Methods**: Epidemiological research was performed by direct interview of the health care professionals, and reviewing medical records in the hospital where the first mortality occurs in Korea.

We also analyzed the characteristics of super-spreaders, factors associated with mortality, and hospital response to infection.
**Results**: The first mortality by MERS-CoV in Korea was infected by the first super-spreader in Korea. The lessons after the outbreak were as follows: - A higher index of alerting system to find the source-patient earlier. - Appropriate numbers of Airborne Infection Isolation Rooms (AIIRs) should be constructed and maintained. - Proper training on putting on and take off of Personal Protective Equipment. - Well-trained health care workers to care for patients infected with highly contagious pathogens must be fostered. - Crowded and narrow hospital rooms should be converted to visitor controlled, larger-spaced hospital rooms.
**Conclusion**: Multiple potential factors were associated with the super-spreading events: misdiagnosis, delayed hospital admission, inter-hospital transfers without accurate information, and also behaviors such as ignoring instructions regarding infection control, and poor environmental conditions. Institutional and health care systems' preparedness is required to prevent such outbreaks.
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## Training and Preparedness for CBRN Emergencies in a Conflict Zone, Lebanon

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**Study/Objective**: Providing training and preparedness for Chemical, Biological, Radiological and Nuclear (CBRN) emergencies to local actors, will increase knowledge and skills of the disaster response community and health care providers, and prepare them for undertaking future responses, while providing training to both local and international actors, will increase the response capacity of humanitarian relief workers who have a large presence in border areas of and among Syrian refugee populations.
**Background**: Following the chemical attack in Syria, with the resulting mass casualties, Lebanese Ministry of Health, with the support of the World Health Organization and in cooperation with the Lebanese Syndicate of Hospitals, worked on increasing the preparedness and response capabilities of healthcare providers, especially those situated near Syrian borders. Concerned parties and responsible stakeholders became more interested and aware of the importance of training field workers on CBRN emergencies.
**Methods**: Eleven workshops were offered throughout Lebanon (North, Beirut, Bekaa, South); 8 of which were dedicated to non clinical staff (total of 207) and 3 to clinical ones (total of 105). It was facilitated using multiple methods to engage participants and reinforce messages. It was delivered in English and/or Arabic. Tools included videos, PowerPoint presentations, case studies and group exercises.
**Results**: The pre/post tests allowed for evaluating trainees; the evolution percentage for the Non clinical staff ranged from a minimum of 19% (Beirut) to a maximum of 49% (Tyr). As for clinical staff, it ranged from 8% (Tripoli 3) to 45% (Beirut 3).
**Conclusion**: Following the international community and the Non-Governmental Organizations (NGOs) effort and urgent need, the CBRN National Team in Lebanon was founded. It is headed by the Secretary General of the Higher Council of Defense and composed of representatives from all relevant parties. CBRN incidents present various challenges at all levels, including decision makers and first responders. Continuous training and preparations with strong cooperation and coordination between all parties, may decrease the impact of such event. A lot remains to be done in this regard where further research is needed.
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## Live Animal CBRN Surveillance: The XIV Pan-American Games Case Experience

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**Study/Objective**: Develop and implement a comprehensive live animal Chemical Biological Radiological and Nuclear (CBRN) surveillance program to support the XIV Pan-American Games.
**Background**: After the September 11, 2001 terrorist attacks, preparedness and response was raised at international sports events, including enhanced surveillance and rapid detection of terrorist-induced or natural events for a timely intervention. The Pan-American Games are the fourth most important international athletic event in the world. Hosted by the city of Santo Domingo, DR, the XIV Pan-American Games Security Directorate developed a CBRN unit.
**Methods**: The unit had strategic and operational mandates. For operational support, two strike teams were active at any given time, each team consisted of five members including a team leader, field physician, and tactical officers. Syndrome surveillance was performed by means of direct communications between the hospitals and units, as well as use of an electronic Web-based surveillance tool. For active real-time surveillance and recognizing the value of the lethal dose 50 concept ( LD50 is the dose of a substance required to kill half the members of a tested population, the LD50 is body mass dependant), a live animal surveillance station (LASS) program was developed and placed in strategic areas. The LASS consisted of bird cages located in confined spaces and a fresh water fish tank with a continuous stream.
**Results**: Bird stations were placed at VIP areas at major sporting venues and a small fish tank emanating from the centralized water tank supplying the Pan-American village, all monitored 24/7 by webcams. Early morning the day of the opening of the village, the surveillance system identified dead fish in the tank. Investigations found non-malicious cause related to over chlorination of the water pipe system; this incident prompted activation and testing of the emergency response protocol.
**Conclusion**: Live animal stations offers a cost-effective surveillance method for CBRN support units.
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## CBRNE Preparedness. Metropolis the First Italian Non Conventional Biological Drill

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**Study/Objective**: Preparedness for terrorism and mass casualty emergencies is a continuous process of planning, training and drills, in which the success of each element is dependent of all the elements involved. In a new age of potential biological terrorism, there is an increased need for frontline clinicians, and all institutions involved in homeland security and emergencies response to work together, to increase the ability to cope with these potential threats. In 2016, Milan, Italy - the first non-conventional biological drill to test all entities involved in the response and treatment of mass casualty victims was organized.
**Background**: The management of Mass Casualty Incidents (MCIs), especially non-conventional, due to a possible release of Chemical, Biological or Radiological or Nuclear substances (CBRN), require that all institutions involved have the appropriate knowledge, technical and organizational skills.
**Methods**: The prefecture of Milan and the Afghanistan Research and Evaluation Unit (AREU), (The Regional Medical Emergency Service Company for Lombardia) decided to jointly organize a non-conventional drill. The METROPOLIS exercise was organized in order to test all the institutions involved in MCIs, both from the point of view of public safety, homeland security, and medical response. Two hospitals were involved, one as National Referral Center for Bioterrorism (for the non-conventional part of the exercise) and the another one for the treatment of conventional mass casualties.
**Results**: The exercise was organized with the simulation of a biological attack in a subway station and simultaneously a terrorist attack at the football stadium, with more than 100 victims and hostages. Prehospital decontamination procedures were performed and biohazard countermeasures were tested on the field and in hospital.
**Conclusion**: It was the first time in Italy, that a metropolitan non-conventional drill was organized, with a multitasking, multidisciplinary approach, underlining the importance to measure the performances and adequate skills of all entities involved in this exercise.

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## A Hospital Mass Casualty Exercise using City Buses and a Tent as a Hybrid System for Patient Decontamination

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**Study/Objective**: A hospital mass-casualty simulation exercise testing the feasibility of two city buses and a tent as a hybrid system for patient decontamination.
**Background**: Despite being situated in a city known for its harsh winters, the Montreal General Hospital, a Level 1 Trauma Center, lacks a garage. On May 26, 2016, in its first mass-decontamination simulation exercise, city buses were tested as shelters for patients awaiting decontamination triage and for stable patients awaiting decontamination.
**Methods**: This multi-disciplinary simulation tested several steps of a hospital's response to an external disaster. The foregrounds of the hospital were cordoned off to create a single entry point for 30 volunteer "simulated" patients that were identified as contaminated by 21 staff wearing personal protective equipment. Non-contaminated patients were directed to a separate hospital entrance. Contaminated patients were triaged in Bus 1 to determine priority for decontamination. Bus 2 served as a holding area for stable patients awaiting decontamination. The decontamination area consisted of a tent adjacent to the emergency department (ED), with separate tracks for non-ambulatory and ambulatory male and female patients. Decontaminated patients were directed to the ED after donning clean hospital clothing.
**Results**: The use of buses as shelters was found to be practical as they are readily available, they are mobile units that provide protection from the elements, and have pre-arranged seating, as well as multiple entry and exit points. However, they were found to have limited capacity, and non-ambulatory patients were not easily transported inside. Furthermore, areas of improvement were identified in communication, staffing, equipment, and coordination of operations.
**Conclusion**: The use of city buses as triage and waiting zones prior to decontamination is a feasible option for centers without a garage and facing unpredictable weather conditions. Further simulations are required for fine-tuning and testing in real-time, unfolding of tasks, ideally during an unannounced exercise.

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## Biological Nightmare, How to Respond to a Smallpox Outbreak

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**Study/Objective**: To discuss the methods of detection and response, if a smallpox outbreak were to occur, due to a biological attack.
**Background**: With the availability of gene editing technology, even moderately trained personnel can manipulate a genome to make a virus more virulent. Combined with the possibility that strains of the smallpox virus are still available globally, since the fall of the Soviet Union, the possibility of an attack is entirely possible, and the efficacy of the response will determine if a local outbreak becomes a global pandemic.
**Methods**: Combining historical epidemiological data on the methods used to eliminate smallpox, such as the Ring vaccination, along with lessons learned from exercises such as

"Dark Winter," I will discuss how to properly respond in the event of an outbreak. In the "Dark Winter" exercise, numerous deficiencies were found in current response methods and training of providers, which would ultimately lead to a large-scale epidemic with the potential to infect people globally.
**Results**: This discussion is only hypothetical in nature, and its ideas will only be put into practice in the event of an outbreak. However, by drawing from the deficiencies found in the outbreak exercise "Dark Winter," changes are suggested in the response and training of medical personnel to better identify the disease and roll out a vaccination plan.
**Conclusion**: Through more thorough training, medical providers can be better prepared for the possibility of a biological attack involving smallpox. If an attack did occur, there would most certainly be chaos and civil unrest, tied with a public frightened from the disease. By employing lessons learned from previous outbreaks, and tying in modern ideas, the chances of a global pandemic forming can be reduced if applied appropriately and quickly.
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## CBRN Information Appropriate - We May be Wiser, But is it Useful?

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**Study/Objective**: Information is power, especially when first responders are dealing with hazmat Chemical, Biological, Radiological, and Nuclear (CBRN) incidents, when time is of the essence and there could be multiple casualties, including themselves. A usability study was conducted to see whether one of the main hazmat CBRN tools was providing appropriate information and capabilities, in a format that was useful to users. The feedback is being used to improve the tool.
**Background**: The National Library of Medicine has a suite of Hazmat CBRN tools and applications for first responders: WISER, CHEMM, and REMM. The most widely known tool, WISER, compiles information from many trusted sources and provides identification support, physical characteristics, human health information, containment and suppression advice, and mapping capabilities. Due to its extensive user base spanning public safety health, health care, and planners/trainers, a usability study was conducted to determine whether the tool was providing users with the types of information needed, in the format needed, and on the devices needed.
**Methods**: A usability study was performed on five user groups (First Responders, Hazmat Specialists, EMS, Hospital Providers, Preparedness Planners) for WISER. Nine participants from each group were tested on the tool, delving into the information sources/structure, unique features, tools, etc. - testing utility and functionality.
**Results**: Many users knew WISER and had downloaded it, but few knew all capabilities offered. Most knew how to search for substances and found the information helpful, but only the Hazmat specialists were familiar with the unique features. The tool was easy to use, but navigation and conciseness of information was an issue.
**Conclusion**: User feedback has provided the necessary direction to make the tool more comprehensive and user-friendly. Some changes have been incorporated, others are pending. Such studies should occur periodically on all public safety/health/medical tools and applications to ensure they evolve with the field's demands.
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## Bio-Weapons Testing: History, Ethics, and Values

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**Study/Objective**: An inquiry into open-air testing of biological weapons, by the United States and the United Kingdom, and the changed understanding of the propriety of such tests.
**Background**: During World War II and the Cold War, US and UK military authorities conducted hundreds of open-air tests with pathogens, and also with less dangerous microbes described as "simulant" agents. The causative agents of diseases including anthrax, plague, and brucellosis were released in largely unpopulated areas to assess their effects on test animals. Simulants including Serratia marcescens and Bacillus globigii (Bacillus subtilis) were released in population centers to study the dispersal patterns of potential warfare agents in a human population.
**Methods**: included development of information, based on past open-air biological weapons tests, review of current relevant literature, and of the evolution of ethics and values regarding human subject research.
**Results**: Besides providing information about the efficacy of biological weapons, the open-air programs left a legacy of unintended consequences, including lawsuits against the government for concealing information about the tests and their possible dangers. The simulants, S marcescens and B globigii, previously considered by some to be harmless, are now deemed human pathogens.
**Conclusion**: Western political culture has changed since the early days of the American and British testing programs. People have become less reluctant to question authority, and institutional review boards must now pre-approve research involving human subjects. Further, the heightened stringency of laboratory containments has accentuated the safety gap between a confined test space and one without physical boundaries. All this makes it less likely that masses of people would again be unwittingly subjected to secret, open-air, biological warfare tests.
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## Improvements that FP7 European Projects Provide to CBRN SOPs and Responder Protection

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These interventions included additional eye decontamination; select patients had nebulized calcium for respiratory distress, topical calcium for skin exposure, and IV calcium, and magnesium for EKG abnormalities. All were discharged home the next day.
**Conclusion**: This event exemplified how strong communication and planning helps control the impact of a mass casualty event. Having a strong interplay between an integrated incident command, EMS, Toxicology, Pharmacy, and EM physicians should all be built in to disaster planning to facilitate all-hazard preparedness and resilience.
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## Necessity of Information Sharing System of Air Dose Levels to Secure enough Medical Teams within the Evacuation Zone in Nuclear Disasters

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**Study/Objective**: We investigate what becomes obstacles to ensure an adequate number of medical response teams, which are deployable to secure safe transport of patients to an alternative location in nuclear disaster.
**Background**: One hospital in Fukushima lost more than 10% of patients while transporting them in a traffic jam without medical attendance. Disaster Medical Assistance Teams (DMATs) don't have any duties in nuclear disaster.
**Methods**: A questionnaire survey was carried out to investigate awareness for a radiation emergency medicine among DMATs in Japan.
**Results**: DMAT members think that the special-educated DMATs for radiation will be a better relief team than REMATs (Radiation Emergency Medical Assistance Team) for hospital evacuation. REMATs are the only specialists of radiation dose evaluation; REMATs have a little knowledge of emergency medical care, and their human resource is poor. But DMATs also think that a majority of them do not want to be on-duty for nuclear power plant disasters. Their hesitation is made by the lack of dosage information at their working place. It affects their decision to dispatch adversely; if only a few data public monitoring posts are offered. But if the first comer DMAT measured the dose rate already, the next team will participate in medical activities. We also evaluated the usefulness of a new ultra-compact portable dosimeter. Once connected to a smartphone, the device works in conjunction with an application software and continues to take and store measured results automatically as digital data. It is also possible to visualize the measurements by automatically importing them to an enlargeable map for real-time information sharing. DMATs think this system will provide a sense of security to them.
**Conclusion**: Information dissemination on correct knowledge of radiation and timely sharing of data on radiation doses are required to ensure that enough medical response teams are deployable in the event of large-scale and complex disasters.
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## Nuclear Disasters: Our Actual Medical Experience

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**Study/Objective**: We analyzed the medical team's roles, mainly based on actual experiences on site, against nuclear disasters.
**Background:** Repeated nuclear disasters were caused.
**Methods**: Fukushima Daiichi Nuclear Plant explosions, which followed a mega-disaster of the Higashinihon earthquake, the same level of the Chernobyl incident, is mainly focused, compared with other nuclear disasters: ie, The JCO criticality incident, 1999 (2 direct deaths), the Mihama nuclear plant's accident 2004 (ruptured secondary water cooling system, lead to 5 deaths), the Kashiwazaki-Kariwa plant damage in the Chuuetsuoki earthquake, 2007 (no fatalities) in Japan, the Chernobyl incident, 1986 in Ukraine, etc.
**Results**: Although the medical role of a disaster surgeon is especially important during such mega-disasters, trauma doctors seemed useless in this nuclear disaster. Many serious problems were apparent, which are as follows: 1) Inappropriate basic preparedness and education against the special disaster (nuclear disaster), i.e most members of Japan DMAT team seemed to be laypersons. 2) Insufficient transporting system to the weak/vulnerable people. Many aged inpatients seemed to have survived if appropriate triage and smooth transportation system had been established. 3) The myth of 'absolute safety' of nuclear plants, which had been strongly declared before the mega-disaster. 4) Lack of long-term follow-up and care system, including mental support, detection of thyroid tumor, etc.
**Conclusion**: In order to cope with the mega and complex disasters, an academic approach from various points is also essential. It is insufficient to take makeshift measures or use cheap tricks. Moreover, the feeling of security and safety of people, or people's reliability is also important to protect the society. Philosophy during a mega-disaster should be reviewed, and the disaster medicine compendium should be realized to be important.
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## Our Preparedness for Radiological Disaster as the City Suffered from the Atomic Bomb Attack, Japan

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**Study/Objective**: Nagasaki University Hospital was designated as a core hospital for nuclear disaster in the west part Japan. Our purpose is to show the process of organizing the team and getting connected with several facilities around our hospital.
**Background**: Nagasaki Medical College, a predecessor of Nagasaki University Hospital, is the only medical university hospital which suffered in the atomic bomb attack. We have continued medical campaigns and research activities since August 9, 1945. In Japan, medical facilities are chosen and

distinguished by ability for correspondence on nuclear disasters. The Nagasaki University Hospital was designated as two centers for high-radiation-exposure medical care, disaster medicine, and comprehensive support for nuclear disaster. We established the Headquarters for Nuclear Disaster Response and Preparedness in Nagasaki University (NDRP) and prepare for emergencies regularly. The staff of the headquarters are mainly concentrating their power on the network construction and joint training with each facility.

**Methods**: We participated in a wide area training, which included 7,300,000 residential area, and carried out conveyance and accommodation of injured patients. The training content is as follows: The leak of nuclear-reactor coolant occurred and brings about the full-scale emergency. One radiation worker suffered contusions and was conveyed to a medical institution close to the plant; the patient received a decontaminate pollutant as the initial treatment, while Nuclear Disaster Response and Preparedness (NDRP) called and dispatched the staff according to the government's request. A medical support team was sent there by air route, contacted the medical team of the stricken area, and carried the patient to our hospital for decontamination and medical treatment. The staff at the university hospital installed hot and cold zones and performed proper estimation and procedure.

**Results**: We have several experiences regarding cooperation with each organization.

**Conclusion**: We are trying to develop our hospital to be the core hospital which is specialized in nuclear disaster.

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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## Collaborative Operations Military Surgical Team Care in Civilian Hospitals during Russia's Hybrid War against Ukraine: Injury Patterns and Care Practices

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**Study/Objective**: The armed aggression of Russian proxy forces started in April 2014 and targeted densely-populated areas of Eastern Ukraine. New hybrid warfare demands an effective response, especially in military medical care. We report on the results of a 12-month service of a Military Mobile Surgical Team (MST) in a near-frontline Local Civilian Hospital (LCH).

**Background**: Casualty care was provided in Military Mobile Hospitals (MMHs) deployed in the conflict zone. Intense shelling in the summer 2014, forced the MMHs to be relocated to a safe distance from the frontline, thus increasing evacuation time. Later, MSTs (a sub-divisions of MMH) were stationed in LCHs close to the war theater, cooperating with domestic personnel and utilizing existing facilities and equipment.

**Methods**: We reviewed case reports and outpatient records, performed by specialized MSTs of the 59th MMH and local physicians in Severodonets'k Municipal Hospital, Luhans'k region, from April 1, 2015 to April 20, 2016. MST was staffed with anesthesiologists, neurosurgeons, thoracic and vascular surgeons, and engaged LCH's general and orthopedic surgeons.

**Results**: In the study period 248 servicemen were presented to the trauma bay. Among them, 76 were injured due to mortar shelling and mine traps, and 7 had gunshot wounds (GSW). In total, 83 casualties required 212 surgical procedures with an average of 2.55 per case. Additionally, 165 patients were admitted with various traumas and had 73 surgeries performed. Availability of a CT-scanner has allowed 27 craniotomies (12 due to penetrating brain injuries, 15 to trauma). There were 17 patients who received transfusions in total; of 18 175 ml of FFP and 17 515 ml of pRBCs. The in-hospital mortality was 2.82%. Ambulatory trauma care was provided to 513 servicemen.

**Conclusion**: Cooperation of MSTs with LCHs in non-occupied Eastern Ukraine is effective for providing specialized medical care to Ukrainian servicemen. Deployment of MSTs in frontline LCHs shortens time for casualties to reach surgical care, thus essentially influencing outcomes.

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## Outcome for Patients with Extremity Wound Infection Following War-Associated Injuries

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**Study/Objective**: To assess whether 'wound infection' is an independent risk factor for amputation or death.

**Background**: Data on the epidemiology of wound infection in patients with war-associated injuries is limited and mainly describes military combatants. It is unknown to what extent wound infection itself is a factor contributing to serious complications. This is an analysis of data containing both civilians and combatants of both sexes and all ages, originating from an International Committee of the Red Cross Hospital in Peshawar, Pakistan.

**Methods**: We included consecutive patients treated between September 27, 2010 and May 9, 2012 that presented with extremity injuries within two weeks after injury. Wounds with pus discharge were defined as infected. To adjust for trauma severity Revised Trauma Score (RTSc) was calculated by using systolic blood pressure, respiratory rate and Glasgow coma scale. We used binary logistic regression models to evaluate the independent effect of wound infection on outcome. P-values $< 0.05$ were considered significant.

**Results**: Wounds were infected in 108/1,033 (10.5%) patients treated during the study period. Of patients with wound infection 15/108 (13.9%) died, compared to 24/925 (2.6%) of patients without infection, crude relative risk (RR) = 5.4; $p < 0.001$. Amputation frequency was 16/108 (14.8%) in patients with infection, and 79/925 (8.5%) in patients without infection, RR = 1.7; $p = 0.037$. RTSc was missing for 31 patients. Mean RTSc was similar in patients with (7.74; 95% CI 7.72-7.76), and without infection (7.68; 95% CI 7.58-7.79). Wound infection was associated with death and amputation after adjustment for age, sex and RTSc, odds ratio = 9.23; (95% CI 4.17-20.44), $p < 0.001$ and 1.90; (95% CI 1.03-3.52), $p = 0.040$ respectively.

**Conclusion**: Extremity wound infection following war-associated extremity injuries seems to be associated with an increased risk of amputation and death, even after adjusting for sex, age and RTSc. We aim to develop models to

identify vulnerable patient groups and risk factors for wound infection.

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### Military and Civilian Collaboration within Medical First Responders - the Israeli Experience

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**Study/Objective**: The two major medical first responding organizations in Israel are the Medical Corps, Israel Defence Forces (IDF) Home Front Command (HFC), and the National Israeli EMS provider, Magen David Adom (MDA). We will describe some of the main, unique, and specific areas of cooperation between MDA and the IDF.
**Background**: The Magen David Adom (MDA) Law, an Israeli Parliament Law from 1950, defines MDA as an operative assistance organization to the IDF Home Front Command (HFC) in case of emergencies and during war time. Cooperation, by law, in preparedness, training, and emergency cases has led to collaboration in day-to-day activity and routine emergencies.
**Methods**: 1. Human Resources - support between IDF and MDA medical teams in various medical events. IDF funding of MDA volunteer course. MDA operates the National Blood Bank, the IDF as the main blood donor. Military blood services unit to assist MDA. IDF recruits the MDA medical personnel. IDF supplies medical personnel to MDA ambulances. Cooperation of medical teams in humanitarian missions. 2. Training - combined training and exercises between IDF and MDA. Interagency cooperation in training (IDF, MDA, MOH, hospitals), mass toxicological events, CBRN drills. Military paramedic course conducted by MDA experts. MDA management goes through senior IDF courses. 3. Command control and coordination - independent organizations are routine, there is information replaced in any event. MDA works under IDF HFC coordination during emergency events. 4. Doctrine and regulation sharing and supervising. 5. Equipment - both logistic departments work together. Mutual influence leading to advanced, up-to-date medical equipment. 6. Scene response - organizations, medical teams can be activated by both. Coordination between IDF Air Force and MDA and IDF HFC.
**Results**: There is a better medical response for civilian and military personnel with collaboration and creating synergism
**Conclusion**: The major keys for success will be described.

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### Military and Civilian Experience in Providing Medical Care to Pediatric Patients in Disasters and Mass Casualty Incidents - What Can We Learn from Each Other?

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**Study/Objective**: The main purpose of this work is to find common areas of combat medicine and civilian medical rescue in mass casualty incidents and disasters were children are the victims. The results of this study provide the basis for the creation of common solutions that will improve the chance for survival of children in disasters and mass casualty incidents.
**Background**: Mass casualty incidents and disasters involving children are difficult situations for medical emergency responders. Rescuing of patients and providing medical emergency care in these types of events is similar to combat medicine. Exchange of experiences, dilemmas and issues in military medical services is the way to improve operation during mass casualty incidents and disasters that involve pediatric patients.
**Methods**: In this research we invited Polish soldiers who are paramedics, and when they were on a military mission, they provided emergency medical care to pediatric victims. A second research group are former civilian medical rescuers, who have provided medical care to pediatric patients of disasters or mass events. Participants were asked questions about difficulties, dilemmas, ways of providing medical care for children, evacuation and transport of pediatric patients from the scene to the hospital.
**Results**: Dilemmas and difficulties in providing medical emergency care to pediatric victims in mass casualty incidents and disasters, are similar to those in combat medicine when the military paramedics save children's lives. The common areas include ethical dilemmas, regarding providing emergency medical care, opportunities and access to resources, rescuers, medical equipment and pediatric patient transport. The biggest challenge in both groups were stress and emotional reactions of children and rescuers.
**Conclusion**: All common areas should be well developed, discussed and have joint trainings. This cooperation could give an opportunity to develop the best solutions to save children in mass casualty incidents and disasters.

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### Development of New Triage and Scene Management Techniques to Provide a More Effective Response to Active Shooter Situations

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**Study/Objective**: This paper will discuss the needs for response in an active shooter incident, including the use of a cold, warm, and hot zones by all responding agencies. Additionally, building upon techniques learned while training in Israel, numerous tactical medical operations, and responding to incidents abroad, a new triage technique will be proposed that evaluates a casualty based only on their ability to follow commands and assessment of a radial pulse. The new method also eliminates the yellow category and labels patients only as

urgent, delayed, or expectant/deceased. The combination of these two methods will reduce the time spent with each casualty and make the entire triage process much more rapid.

**Background**: With an increase in mass shootings in recent years, providers may find themselves responding to an active shooter scenario incident. Lessons learned from the incidents in the Paris theater shooting, Columbine school shooting, and Orlando nightclub shooting demonstrate the lapses in active shooter and triage protocols.

**Methods**: In those with an inability to follow basic commands, in addition to a weak or absent radial pulse, the mortality rate approaches 92%. In a mass shooting event, a novel "two step" triage technique is proposed, in which EMS determines if the casualty can follow a basic command, such as "squeeze my fingers," combined with the assessment of a radial pulse to establish a triage category.

**Results**: The benefit of this simplified process is speed and ease of use. When there are dozens of patients, spending 60 seconds with each patient is not only unfeasible; it may cost the lives of those awaiting triage.

**Conclusion**: The current method of responding to active shooter incidents is ineffective at best, and current triage methods are overly complicated and difficult to implement. By moving toward new triage and scene management techniques, the potential to save numerous lives is possible.

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## Evacuating a Geriatric Medical Facility during Emergencies - Exercising a Complex Challenge

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**Study/Objective**: To examine lessons learned from exercises simulating evacuation of geriatric hospitals to improve emergency preparedness.

**Background**: Emergency events may necessitate full or partial evacuation of geriatric hospitals, posing a complex challenge. The evacuation process entails close medical supervision of chronic/ventilated patients and provision of oxygen-support means in tandem with evacuation of visitors and hospital staff. In order to generate an effective automatic response to such situations, the Ministry of Health (MOH) developed a national evacuation doctrine of geriatric facilities and evaluates it through routine exercises.

**Methods**: The geriatric evacuation exercises encompass four main processes: decision-making, planning, implementing the evacuation, and return to normalcy. Following each exercise, an After Action Review is conducted, to identify elements that should be sustained or improved.

**Results**: Strategic, operational and infrastructural lessons were learnt, including: 1) evacuate patients based on internally available personnel and equipment rather than reinforcements; 2) accompany each evacuating vehicle with hospital's team member to ensure patients' safe arrival to a receiving facility including sharing information; 3) plan and utilize designated forms, to facilitate control and monitoring of the evacuation; 4) equip each evacuation vehicle with a list of the patients including contact details of evacuating and receiving facilities; 5) operate an "evacuation operation center;" 6) prepare a mechanism to assess patients that may potentially be released home; 7) plan evacuation of patients through stairs, due to potential dysfunctional elevators; 8) plan positioning of rescue forces in a way that will prevent blockage of evacuation routes; 9) exercise joint communication means to ensure flow of information between all responders.

**Conclusion**: Evacuation exercises significantly promote emergency preparedness of geriatric hospitals and strengthen their collaboration with first responders. Readiness of geriatric hospitals for an emergency evacuation necessitates preparedness of resources, life-saving equipment, and personnel to facilitate a rapid response during such a complex emergency.

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## Conflict and Disaster Medicine: The State of Military Medicine in Ukraine

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**Study/Objective**: Assess battlefield morbidity and mortality, from point of injury to tertiary care, across the spectrum of the evacuation chain. This is to include phases of TCCC and Prolonged Field Care (PFC) for war-fighting and ancillary activities in Eastern Ukraine and peri-conflict regions.

**Background**: The former Ukrainian president Yanakovich's refusal to sign an agreement, bringing Ukraine economically closer to the EU in November 2013, ignited a political and social revolution. The reforms' process for the Ministry of Defense (MoD) is a long struggle, and as NATO alignment in all processes remains the goal, multiple actors must continue support it in order to save life, enable the soldier to have access to best practices in battlefield medicine, maintain state sovereignty, promote democracy, and uphold the Ukrainian constitutional values.

**Methods**: Qualitative and quantitative morbidity and mortality data from war-fighting activity; research spanning 2014-2016. Field data in the form of structured interviews and surveys, core methods under the Working Group model, in collaboration with all departments and institutes at the military medical academy.

**Results**: We conclude that the evacuation chain has improved markedly from the onset of the war, but that hybrid warfare by

Russia and Russian backed proxies has highlighted gaps in the prolonged field care (PFC) phase of TCCC/TECC. Evidenced-based practice into the curriculum of military medicine training with highlight on the NATO Military Medicine Center of Excellence (MILMED COE) Lessons Learned process. The Strategic Defense Bulletin of Ukraine and the Military Medical Doctrine require fundamental revision.

**Conclusion**: Ukraine remains at hybrid war with Russia, and this impacts mortality and morbidity of war-fighting activity, as outlined from 2014-2016. A highlight in the Reforms Process must remain, NATO alignment with policy and principles, and in addressing the PFC level of care and doctrinal change at the MoD Ukraine.

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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

### Disaster Psychiatric Assistance Team (DPAT): The Present Situation and Future Measures to Address Disaster Psychiatry in Japan

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**Study/Objective**: There is no guidance for mental care teams during disasters; this leads to inefficient activity. For example, the lack of consistency in the number of consultations per team. The Ministry of Health, Labor, and Welfare has a budget which is provided to each prefecture, but without a manual for what mental care teams should do.
**Background**: In addition to those providing medical assistance, many organizations and institutions went to the disaster area to provide mental health care following the Great East Japan Earthquake. However, it became clear that the lack of predefined methods and guidelines resulted in unneeded activity and an uneven distribution of care, and so, these became points for future improvement.
**Methods**: We conducted researched about the system of mental care support activities in the Great East Japan Earthquake 2011.
**Results**: The aims of Mental Care teams are: 1) The need for assistance in the acute phase; 2) The need for a coordinator; and 3) The need for preparation during normal times.
**Conclusion**: In order to tackle these shortfalls a new specialist organization, Disaster Psychiatric Assistance Team (DPAT) is able to support the psychiatric care and psychiatric social care in disaster areas, and was created on April 1, 2013. I would like to explain the actual activities in each disaster so far, as well as discuss the future prospects of disaster psychiatry in Japan.

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### Preparedness Analysis for Management of Bleeding during Mass Casualty Incidents, Qom, Iran

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**Study/Objective**: In this study we determine the most important factors affecting the ability to care for Bleeding Patients (BP) during a Mass Casualty Incident (MCI) and devise a tool to assess them in our work setting.
**Background**: Bleeding is responsible for a major part of preventable deaths during trauma and MCIs. An MCI may greatly overwhelm a system's ability to manage BPs. In such settings, implication of usual protocols used to manage trauma patients may not be possible or applicable, while the hospital's inability to provide necessary products in time may hamper optimum care.
**Methods**: An extensive literature review was conducted to determine factors effective in a system's ability to manage bleeding during an MCI. Using the qualitative method these findings were converted to a questionnaire to examine different parts of the response system. This tool was then used to assess different organizations participating in response to an MCI at the city of Qom, Iran.
**Results**: Factors having a significant effect on bleeding and whose restrictions may impair proper management of BPs were divided into three domains: Blood and blood products' supply, prehospital management of bleeding, and in-hospital patient-specific interventions. After assessing different parts of the response system at our work setting, it was found that the system was grossly unprepared to manage bleeding during a mass casualty incident in all three domains. Among the domains, preparedness of the blood supply system was better than others, while prehospital management had the lowest score.
**Conclusion**: Based on the assessment tool we devised, we found the response system at our setting to be unprepared for the management of BPs during an MCI. We believe our questionnaire is a useful and much needed tool, which will expose the limiting factors of providing care for BPs in response systems.

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### Disabled People in Disasters - EC Project "EUNAD-Implementation"

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**Study/Objective**: The specific reactions and needs of mentally and/or physically disabled people in disaster settings, as well as trauma-related psychosocial consequences in the mid- and long-term phase, are a known gap in psychosocial and mental health support. The EUNAD IP project aims toward the implementation and preparation of EU human rights related Assistance Programs for disabled survivors of disasters on the basis of EUNAD (people with visual or hearing disabilities) and EUTOPA (Target Group Intervention Program) projects.
**Background**: EUNAD IP project is supported by the European Commision, DG Humanitarian Aid, and Civil Protection. Acronym EUNAD IP: European Network for Psychosocial Crisis Management – Assisting Disabled in Case of Disaster – Implementation. Duration: 24 months (2016-2017). Coordinator: Federal office of civil protection and disaster assistance, Bonn, Germany.

Project partners: University of Innsbruck, Austria; Charles University in Prague, Czech Republic; Center for Psychotraumatology,

Alexianer GmbH, Krefeld, Germany; Norwegian Center of Violence and Traumatic Stress Studies, Oslo, Norway, University of Southern Denmark, Denmark. Fields: Civil protection, psychosocial support in disasters, disaster psychology, crisis communication, crisis management, needs of physically and mentally disabled people in disasters.
**Methods**: Focus groups, in-depth interviews, expert interviews, questionnaires, literature research, guidelines research, case studies, and qualitative studies.
**Results**: Recommendations, guidelines, training programs, practical toolkits, and an international expert network.
**Conclusion**: EUNAD IP project integrates mentally and/or physically disabled people in the crisis management programs, and develops training tools for first responders, psychosocial helpers, social workers, and mental health professionals.
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## Crisis Standards of Care: Concepts of Operations and Tools

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**Study/Objective**: 1. Review Crisis Standards of Care (CSC) concepts. 2. Introduce scarce resource conservation and allocation tools developed by Northwest Healthcare Response Network (NWHRN). 3. Understand complexities of operationalizing CSC using NWHRN Regional Scarce Resource Management Concept of Operations as an example.
**Background**: In a catastrophic disaster, standards of care may change, either due to overwhelming number of patients or lack or resources. In 2009, the Institute of Medicine published a landmark report on CSC.[1] Since then, many others have worked to operationalize concepts of CSC. Delivering health care when resources are limited (eg, ventilators in a pandemic) would force clinical practice to change dramatically. The NWHRN is a health care coalition representing the two largest counties in Washington State. We convened a Disaster Clinical Advisory Committee (DCAC) and developed clinical guidelines for use during times of scarce resources.
**Methods**: The NWHRN DCAC committee developed nine Scarce Resource Cards based on work by Minnesota Public Health. We have modified Minnesota's work to meet our regional needs and have added 3 Critical Care Algorithms. The Critical Care algorithms are used together with Triage Team Guidelines. All resources were developed by subject matter experts and clinical leaders, with input by adult and pediatric ethicists.
**Results**: These CSC tools are important, but only a small part of response. Local and regional coordination between clinicians, health care executives, and public health is required to best serve a community. Recognizing this, NWHRN developed an overall Concept of Operations for Scarce Resource Management bringing all stakeholders together for regional planning.
**Conclusion**: Clinical decisions when resources are scarce require coordinated efforts between many health care stakeholders. Developing a Concept of Operations around scarce resource management is key in planning for Crisis Standards of Care.
[1]IOM 2009. *Guidance for Establishing Crisis Standards of Care for Use in Disaster Situations: A Letter Report*. Washington, DC: National Academies Press.
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## The Golden 100 Hours of Mass Casualty: A Civilian Team Applying the Military 'Mobile Forward Surgical Team' Model to Deliver Mass Casualty Surgical Care in the Aftermath of Super Typhoon Haiyan

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**Study/Objective**: The first 100 hours following a mass-casualty or natural-disaster event offers a "Golden 100 Hour" period of time where the opportunity exists to provide maximal medical and social benefit to disaster victims. Our rapidly deployable, self-sustained, Civilian Mobile Forward Surgical Team (CMFST) analogous to the Mobile Forward Surgical Team utilized by the United States Military showed this model is safe and effective.
**Background**: The first 72-100 hours post-event is often devoid of formalized medical responses from outside the disaster zone, and local response is often hampered by the disaster itself. Among survivors, there is a need for urgent medical care within the first 100 hours.
**Methods**: Our CMFST began surgical operations in Leyte Province, Philippines approximately 60 hours after Super Typhoon Haiyan hit landfall. This represented the only operational medical facility, providing Damage Control surgical and obstetrical care within the hardest hit region from 60 to 110 hours post typhoon landfall. Our CMFST training, organization, and discipline was based on the Military Forward Surgical Team model. Ten out of the 13 individuals had prior formal CMFST/Mass Casualty training, none had prior military experience.
**Results**: Over a four-day period, we cared for 157 patients requiring urgent surgical, obstetric, or orthopedic operations or procedures, who otherwise would not likely have had access to medical or surgical care. Our field hospital was the de facto medical and surgical facility for a population of 50,000, until the local hospital resumed operations, and even then, remained functioning for a time period of four months after our team departed the disaster zone.
**Conclusion**: Based on our operational experience in the immediate aftermath of Super Typhoon Haiyan, we believe that Civilian Mobile Forward Surgical Teams should become standard in international disaster relief to provide care as early as is possible within the "Golden 100 hours" post-event.
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## Using Mind Mapping Technology for Personal Preparedness Planning

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**Study/Objective**: Personal preparedness is a cardinal step to a better prepared community. For the purposes of personal preparedness planning mind maps can be strategically implemented in personal preparedness efforts to structure and synthesize key information.
**Background**: Mind-mapping is a tool, which visually organizes information portraying complex hierarchies and relationships. As applied to personal-preparedness context, mind maps have potential for: 1) structuring existing information framework 2) conveying knowledge to the public in an accessible intuitive format. Demonstrated mastery of personal and family preparedness for disasters and public health emergencies includes certain objectives, all of which may be tracked or maintained through mind mapping technology. Mind-mapping is vastly superior to traditional checklists in its capability to highlight how, when and what needs to be done. Not only can mind maps be constructed with modest effort to visual-spatially represent and organize relevant information and interrelationships but can also serve as a living document.
**Methods**: A mixed methods approach was adopted. First, competency sets addressing personal preparedness planning were identified through the peer-reviewed literature. Existing checklists from a variety of sources including *ready.gov*, FEMA, the American Red Cross and academic centers were systematically reviewed. Commercially available software, TheBrain v9.0 beta (Los Angeles, CA, 2016), was used to develop a draft personal preparedness template. https://www.thebrain.com/products/thebrain/
**Results**: Mind maps enable visual-spatial representation of both concrete and abstract elements of personal preparedness planning. The software features an intuitive interface, collapsible windows and hyperlinks as well as embedded notes and collaborative sharing. Each section of a personal preparedness plan developed in this way, can be examined in further detail and in turn should be continually updated and revised.
**Conclusion**: Mind mapping offers a feasible alternative to traditional modes of information management for disaster preparedness and personal preparedness planning.
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## Countdown to the Future - The Biggest Threat: Man-Made or Nature-Source Disasters?

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**Study/Objective**: These days, the human world copes with global (warming, agricultural drought, armament, displacements, terrorism, etc.) issues. Even if any issue is a regional one, it fastly becomes a global concern and affects the world over. When a problem occurs, not only does it affects the poor, the indigents, but also the wealthiest. Unfortunately, wars cause more deaths, casualties, and orphan populations than earthquakes and hurricanes. In this day and age, on one hand, advanced technologies make life easier for humanity; on the other hand, it leads the human world vulnerable to man-made disasters never-before-seen. The study aims to define the risks for the future and determine solutions for mankind.
**Background**: An outlook to the world panorama shouts the fact: deaths, victims, casualties, orphans, and narcotic addicts are due to ongoing wars, terrors, conflicts, forcibly displacements, individual and military armaments, drug trafficking, and abortions worldwide. Even worse, the future is pregnant to unprecedented events, and threats maybe caused by state and non-state terror groups and malevolents under favor of easy access to dangerous materials, machines, and applications, and fast transportation of hazardous materials. Also, any country or a group in an army can easily cause big regional or global chaos by using mass destruction weapons.
**Methods**: We make conferences about disarmament and non-proliferation concerns, prepare statistics, frameworks, and projects to reduce poverty and world hunger; issue prospects for urbanization and prepare plans for refugees; to maintain international peace and security, promote sustainable development, protect human rights, uphold international laws, and deliver humanıtarian aid.
**Results**: We settle shelters for refugees and serve aid programs for the hungry; but is it enough and sufficient for today and future conditions? The problems are growing day by day.
**Conclusion**: Every human being has the the right to live in security, peace, and dignity, and with security of tenure.
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## Understanding the Impact of Visual Imagery in Emergency Warning Messages

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**Study/Objective**: This study examines how the provision of emergency messaging during flood events is perceived by members of the community; whether it correctly prompts the correct risk assessment; and whether messages prompt the desired behavior. Experimental conditions are applied to determine the correlation between an individual's innate risk tolerance and the perceived risk they associate with a series of flood-related image prompts.
**Background**: Australia experiences a broad range of natural hazard events annually, which lead to injury, loss of life, and long-term negative impacts on individuals and communities. Estimates of the costs associated with these events have reached $9 billion a year (Deloitte, 2016). Some impacts can be mitigated by optimising emergency instructions during the event (Burns and Slovik, 2012). Our previous work has indicated that the addition of images and maps in warnings improves the

comprehension of these messages. However, there remains a lack of clarity about whether or not images improve risk perception and associated behavioral intention.
**Methods**: Participants will complete items from the Domain-specific Risk Taking scale to position their personal risk threshold profile. Participants will then be randomly assigned to one of three conditions (emergency messaging with no imagery; emergency message with images that escalate as the message urgency increases; and emergency messaging with a generic, non-escalating image) and have their responses to the message measured using eye tracking software. Finally, participants respond to a short on-line questionnaire about their perceptions and understanding of the behaviors being elicited by the messages.
**Results**: Our preliminary results indicate that the addition of visual imagery improves risk perception and comprehension of the immediacy of the message. The results from the proposed extension experiments described here will be presented in this presentation.
**Conclusion**: Grammatical construction, language, imagery, media channel, and length must all be considered as important factors in maximizing messaging for optimal effect.
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## Outcome Following Cranioplasty, with Bone Flap Stored in Bone Bank or in Abdomen, in Severe Head Injury Patients

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**Study/Objective**: To find the Outcome Following Cranioplasty, with Bone Flap Stored in Bone Bank or in Abdomen, in Severe Head Injury Patients
**Background**: Following Decompressive Craniectomy (DC), bone flap is usually stored either in abdomen or in the bone bank. Patients who return for cranioplasty following DC are considered to have the best outcome, as it is a cosmetic procedure. However, infection of the bone flap can lead to high morbidity and mortality in this group.
**Methods**: The study included 190 cases of cranioplasty done between August 2011 and September 2012. All were post-traumatic cases who had undergone decompressive craniectomy for severe head injuries, and had no apparent features of localized or systematic infection. Infection was defined as presence of culture positive collection, or frank pus around the bone flap.
**Results**: Twenty-six of 190 cases (13.7%) had infection of the bone flap presenting after 1–14 months of cranioplasty requiring its removal. The infection rate in 119 flaps kept in bone bank was 14.3%, and in 54 flaps kept in abdomen was 11.1% ($p > 0.5$). Two out of 17 (11.7%) cases done with bone cement had infection. There was no significant difference of age, sex, presence of tracheostomy, type of graft used and post-op hospital stay. This compared to patients who had early surgery, multiple surgical procedures, suture line infections and long hospital stay after primary surgery had a significantly higher rate of bone flap infection.
**Conclusion**: This is the only study of its kind which has assessed the infection rates in different kinds of storage of bone flaps, and it shows that there is no significant increase in infection rate, if bone is stored in bone bank.
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## Online Disaster Training for Clinicians and Non-clinicians at a Children's Hospital

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**Study/Objective**: To examine changes in knowledge acquisition of pediatric disaster preparedness among clinicians and non-clinicians who completed an online training course of 5 modules: planning (M1), triage (M2), age-specific care (M3), disaster management (M4), and emergency code response (M5).
**Background**: Terrorism and natural disasters have brought disaster preparedness to the forefront in the medical world. Although children are vulnerable victims during disasters, no standardized pediatric disaster preparedness training exists to date for medical and nonmedical hospital personnel.
**Methods**: An online training course was developed through the hospital's Pediatric Disaster Resource and Training Center. Course data from July 2009 to August 2012 were analyzed through linear growth curve multilevel modeling, with module total score as the outcome (range 0–100 points), attempt as the level 1 variable (participants could repeat the course), role (clinician versus non-clinician) as the level 2 variable, and attempt by role as the cross-level effect.
**Results**: There were 44,115 module attempts by 5,773 participants (3,686 clinicians, 2,087 non-clinicians) were analyzed. As shown in the results table, intraclass correlations indicated substantial variance in knowledge acquisition. The average module total score upon first attempt across all participants ranged from 60.28 to 80.11, and participants significantly varied in how they initially scored. On average in M1, M2, M3: total scores significantly increased per attempt across all participants (average rate of change ranged from 0.59 to 1.84); clinicians initially had higher total scores than non-clinicians (average difference ranged from 13.25 to 16.24). Cross-level effects were significant in M4 and M5: on average, non-clinicians' total scores significantly increased per attempt by 3.77 in M4 and 6.40 in M5, while clinicians' total scores did not significantly improve from additional attempts.
**Conclusion**: Medical and nonmedical hospital personnel alike can acquire knowledge of pediatric disaster preparedness. Key content can be reinforced or improved through successive training in the form of an online course.

| Linear Growth Curve Multilevel Modeling Results | | | | | |
|---|---|---|---|---|---|
| Module | N Attempts | N Participants | Range of Attempts | Intra-class Correlation | Intercept (Fixed Effect) |
| M1: Planning | 11010 | 5760 | 1-54 | 0.22 | 62.16*** |
| M2: Triage | 7755 | 5647 | 1-29 | 0.23 | 70.41*** |
| M3L Age-Specific Care | 8395 | 5603 | 1-20 | 0.21 | 60.28*** |
| M4: Disaster Management | 10747 | 5577 | 1-43 | 0.34 | 71.09*** |
| M5: Emergency Code Response | 6208 | 5567 | 1-16 | 0.27 | 80.11*** |

| | Intercept Variance (Random Effect) | Slope (Fixed Effect) | Slope Variance (Random Effect) | Role Difference (Fixed Effect) |
|---|---|---|---|---|
| M1: Planning | 127.69*** | 1.84*** | 0.86*** | 16.24*** |
| M2: Triage | 117.05*** | 0.97*** | 0.07 | 13.25*** |
| M3L Age-Specific Care | 122.91*** | 0.59*** | 0.06 | 15.27*** |
| M4: Disaster Management | 123.54*** | 3.77* | 0.28** | 12.62*** |
| M5: Emergency Code Response | 64.60*** | 6.40* | N/A (Constant Slope) | 10.95*** |

**Table 1.** Linear Growth Curve Multilevel Modeling Results. *Significant effect at $P < 0.05$; **Significant effect at $P < 0.01$; ***Significant effect at $P \leq 0.001$

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## A Pilot Study to Assess Whether the Public can Achieve Consensus on Patient Prioritization with Allocation of Scarce Resources during a Catastrophic Pandemic

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**Study/Objective**: To ascertain the lay public's choice as to which of three critical case-scenarios should receive the only ventilator immediately available during a catastrophic, like the 1918 pandemic.
**Background**: The medical/ethical literature continues to prepare the medical community about patient prioritization and allocation of scarce resources issues during a pandemic like 1918. There remains no consensus about what ethical framework to adopt and which tactical markers (ie, physiologic or demographic) to employ when critically ill patients require the same few resources.
**Methods**: An IRB-approved survey was developed and presented to a convenience sample of the general public. It contained a previously-published, validated pandemic case scenario involving three patient-cases, all of whom were critically ill and requiring the only ventilator available. Specific demographics and SOFA (Sequential Organ Failure Assessment) scores differed for each patient. Survival estimates based on the SOFA scores were provided assuming each patient received optimal ICU management.
**Results**: There were 39 lay public individuals in the pilot study. The case selected by the study group for the only ventilator was #1 (young female overdose): 22 (56.4%); #2 (geriatric acute vascular crisis): 1 (2.6%); and #3 (septic, middle-aged male): 15 (38.5%). The factors they considered for their selections, in descending order, were SOFA score, age, Glasgow Coma Score, pregnancy status, and dependents. Noteworthy is that Case #2 had a better chance of survival than patient #3 based on SOFA scores (ie, 50% survival vs 30% survival) and yet received only one vote for the ventilator.
**Conclusion**: These results validate the authors' hypothesis that the general public will not achieve consensus regarding patient prioritization during a catastrophic, resource-poor pandemic. Should future studies verify this data, it should sound an alarm that public education on this subject is essential to avoid, at the very minimum, loss of confidence in the health care infrastructure.

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## Hierarchical Task Analysis as a Method to Support Emergency Response Planning

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**Study/Objective**: The objective of the current work was to use the Hierarchical Task Analysis (HTA) method to support the process of planning the emergency response to a train accident in cold climate and inaccessible terrain. The HTA was used in order to 1) capture essential and critical tasks in a structured manner, 2) to facilitate group workshops, and 3) to identify potential problem areas and pitfalls.
**Background**: HTA is a type of task analysis that focuses on the overall goal of a complex activity. It proceeds to deconstruct the complex activity into subgoals needed to reach the overall goal, and subgoals to those subgoals, etc., through multiple iterations down to specific simple tasks or actions. HTAs are often the foundation for more complex analysis, such as human error or situation awareness analysis.
**Methods**: Three workshops were conducted with regional stakeholders (eg. rescue services, hospitals, ambulance services, police, etc.). The purpose was to construct new emergency response plans to train accidents in the region. An observer participated in the workshops to collect the data necessary for the HTA. Additional observations were conducted during a train accident training course for emergency services personnel, to incorporate more specific tasks into the HTA.
**Results**: The three main subgoals recognized in the HTA were 1) mobilizing resources, 2) establish efficient accident site

management, and 3) saving lives at the accident site. Each subgoal included 20 to 29 additional subgoals at up to eight different levels, with associated specific tasks and plans.

**Conclusion**: The HTA provided a unified structure for the complex task of responding to a major train accident in cold climate and inaccessible terrain. One specific benefit of the HTA was that it provided an overview of organizational interdependencies, and can serve as a tool when developing and streamlining response plans to major incidents.

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## Hospital Disaster Victim Registration: A National Standard in Belgium

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**Study/Objective**: Development of a National standard for victim registration.

**Background**: During disasters, hospitals are overwhelmed with questions about potential victims, one of the most disturbing elements during the initial response phase. However, there is a need for early and accurate victim information for the relatives about identification, hospital location, and severity. The Belgian authorities took the initiative to develop and test such a system in a pilot hospital.

**Methods**: The study used a mixed-method design. Initially, a structured questionnaire was developed and sent to all EDs of the Flemish part of Belgium. Out of the questionnaire responses, an exchange disaster victim identification system was distillated. The feasibility of this system was tested in a pilot hospital using a command post exercise. The qualitative part consisted of semi-structured interviews to analyse the structure and actions of the hospital staff within the system.

**Results**: The response rate to the questionnaire was 75%. The awareness of the need of such a system was extremely high - high (x - y): ED head nurses (68% - 30%), disaster coordinators (62% - 22%), ED nurses (44% - 42%), emergency physicians (24% - 38%), and other ED personnel (16% - 38%). A command post exercise demonstrated the feasibility of the developed standardized exchange disaster victim identification system. These structures need sufficient and additional personnel; the observations and interviews provided evidence that there is still room for process improvement.

**Conclusion**: There is a need for a standardized national disaster victim identification system, adapted to the context of hospitals. A national partnership was developed concerning such a system with standard guidelines and usable registration tools. The collaboration agreement will be effectively implemented in all Belgian hospitals. Testing this national system at a pilot hospital was an important step in creating this generic document for Belgium.

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## Disaster Response Coordination among Disaster Management Organizations in Modern Cities: The Case of Nairobi County, Kenya

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**Study/Objective**: To assess disaster response coordination among disaster management organizations in Nairobi County in the last five years, identify factors affecting, and establish ways of improving disaster response coordination in Nairobi County.

**Background**: Disaster response coordination ensures access to core information and efficiency of response actions among responding organizations. This helps mitigate against morbidity and mortality that result following disaster events. However, coordination has remained a significant problem during and after each disaster. In Kenya, frequency of disasters has heightened with observable response coordination challenges among the several disaster management agencies specialized in various fields.

**Methods**: We carried out a cross-sectional study that utilized quantitative and qualitative methods among disaster management organizations in Nairobi County, Kenya. All of the 71 organizations providing ambulance transport, fire-fighting, security, health services, rescue and media were recruited. A respondent drawn from an organization provided information on a self-administered semi-structured questionnaire. Quantitative data was analyzed on SPSS Version 20.0, while qualitative was analyzed thematically. Deductions were drawn from frequencies and proportions of the findings and presented as narrative, tables and figures.

**Results**: Organizations included media houses, air ambulances, military and humanitarian organizations such as the Kenya Red Cross and St. John's Ambulance, that had a broad approach to response. Majority, 46 (75.4%), reported interrelating with experience of in-optimal response (53.2% responded to <10 out of 27 listed emergencies). Factors that affected coordination included age of organizations $\times 2\,(1) = 5.031$, $P = 0.025$, inter-communication $\times 2\,(1) = 34.252$, $P < 0.001$), presence of emergency response policy $\times 2\,(1) = 15.149$, $P < 0.001$) and knowledge sharing $\times 2\,(3) = 12.921$, $P = 0.005$). To improve coordination, they indicated the need to improve success factors such as positive public response, inter-cooperation, enhanced government role, participation of Non-Governmental Organizations and a fair command system. Others were to prioritize disaster operations by continuous integration and synchronization of disaster plans, symposia and funding.

**Conclusion**: Organizations had limited inter-relationships with nonoptimal response to emergencies. A major factor was lack of guidelines. There is need for the organizations and county governments to initiate an overall forum, to hold symposia for stakeholders and to draw coordination standards and guidelines. Further research is needed to determine if regular inter-organizational cooperation would improve disaster response coordination in Nairobi County.

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### Willingness to Work of Hospital Staff in Disasters: A Pilot Study in Belgian Hospitals

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**Study/Objective**: Willingness to work, promoting factors, and hospital disaster management, including the role of the hospital disaster coordinator.
**Background**: Following a disaster, hospitals are at-risk for sudden crowding of victims. However, can they recruit extra staff willing to work? Is disaster management a daily concern?
**Methods**: This mixed-method study encompasses an explanatory sequential design with a quantitative data collection and analysis, followed by a second phase with a qualitative research track to explore the willingness to work. A quantitative survey with 11 different virtual disaster situations was offered at four different hospital staff groups (nurses, doctors, administrative, and supporting staff). In the qualitative part, we performed focus groups and semi-structured face-to-face interviews with a purposeful sample of staff members. A "within" the cases analysis was performed to retain the uniqueness of each setting, followed by a cross-case analysis.
**Results**: Twenty-two Belgian hospitals participated from March 2014 to July 2016. The willingness to work differs between doctors (33.8%), supporting staff (28.1%), nurses (23.6%), and administrative staff (23.1%). Both quantitative and qualitative research at three regional hospitals, from February 2016 to July 2016, confirmed a high willingness to work in all groups. Willingness was strongly related to the disaster type. The greatest willingness detected was with a seasonal influenza epidemic, the lowest for Ebola and nuclear incidents. Four facilitators increased the willingness to work: availability of personal protective equipment, insurance that their family is safe, feedback on the incident, and previous training. The hospital disaster coordinator is the key figure concerning "awareness" and "preparedness" within the hospital.
**Conclusion**: Although differences in willingness to work depending the context, specific measures, and a concerned, dutiful hospital disaster coordinator all play an important role to enhance this willingness. Hospital disaster planning must reflect continuously on quality and safety policies within the organization.

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### International Guidelines for Foreign Medical Workers' Response to Natural Disasters in Low and Middle-Income Countries: Do they Exist, and Are they Being Followed? A Literature Review of Current International Policy and Grounded Theory Study of the Response to the 2015 Nepal Earthquake

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**Study/Objective**: To identify international guidelines for foreign health care workers and determine if there is knowledge translation in order to highlight gaps and aid progress to better disaster response.
**Background**: Following natural disasters, the health sector response has been disorganized and at times harmful to affected populations. Ensuring quality care and effective use of scarce resources depends, in part, on the international workers who participate in the response.
**Methods**: A literature search and semi-structured interviews of participants in the health sector response to the 2015 Nepal earthquake was used to examine the existence, awareness, and utilization of international guidelines for health care workers responding to disasters.
**Results**: The literature search revealed no guidelines directly addressing the appropriateness of potential responders. International guidelines contained only general humanitarian principles for guiding activities once in the field, or were directed at organizations or teams rather than individuals. Grounded theory analysis of the interviews suggested that those who were experienced in disaster response tended to be part of larger, established, international organizations. They were also more likely than members of ad hoc teams to be familiar with existing guidelines and engage in field activities consistent with these guidelines, including coordination, reporting, and building on local capacities.
**Conclusion**: Only general principles exist to guide medical personnel planning to respond to a sudden onset disaster. There are no defined qualification requirements, either for professional skills or disaster response training, for individual foreign health workers. Although progress has been made in setting standards for teams responding to disasters, there is a knowledge gap among inexperienced responders. This contributes to unqualified individuals becoming an additional burden to affected communities. Increasing awareness of international disaster relief guidelines among health professionals prior to the occurrence of a disaster, including emphasizing the need for training prior to deployment, should be a priority.

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### Apport des Cindyniques dans le pilotage stratégique des crises/catastrophes

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**Study/Objective**: Expliciter en quoi le prisme des Cindyniques, au delà de son intérêt pour l'analyse post-crise, autorise des progrès significatifs dans le pilotage stratégique des crises/catastrophes.
**Background**: L'approche stratégique de la médecine de catastrophe n'a pas, à ce jour, bénéficié d'un corpus théorique qui lui permette de connaître les mêmes progrès que l'approche tactique dans un contexte ou cette dernière conduit à croire, à terme, à la maitrise des risques.
**Methods**: Le prisme des Cindyniques postule l'inéluctabilité de la désorganisation de tout système (sociologique, technologique,

biologique) placé en situation de tension critique, a fortiori en situation de crise/catastrophe. Ce postulat autorise une analyse non plus seulement sur l'identification des causes et la description de leur enchaînement probable de l'approche de type « sûreté », mais de réaliser une véritable taxonomie de ces causes.
**Results**:

| Points clés relatifs aux Cindyniques |
|---|
| – intègrent la propension de toute situation à se diriger inéluctablement vers le désordre si elle est livrée à elle-même |
| – identifient la nature asymptotique de la prévention des risques basée sur la seule analyse des dangers matériellement perceptibles et d'une réponse purement technique ou procédurale |
| – reconnaissent les niveaux « global », « individuel », « interindividuel » et « organisationnel » comme critiques |
| – constatent l'influence du contexte, des flux, de la dynamique et des interactions au sein d'une situation, sur la constitution d'un danger |
| – perçoivent l'existence de conditions additionnelles « imperceptibles » ou « impensables » susceptibles de renforcer le caractère cindynogène d'une situation |
| – postulent la nature multidimensionnelle du danger descriptible grace à un espace à 5 dimensions |

**Table 1.** Points clés relatifs aux Cindyniques.

**Conclusion**: Le prisme des Cindyniques permet, in fine, d'acter l'importance des représentations, en pointant que « le risque se mesure, la menace se subit, le danger s'affronte » ce qui abouti au triptyque stratégique « affronter – réguler – dépasser » la crise/catastrophe.

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## The European Advanced Medical Strategic Triage Doctrine, as a Potential Enrichment for the Federal Emergency Management Agency's National Response Framework

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**Study/Objective**: Clarifying the European advanced medical strategic triage doctrine, and highlighting its key features and strengths when it comes to mass-casualty situation management.
**Background**: Mass-casualty events, such as accidents, disasters, or public health emergencies, call for organization to take advantage of the "golden hour" and to ease overwhelmed hospitals in order to maximize victims' survival rate.
**Methods**: This expert review examines available literature and outlines a practical approach to manage mass-casualty situations, on the basis of a doctrine initially developed by the French Society for Disaster Medicine and extensively practiced in France and continental Europe today.
**Results**: The European advanced medical strategic triage doctrine differs from other doctrines that only focus on Hospital comprehensive emergency management plans, to respond to a unique combination of patient numbers and care requirements, that challenge a given community's ability to provide adequate patient care using day-to-day operations, in that it insists to treat patients as much as possible at the scene by sending trained physicians and nurses to the nearest spot of the tactical zone (even within the tactical zone, the so-called "exclusion zone"), in order to deliver on-site damage control to prolong the "golden hour" window of therapeutic opportunity and allow an advanced medical strategic triage in combination with a medical strategic dispatch that hierarchies and buffers victims' medevaced to the best nearest available trauma center or resuscitation unit with optimal use of assets.
**Conclusion**: The issue of mass casualty associated with terrorism has revealed limitations of doctrines that focus on hospital response plans only. Those limitations call for solutions that can be nurtured by the advanced medical strategic triage doctrine.

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## Establishment of a National Catastrophe Plan for the Delivery of Care for Burn Patients in Lebanon

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**Study/Objective**: This study aims at gathering data concerning the care of burn patients in Lebanon. Based on the findings, a national burn plan will be drafted to standardize burn treatment.
**Background**: Due to Lebanon's tumultuous status and poor infrastructure, burn victims are common. Regardless of the cause, whether politically motivated or a household accident, the country lacks the multi-disciplinary approach to deal with these patients in the acute setting and on a long-term basis. The absence of a national catastrophe burn plan, which would potentially reduce the mortality and morbidity by standardizing burn treatment, renders the situation even more despairing. Currently, one burn center exists in Lebanon providing only 10 specialized beds. This facility cannot accommodate for catastrophes that Lebanon so commonly experiences.
**Methods**: Questionnaires were disseminated to physicians in 4 hospitals, emergency medical team responders in 3 Lebanese Red Cross centers, the Lebanese Army and the Lebanese Civil Defense with the approval of the Lebanese Society of Emergency Medicine and the Syndicate of Hospitals, after obtaining informed consent. The questions covered topics including burn treatments, patient triage, burn wound evaluation, and the perceived role of the different parties involved in dealing with a burn catastrophe.
**Results**: Given that we are nearing the end of the data collection phase, results will be presented at the conference.

**Conclusion**: In Lebanon, burn care appears to be fragmented and heterogeneous. This is in addition to the fact, that the different parties (Army, EMT responders, physicians, etc.), that should sequentially be involved in addressing burn care, seem unsure of their role in the chain of command. Centralization of burn care by means of a national catastrophe burn plan would allow for a multi-disciplinary and coordinated approach, which is the only effective way of treating a burn victim.

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### Patient and Family Reunification During Disasters - Hospital Perspectives and Process Improvements, Boston, MA

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**Study/Objective**: Patient and family reunification during and after disasters requires thoughtful, innovative planning by hospitals. A clear and practiced Family Response Protocol ensures that in addition to providing clinical care for patients injured in disasters, hospitals are prepared to rapidly and effectively reunite patients with their loved ones.
**Background**: The Massachusetts General Hospital (MGH) Family Response Protocol is informed by our experience responding to multiple mass casualty events, including the Station Nightclub Fire in 2003 and the Boston Marathon Bombings in 2013. Our experience in these events identified the need to quickly mobilize trained patient/family support teams as part of our mass casualty disaster response, and to implement mechanisms to support patients and families at our hospital, as well as those looking for loved ones located at other hospitals in the area. The key tenant of the protocol is to connect patients, family members and friends of victims with the most appropriate resources to meet their needs. Multidisciplinary in nature, the Family Response Protocol leverages the expertise of leaders in psychiatric care, social services and emergency management as well as hospital security and support personnel.
**Methods**: Our strategy and protocol for patient/family reunification is based on our experiences responding to several mass casualty events, and internal review of event data from other responses.
**Results**: A well exercised Family Response Protocol focused on supporting patients and families post disaster, is a critical component of the hospital Emergency Operations Plan.
**Conclusion**: Our presentation will discuss best practices in hospital patient/family reunification post disaster. Using case studies from our experiences responding to the 2003 Station Nightclub Fire and the 2013 Boston Marathon Bombings. We will explain how key aspects of the plan were used in each event, and identify critical improvements implemented based on lessons learned.

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### Communication: The Antidote to Chaos during a Mass Casualty Event

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**Study/Objective**: Mass Casualty Incidents (MCI) typically occur without warning, unfold rapidly and unpredictably, creating a chaotic environment. The lack of advanced notice and the nearly-ubiquitous lack of good situational awareness regarding the early event details, creates major challenges for hospitals and health systems in their response, often resulting in suboptimal mobilization and/or use of resources.
**Background**: The initial development of the MGH MCI Protocol in 2010, was formed by lessons learned from terrorist, and other mass casualty events, in Israel, London, Madrid, Mumbai, and others. The MGH MCI protocol has been updated and refined following critical evaluation of our own response to the 2013 Boston Marathon bombing, and other less severe events. Our experiences have confirmed the importance of setting clear expectations for a large number of hospital departments outside of the Emergency Department upon identification of an MCI. Setting clear and actionable responsibilities for the operating rooms, ICUs, blood bank, radiology, and even internal medicine services in the hospital, has helped us ensure a rapid, coordinated response to no notice events that supports the safe and efficient movement of patients through the hospital.
**Methods**: Our findings are based on a review of published, and informally shared event data, as well as on our own experience in the Boston Marathon bombing of 2013.
**Results**: We believe that a comprehensive and detailed hospital-wide protocol to proscribe the initial hospital MCI response actions is a required component of an optimal response.
**Conclusion**: We will present an overview of the collaborative process that we used to develop our MCI Protocol and discuss examples of its use. We will also give session participants a template to create their own MCI Response Protocol for their Emergency Operations Plan, and present strategies for use when developing such a protocol that is appropriate for the capabilities of their hospital and setting.

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### Airport Aviation Disaster Patient Transfer Point Lifesaving Enhancement

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**Study/Objective**: Comparison between the means of voice reporting messaging apps and a dedicated app for counting, tracking, and decision-making in the transfer point out during aviation airport disasters.
**Background**: In Israel, the medical preparedness and response to aviation disaster events is the responsibility of Magen David Adom (MDA), the Israeli national EMS organization.

Preparedness is comprised of a response plan which is taught in basic EMS training and practiced a few times each year. The response is based on shift ambulances, Mobile Intensive Care Units (MICU), and volunteer first responders. This article proposes to study the phase which occurs after authorization by the fire department, extraction of the patients, and first triage and treatment that includes secondary triage and allocation of the patient to the appropriate transporting vehicle, with the appropriate medical team for transportation to the hospital, with consideration of injury types and severity. The departure site facilitators conduct secondary triage, ensure the proper medical team and vehicle, and report quantity of injured and severity to the receiving destination hospital.

**Methods**: MDA is using a departure dispatch site to make secondary triage and transportation decisions. MDA conducted a drill to compare the efficiency between the use of a dedicated app for report and decision making and the use of a smartphone messaging app that allows recording of times and voice recording.

**Results**: Data were extracted from both apps and compared as to time intervals, report quality, apprehension of the dispatch center, and decisions made by the dispatch center. The data were compared with consideration of data from the records of MDA representative in the receiving hospitals which records arrival of ambulances, number of injured, and injury types.

**Conclusion**: The messaging app allowed for quicker apprehension by the dispatch, higher quality of report, and quicker and better decisions as to the destination hospital.

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## Pediatrics for the Non-Pediatric Provider: Kids are Just Small Adults

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**Study/Objective**: 1. Provide an overview of pediatric emergency care in the US, emphasizing the fact that most children are seen in non-pediatric facilities. 2. Describe various tools available to reduce cognitive load and error when caring for children. 3. Describe the Northwest Healthcare Response Network's (NWHRN) regional Hospital Toolkit for Managing Pediatric Patients in Disaster, and the statewide trainings developed as a result.

**Background**: Children under the age of 18 represent approximately 25% of the total US population. Many metropolitan areas have specialized Children's Hospitals. However, studies show that the majority of pediatric ER visits are made to non-pediatric hospitals[1]. Therefore, pediatric specialists must continue training and engaging their non-pediatric colleagues. Initial stabilization of a child can be done by *any* non-pediatric emergency provider. The NWHRN has developed tools and trainings for non-pediatricians, and over the past 3 years has taught throughout Washington state.

**Methods**: The NWHRN is a healthcare coalition representing the 2 largest counties in Washington state. We developed a regional Hospital Pediatric Toolkit specifically for non-pediatric hospitals.[2] We then created half-day workshops incorporating hands-on skills sessions. Participant evaluations are reviewed and used to improve and develop new trainings.

**Results**: The NWHRN Pediatric Toolkit received the 2010 NACCHO Model Practice Award (National Association of County and City Health Officials (NACCHO)). Since then eleven different hands-on pediatric training sessions have been developed. Participant evaluations have "strongly agreed" that these sessions are "valuable" and "useful learning aids". The demand for trainings continues. We have also shared these products with our colleagues in Oregon through a "Train the Trainer" Workshop. Oregon has successfully completed 2 workshops in their state.

**Conclusion**: Pediatric emergency care and disaster preparedness should be an everyday priority in all healthcare facilities. There are several tools available to help non-pediatric providers plan and train for the pediatric patient. Hands-on sessions have been a valuable training tool. [1]Gausche-Hill, M, et al, JAMA Pediatr. 2015;169(6): 527-534. doi:10.1001/jamapediatrics.2015.138 [2]www.nwhrn.org/all-documents/hospital-guidelines-for-managing-pediatric-patients-in-a-disaster/

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## Development and Application of an Educational Program for Medical Disaster Health Coordinators in an Earthquake and Tsunami Prone Area of Japan

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**Study/Objective**: We have developed and implemented an educational program for medical professionals in an earthquake and tsunami prone area of Japan, in order to provide training on the competencies needed by medical and disaster health coordinators to run a cluster meeting.

**Background**: Major earthquakes with a magnitude of 8.0-9.0 are anticipated to occur on the southern coast of Japan. Most part of Mie Prefecture would likely be damaged severely by tsunami and landslides. We need to foster medical and disaster health coordinators who could serve the area's Health Emergency Management Service.

**Methods**: We have developed a 4-hour program for the coordinators, that includes 2-hour didactic lectures and 2-hour tabletop exercises, which will be organized by the local government. The educational contents include practical procedures necessary to function as a disaster health and medical coordinator; ie, registering and dispatching medical teams and public health teams, analyzing and assessing situations in order to plan further response to a disaster, and organizing health cluster meetings. The tabletop exercise simulates disaster response in the area where the program is conducted. It requires participants to utilize the cluster meetings to share information and dispatch each team to rescue sites, shelters and/or facilities for medical and health support. The program evaluation by the participants was anonymously conducted using a questionnaire.

**Results**: We implemented the program at nine different sites in Mie prefecture, and a total of 40 medical and health professionals participated in the program. The program was well perceived and the participants expressed their willingness to undergo the exercise with other various scenarios on a regular basis.
**Conclusion**: A practical program with a useful framework to prepare health and medical coordinators in disaster prone areas was successfully developed and implemented. We believe the approach used in this program could help in training health professionals in disaster prone areas.
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## Creating Order Out of Chaos: Centralized Team Training for Disaster and Austere Medical Response

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**Study/Objective**: To explore a prototype in the medical training for civilian disaster response.
**Background**: Medical response to complex humanitarian disasters requires organized training that is lacking in most civilian health care providers. We believe that because of the unique challenges faced in austere medical environments, a centralized team approach to training needs to be created by the overarching command structure of international disaster response. This training should include not only damage control procedural skill acquisition, as well as realistic simulation drills, but also fundamental instruction of the pre-existing command framework within the greater disaster response, such that a trained team can productively incorporate within this context.
**Methods**: Modeled after the military Tactical Combat Casualty Care (TCCC), we developed a team-based, Disaster and Austere Medicine Course for civilian providers called the International Disaster Austere Medicine Course (IDAMC). This course has been in existence for five years and highlights didactic teaching, procedural skills, simulation training, and Mass Casualty theory through the use of cadaver models and surgical simulators.
**Results**: Participants demonstrated an increased knowledge of core curricula learning objectives on pre- and post-course testing and displayed increased knowledge of their role within the structure of a greater disaster response. One disaster response team, in which 76% percent had undergone IDAMC training, was able to work efficiently in the immediate aftermath of Super Typhoon Haiyan and serve as the de facto hospital for a population of 2.1 million for four days.
**Conclusion**: The IDAMC serves as a prototype for civilian medical training in which simulation, procedural skills, and disaster response command framework are taught based on a successful military model.
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## Disaster Preparedness for Clinics - Further Study from Haiti

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**Study/Objective**: Our team created a manual to train clinics in Low- and Middle-income (LMI) countries to effectively respond to disasters. This study is follow-up to a prior study evaluating disaster response. We returned to previously trained clinics to evaluate retention and performance in a disaster simulation.
**Background**: Local clinics are the first stop for patients when disaster strikes in LMI countries. They are often under-resourced and under-prepared to respond to patient needs. Further effort is required to prepare these crucial institutions to respond effectively, using the Incident Command System (ICS) framework.
**Methods**: Two clinics in the North East Region of Haiti were trained through a disaster manual created to help clinics in LMI countries respond effectively to disasters. This study measured the clinic staff's response to a disaster drill using the Incident Command System (ICS) and compared the results to prior responses.
**Results**: Using the prior study's evaluation scale, clinics were evaluated on their ability to set up an Incident Command System. During the mock disaster, staff was evaluated on a 3-point scale in 13 different metrics grading their ability to mitigate, prepare, respond and recover in a disaster. By this scale, both clinics were effective (36/39, 92%) in responding to a disaster.
**Conclusion**: The clinics retained much of the prior training and after repeated training the clinics improved their disaster response. Future study will evaluate the clinic's ability to integrate disaster response with regional health resources, to enable an effective outcome for patients.
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## Simulating a Disaster - Preparing Responders in India

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**Study/Objective**: This study evaluates the effectiveness of a novel modality created by our team to teach disaster

preparedness consisting of tabletop drills and disaster simulation. Based on the Incident Command System (ICS) framework, our system prepares medical providers to respond independently to country level disasters.

**Background**: Disaster response remains an important component of emergency preparedness internationally. To this end, the Incident Command System (ICS) provides a standardized approach to the command, control and coordination of emergency response.

**Methods**: A two-day workshop was conducted with medical providers in Bangalore, India that used serial disaster simulations to improve disaster response using the Incident Command System (ICS). Through increasing responsibility and self-directed tabletops, the participants (doctors, medical students, nurses and police) gained the skills to respond independently to a simulated countrywide disaster. After the exercise, they were asked to grade the usefulness of simulation and lectures.

**Results**: Forty-four providers responded to the questionnaire, all of which (n = 44, 100%) recommended the course. They graded the final disaster drill as most useful (n = 36, 82%) and also graded lectures from topic experts as useful (n = 36, 83%). Based on qualitative written feedback, participants felt drills helped them in communication and leadership.

**Conclusion**: This novel teaching modality, using simulation and tabletop drills is an effective tool to teach the Incident Command System (ICS) to medical providers. Participants felt they benefitted from training and would respond better to future disasters.

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## Assessment of Hospital Disaster Readiness: A Tertiary Care Teaching Hospital Experience

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2. Académie CHUM/Centre Hospitalier de l'Université de Montréal, Montréal/QC/Canada

**Study/Objective**: Evaluate disaster readiness in a large tertiary care teaching hospital environment.

**Background**: The Centre Hospitalier de l'Université de Montréal is a large tertiary care teaching environment without the designation of "trauma center". It will soon move to its new location in downtown Montreal; a $3.5 billion investment. The PHARE project (Projet Hospitalier d'Amélioration du Rôle d'Expert en situation de désastre) is a CHUM initiative to assess and improve hospital disaster readiness and planning for the new mega hospital.

**Methods**: In order to evaluate hospital disaster readiness, an online study was conducted among the entire CHUM community. We evaluated work experience, as well as basic and specific training in emergency measures. The online survey was conducted on a volunteer basis between September 13 and October 2, 2016. Completed questionnaires were included in the analysis.

**Results**: Overall, 2,927 members of the CHUM community completed the survey; managers, physicians, employees and volunteers were represented at 77%, 29%, 24% and 32% respectively. Although 64% of participants reported basic training in emergency measures, these were mostly managers (86%) and employees compared to physicians (15%) and volunteers (17%). Overall, 60% of participants felt well prepared to face aggression (code white), medical emergency on site (code purple), or fire (code red) but inadequately prepared to face a bomb alert or call threat (code black, 67%). Very few participants reported specific training in emergency measures such as massive patient arrival (code orange, 8%), decontamination (3%) or general evacuation (code green, 25%). Overall, the level of knowledge (% of correct answers) of emergency color codes was aligned with perception of preparedness.

**Conclusion**: The PHARE project at the CHUM revealed that medical staff and volunteers are insufficiently prepared to face basic, as well as specific disaster situations. Efforts in the following months will be directed toward training disaster experts at our institution using table-top exercises.

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## US Disaster Medicine Fellowships: What is Out There?

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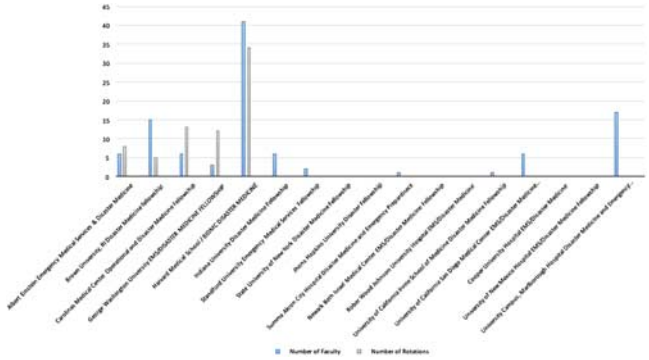
**Study/Objective**: The goal of this study is to differentiate between the various Disaster Medicine (DM) fellowships in the United States (US) by analyzing objective data that include: length of program, prerequisites, disciplines offered, curricula taught, and utilization of blended or hybrid educational modalities. This will be helpful to applicants as they make decisions on which programs to apply to.

**Background**: According to the Society for Academic Emergency Medicine (SAEM), there are 17 Disaster Medicine fellowship programs in the United States as of 2016. These fellowships are Non-American College Graduate Medical Education (ACGME) accredited, and most utilize a unique curriculum and educational program, making it difficult for applicants to make educated decisions. As of now, there is no single online source providing a full description of all DM fellowships available. By concentrating information into useable metrics, this study provides an objective comparison of the available options for DM fellowships in the US.

**Methods**: A comprehensive survey of online data available on fellowship websites, as identified though the SAEM list of US programs. A data-mining tool was used to evaluate the characteristics of each fellowship program.

**Results**: Demographic, prerequisite, curriculum, and programmatic data for the US DM fellowships demonstrates the unique characteristics of each program. An example of two data points, number of faculty and outside rotations, can be seen in Table 1.

**Conclusion**: Because US DM fellowships are non-ACGME accredited, there is a lack of conformity in their educational models. This study provides applicants with the differentiating data needed to make educated decisions on which is the best fit for them.



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## Disaster Severity Index: Proposal of a New Tool in Disaster Metrics

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**Study/Objective**: The Richter Scale measures the magnitude of a seismic occurrence, but does not feasibly quantify the magnitude of the "Disaster" at the point of impact in real humanitarian needs based on United Nations International Strategy for Disaster Reduction (UNISDR) 2009 Disaster Terminology. A Disaster Severity Index similar to Richter Log Algorithm has been formulated; this will quantify needs, holistically, and objectively, in the hands of any stakeholders and even across timelines.
**Background**: An agreed terminology in quantifying "Disaster" matters, and inconsistency in measuring it by stakeholders, posed a challenge globally in formulating legislation and policies responding to it.
**Methods**: A mathematical calculation which uses the median score percentage of 100% as a baseline, indicating the ability to cope within the local capacity. Seventeen indicators were selected based on the UNISDR 2009 disaster definition of vulnerability and exposure and holistic approach as a precondition. The severity of the disaster is defined as the level of unmet needs. 30 Natural disasters were tested retrospectively and non-parametric tests were used to test the correlation of the Disaster Severity Index scored against the Indicators.
**Results**: The findings showed that 20 out of 30 Natural Disasters tested fulfil the inability to cope within local capacity in Disaster Terminology. Non-parametric tests showed that there is a correlation between the 30 Disaster Severity Index Scored and the Indicators.
**Conclusion**: By computing a median fit percentage score of 100% as the ability to cope, and the correlation of the 17 indicators in this Disaster Severity Index Scale, 20 natural disasters fit into the Disaster definition. This Disaster Severity Index will enable humanitarian stakeholders to measure and compare the severity of the disaster objectively and enable future response to be based on needs.

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## Microchips, from a Disaster Perspective

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**Study/Objective**: To review the documented uses of microchips in the medical field, and explore their possible utilisation in the disaster medicine environment.
**Background**: Microchips have a number of non-medical uses in varied fields including banking, retail and the veterinary sectors. In some countries it is mandatory to chip domestic pets to enable identification if they stray from home. Disaster preparedness organisations in the US advocate chipping animals to facilitate post-disaster reunification. To date there is limited data on use of microchips in the field of disaster medicine or the ethical implications of their use.
**Methods**: The authors performed a review of literature indexed in PubMed and the Cochrane Library with no limits on year of publication or language, including both human and animal results. Exploded search terms included "microchip*" Biochip*" "RFID*" "Disaster RFID*" tracking and/or identification.
**Results**: Search strategy yielded 686 citations, with 40 records used in this review, 9 from the veterinary field and 31 from the medical field. These papers suggested multiple existing uses of the microchipping technology, including identification, the retrieval of medical information in the event of an emergency and the use of GPS-enabled chips in locating missing individuals, a few of which can be used in the setting of a disaster.
**Conclusion**: Based on the results of the study, several different uses of this technology were identified . Microchips have proven to be beneficial in tracking and identification, in both the medical and the veterinary medicine field. This paper aims to explore this topic further by looking at the current uses of microchips, and by suggesting additional uses of this technology in the disaster setting, such as triaging and patient identification.

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## It's a crush… It's a collapse… It's… Wait, that's No Stampede!

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**Study/Objective**: To quantify the frequency and intention with which "stampede" is used to describe types of Mass Gathering (MG) disasters.
**Background**: Hazard vulnerability analysis would identify "human stampedes" as high probability events at MGs. Over 200 "stampedes" have occurred in the past 30 years. At the 2015 Hajj, at least 2,000 pilgrims died in one of the deadliest MG disasters in recent history. News and literature referenced the event as the "Hajj Stampede", implying abruptly increased speed and mass panic. At the crux of many of these events, however, is a dense, immobile crowd – hardly the uncontrolled mindless mass implied.
**Methods**: The authors performed a systematic search of peer reviewed literature indexed in PubMed, EMBASE, and Web of Science. Abstracts were limited to human studies in English and keyword 'stampede'. Grey literature using 'stampede' in the title or abstract in reference to MG disasters were also reviewed.
**Results**: Search strategy using the term "stampede" yielded 649 articles. After excluding those using the term 1) apropos computing, 2) as an acronym, or 3) colloquially, fifty-six remained which used the term in reference to mass gathering disasters. Within these articles, fourteen incidents were described in detail. "Stampede" was used in the same context as "crowd disaster", "turbulence", "quake", "mass panic", "crush", and "trampling".
**Conclusion**: It is important to distinguish between stampede and non-stampede events. Few articles describing stampedes actually involve speed anywhere in the description. The generic "stampede", through suggesting a fast moving, irrational and culpable crowd, focuses on herding the masses rather than improving venue safety. We must stem the notion that these disasters are a whim of the crowd and work towards evidence-based engineered solutions.
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## Canadian Hospital Disaster Preparedness

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**Study/Objective**: The objective of this study is to assess the level of disaster preparedness at Canadian hospitals.
**Background**: The most recent (2011) study of Canadian disaster preparedness provided valuable but rather limited insight due to the poor response rate (11%). Many new regional natural and man-made disasters have occurred since then, which mandates a reassessment of Canadian hospital disaster preparedness.
**Methods**: Design: 12-item paper survey, convenience sample. Target population: attendants of three Canadian conferences (ED chiefs/physicians, trauma surgeons/directors, EMS medical directors, ED nurse managers, Trauma/EMS fellows, and/or emergency management personnel). Period: Trauma Association of Canada Conference May 2016; Canadian Conference on Emergency Planning and Preparedness for Healthcare Facilities May 2016; Canadian Association of Emergency Physicians Conference June 2016.
**Results**: The overall response rate was 86.1% [Ontario (54.4%), Quebec (30.9%), rest of Canada (14.7%)]. Level-1 trauma centers comprised 45.6% of responders' hospitals. As for responder roles, 38.5% were ED physicians, 11.5% emergency managers, and 9.0% trauma directors. External disaster response plans were present in 97.5% and internal disaster response plans were present in 89.7% of responders' hospitals. Within the three years preceding the survey, tabletop drills were held at 70.6% and live drills at 57.3% of responders' hospitals. Centralized mass notification systems were present in 63.2% of responders' hospitals. In the three years preceding the survey, 44.1% of responders reported an activation for an external disaster.
**Conclusion**: The overwhelming majority of responders report the presence of disaster response plans at their hospitals. The drill frequency appears higher than previously reported but should be increased further to comply with most recognized international recommendations for disaster preparedness. Study limitations include recall and sampling biases since the collected data was mostly limited to academic settings with uneven representation of certain provinces and rural areas. A standardized assessment of Canadian hospital emergency preparedness is warranted in light of these results.
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## Emerging Disasters and Non Traditional Health Threats, A Terminology Scoping Review

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**Study/Objective**: To examine and map the range of new and emerging disaster risks, based on evolving disaster: definitions, terms, and classifications in contemporary practice.
**Background**: Disaster risk reporting is primarily produced to identify who may be at risk (vulnerable populations) to specific events (cause). There is a paucity of discussion and literature attempting to establish what the emerging causes are of disasters, and consequently recognition of their potential impact. Possible reasons for this may include perceptions of these causes being non traditional threats, and therefore not readily identifiable as disasters. Nevertheless, many of these events currently meet established criteria defining 'disasters'.
**Methods**: A scoping review utilizing the framework articulated by the Joanna Briggs Institute was undertaken to examine the extent, range and nature of new definitions of disaster in the existing literature.
**Results**: There is great diversity within disaster peer reviewed literature and further breadth in the "grey literature",

humanitarian practice and media reporting. This is evidenced by a study conducted by Smith et al. in 2009, who identified nearly 2,000 peer reviewed, event specific publications that have been published in 789 journals. A variety of new and evolving threats to health described as disasters were identified, that are not captured in established disaster glossaries, along with new descriptors that attempt to classify them.
**Conclusion**: There is a lack of consistency in terminology when defining disasters across disciplines and communication exchanges. While disaster research guidelines and terminology standards have been produced, definitions are still applied inconsistently across disaster practice. The capacity to scan the horizon to identify non-traditional and emerging threats requires scope to redefine how disasters are interpreted, classified and measured. Interdisciplinary effort is required to inform and guide risk assessment and terminology definitions in a changing environment.
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## Lessons Learned from Trauma Injury Patients by Medical Support in the Aftermath of Typhoon Yolanda in the Philippines

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**Study/Objective**: Course of treatment for trauma patients by JDR (Japan Disaster Relief team) support after typhoon Yolanda in the Philippines.
**Background**: Typhoon Yolanda hit Leyte directly in November, 2013. A large number of casualties occurred. Japan sent three teams of JDR, and built an air tent in Lethal Park, and they treated patients from 9:00 am - 1:00 pm. We report the course of the patients who underwent trauma.
**Methods**: There was a total of 187 patients who were treated from November 15 - December 07, 2013. Of those, 132 were men and 55 were women. The ages were 3 - 77 years. We found the tendency about patients who were treated in our tent.
**Results**: Ninety-four patients needed follow-up, and 78 of them had follow-up treatment more than twice, and 17 had treatment until the wound totally healed. After suture treatment, 4 patients became worse. Almost all patients stayed in the shelter near our tent. We introduced 12 patients to other hospitals when we closed our tent. There is the tendency that men continue to be treated more than women, when they didn't feel pain, they didn't come to our tent, sutured wounds were becoming worse.
**Conclusion**: Many patients had repeated medical examinations, but only a few consistently followed up treatment until their injuries completely healed. If we treated their injury, we educated them about the continuation of treatment, and what they have to do. We have to know the life and thought.
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## Report of Hospital Evacuations in the 2016 Kumamoto Earthquake

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**Study/Objective**: In the 2016 Kumamoto Earthquake, over 2,000 Disaster Medical Assistance Team (DMAT) members responded. One of the main activities was the inpatient-evacuation from ten damaged hospitals to other hospitals. Some operation problems were found, and those require investigation for future reference.
**Background**: The 2016 Kumamoto Earthquake consisted of two giant quakes (magnitude 6.2 and 7.3) in the same area within a 2 day duration, and 774 aftershocks occurred within a week. Fifty people died, and 2,300 people were treated, and approximately 180,000 people had spent time in shelters. Inpatients-evacuation at the early phase of earthquake is at high risk of danger due to building damage. DMAT must avoid all risk factors before their operation. Since we had a hospital evacuation in the early phase of the earthquake, it is time to evaluate problems from hospital evacuation.
**Methods**: Survey questions and a hearing investigation for all evacuated hospitals were conducted.
**Results**: A total of 1,377 inpatient-evacuations from 10 hospitals was performed, 5 general hospitals, 4 psychiatric hospitals and 1 recuperation hospital. There was no deterioration in patients while being transfer. The reasons for evacuation were: partial building collapse, uneasiness of the mental disease patients and anxiety from building damage with aftershocks. As a result, there were no hospitals that were fully damaged or completely collapsed, however, DMAT entered damaged hospitals without safety confirmation, and transferred in-hospital patients who must stay in complete rest. Another problem for the hospital was financial damage. Since patients were evacuated, hospitals encountered decreased income or defrayment for returning patients.
**Conclusion**: Inpatient-evacuation needs to be avoided as much as possible for the safety of patients and DMAT members. Also, it affects hospital finances. In order to judge the needs of hospital evacuations, this requires expert opinion of building safety at the early phase of earthquake.
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## The Concept of "Aesthetic of Disaster" and its Usefulness for Disaster Preparedness Plans

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**Study/Objective**: To provide relevant insights for a broader understanding of disaster medicine key concepts.
**Background**: On September 29-30, 2016, the Institute for Communication Sciences (ISCC), a Joint Service Unit with the Paris Sorbonne and Pierre & Marie Curie Universities ran a European Seminar during which, the question of the aesthetic of disasters (either natural, industrial or intentional) rose.

From the disaster preparedness standpoint, the concept of aesthetic of disaster is not something to neglect or to be considered as minor.
**Methods**: Expert opinion elaborated on a grounded theory approach, experience and literature review.
**Results**: First of all, the "Lisbon earthquake" along with the related major firestorm that levelled the city, and the tsunami with heights reaching 12 meters (39 ft.) that devastated both the Iberian peninsula and the North African coasts and reach the Americas, paved the way for Disaster Preparedness. The desire to investigate, record, and understand disasters with a scientific rather than a metaphysical approach, was crystallized by this watershed event in European history. Kant was among the first ones to highlight that disasters provide both aesthetic pleasure and displeasure, depending on whether we have some safe distance from the natural disaster or not. In the first case we experience the 'awe inspiring' version, while in the second case we truly 'realize that we are physically powerless' in the face disasters.
**Conclusion**: Today, Disaster Preparedness calls for a combination of liberal arts, such as History, Philosophy and Psychology among others, fine arts such as Architecture, and applied sciences such as Engineering, Cindynics and Medicine. Disaster Medicine is, in fact, both an Art and an applied science, those being interdependent and inseparable, just like two sides of a coin.
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doi:10.1017/S1049023X17000978

## Identify the Capacity of a District Hospital Response in Bogota, for a Mass-Casualty Event - Earthquake

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**Study/Objective**: The overall objective of the study is to identify the capacity of a district hospital response in Bogota for a mass-casualty event -Earthquake. Further improvement opportunities were identified to optimize hospital response, per their level of care.
**Background**: Health institutions are considered essential to the population, so they must be prepared to operate not only under normal conditions, but also in alert situations, which often happens in natural disasters. Bogotá is located in an area of intermediate seismic hazards; current natural events such as the earthquake in Haiti, which left 300,000 dead and over 700,000 injured, and the Chile earthquake, makes us think about the importance of hospital preparedness for mass-casualty events.
**Methods**: The research was conducted by a cross-sectional study, where a sample of the District hospital network was made for convenience under the application of a targeted survey. The results were compiled in a database of Excel 2013 and analyzed under statistical software STATA 12.0, where variables, categorical, and quantitative ratings were evaluated.
**Results**: As a result, an occupancy rate of over 100% in 25% of hospitals was found. The 16 hospitals surveyed, they have an emergency hospital committee, as well as emergency plans, and have been reviewing and implementing these. Fifty percent of the hospitals contemplated within the structured plan for emergencies, the Incident Command System; only 18.8% of hospitals have structural reinforcement; and 81.2% of hospitals reported having cooperation with local or external organizations. Only four of the 16 hospitals have protocols for diagnosis and medical treatment in disasters.
**Conclusion**: In the overall analysis, the hospital network is not capable of an adequate response in the event of a mass-casualty event or the scene of a major earthquake; considering the current occupancy rate where 25% of the district hospital system has overcrowding, and 50% are at the top of their installed capacity.
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doi:10.1017/S1049023X1700098X

## Experience of Nagano Prefectural Kiso Hospital in the Volcanic Eruption Disaster of Mt. Ontake

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**Study/Objective**: Experience of Nagano Prefectural Kiso Hospital in the Volcanic Eruption Disaster of Mt. Ontake.
**Background**: Mt. Ontake, the second highest volcano in Japan at 3067m, erupted on September 27, 2014. There were no significant earthquakes that might have served as warning. This mountain is a popular tourist attraction for hikers and a holy site for followers of Ontake-kyo, one of the sects of the Shinto religion. Because the eruption occurred around the lunch time and the weather was good, there were several hundred people on its slope. Volcanic ash, hot water, and flying rocks from the hydrothermal explosion caused many casualties. Fifty-eight bodies have been found and five people are still missing. All of the injured were brought to our hospital. All staff at our hospital and the Disaster Medical Assistance Team (DMAT) members from other hospitals delivered care to the patients.
**Methods**: We investigated and analyzed our first experience with a severe disaster and the many difficulties involved.
**Results**: All of the patients, including severely injured persons transferred to other hospitals, recovered completely. Main cause of injury and death was back damage from flying rocks. However, psychiatric injury remains among the patients and family members of those who died in the disaster.
**Conclusion**: Cooperative work with many organizations such as Public Health Centers, Municipal Offices, Police, Fire, and Military were very important. We should train for preparation of all types of disasters.
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## Disaster Medicine - Significance of Disaster Medicine Compendium

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**Study/Objective**: The large number of casualties during mega-disasters are global problems. Establishment of

systematic measuring and life-saving medical systems should be urgent and essential issues. However, there are many problems to be solved in various fields of disaster medicine.

**Background**: We believe that in order to solve the medical problems, it is necessary to compile and systematize "disaster medicine."

**Methods**: Already we have worked on compiling a compendium of disaster medicine from a broad or bird's-eye perspective, and from a long-term view, which is tentatively completed with 22 volumes as of the financial year 2005. The English version occupied only one fourth, and nearly three fourths is written in Japanese, which are briefly presented: Title : "Compendium of Disaster Medicine", by Clinical Research Institute, National Hospital Tokyo Disaster Medical Center, Clinical Research Institute; Edited by Haraguchi Y, Tomoyasu Y, Nishi H and contributing editors and advisors: Muneo Ota, Yasuhiro Yamamoto, Noriyoshi Ohashi, Mitsuru Aono, Tsutomu Takeda, Toshiharu Makishima, Tohru Ishihara, etc, which are discussed.

**Results**: The compendium (Japanese temporary version) were sent to 250 medical facilities against disaster in Japan, as a DVD record (with a few example volumes), and some were also distributed to public health centers, governmental offices and medical voluntary groups before 2010, which seemed partly worked during the mega-disaster in 2011 in Japan (Tohoku area earthquake of 8.9 magnitude with tsunami, followed by the Fukushima Daiichi Nuclear Incident of level 7, as same level of Chernobyl Incident).

**Conclusion**: Innumerable preventable deaths were caused by the mega-disasters, including the above-written disasters in 2011 and 1986. Most surgeons, found training to be educational and reported learning much about disasters. To educate, many different specialties are needed. There are several, most severe problems for education to be pointed out. The Compilation of disaster medicine compendium are needed as soon as possible.

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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## Assessment of Triage Performance and Quality

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**Study/Objective**: **Assessment of Triage Performance and Quality** 1- Triage is the right decision for the right patient at the right time, that puts the patient in the right track for further management 2- Tirage is done every minute during the patient care process in the Emergency Department 3- In order to assess the Emergency Department Triage performance this procedure is proposed 4- Review periodically the patient's priority, times, distension and outcome 5- Using the above mentioned definition of Triage, the outcome of the patient care will be assessed 6- Continuous periodic evaluation will explore the areas that needs improvement.
**Background**: Triage is an Emergency Tool, used to handle patient overcrowding in an emergency department. Case mix validity and reliability of different systems had been evaluated. The aim of this paper is to assess the performance of emergency department in using the applied triage system.
**Methods**: A retrospective review of the patient outcome, according to their priority and the distension in relation to the time spent, will be reviewed monthly to identify delays and/or wrong triage methods, or outcomes and point out areas for improvement.
**Results**: The outcome will be benchmarked to other institutions and hospitals. Continuous, periodic review will also be able to view the performance improvement after correction of deficiencies.
**Conclusion**: Continuous triage performance and quality evaluation, is important for identification of deficiencies and of course for patient safety.

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## Overcrowding is Still a Big Problem for our Emergency Services, Real Disaster is in our Emergency Departments in Turkey

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**Study/Objective**: It seems that overcrowding in an emergency department becomes a serious problem in Turkey. In this context we aimed to find causes of this overcrowding and find solutions.
**Background**: Emergency is defined as something dangerous or serious, such as an accident, something that happens suddenly or unexpectedly and needs fast action in order to avoid harmful results. What about the people who come in for an examination? The question is "Do they really need urgent help?"
**Methods**: In Turkey everyone can easily reach emergency services, and as a doctor, you can not possibly reject examining patients. If you visit an emergency department, you would see a long line of people waiting for examinations. Generally this line includes green codes and blue codes. It has been said that a green code is defined as 'standard accident and emergency cases without immediate danger or distress', and the blue code is defined as 'patients whose conditions are not true accidents or emergencies'. The people in line, related exactly to this definition. A sore throat that has just started, never ending joint pains looking for an injection, pregnancy suspected and just wants to be sure that she really is pregnant, fungal infections, etc., they all wait a long time for cures and more. They would even come in for prescriptions for a chronical disease after shopping at a mall. It is so pathetic that we have such people causing overcrowding. This is one of the most common causes of overcrowding in our EDs.
**Results**: Population in Turkey is growing from 2011 to 2015.
**Conclusion**: It is obviously clear that there is a remarkable overcrowding EDs in Turkey. To avoid this situation education must achieved. Every person who lives in Turkey must be informed about the types of emergencies, and which situations are called an emergency. Thus, people could easily decide what to do, and would learn what EDs are all about.

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## Causes of Overcrowding and NEDCOS Score at Resource Limited Setting: Experiance from Ethiopian Teritary Care Hospital Emergency Center

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**Study/Objective**: To identify major causes of Emergency Department overcrowding in resource-limited Emergency Centers. To identify NEDCOS score level of Emergency Centers.
**Background**: The ACEP Crowding Resources Task Force adopted the definition of ED crowding as "A situation in which the identified need for emergency services outstrips available resources in the ED. This situation occurs in hospital EDs when there are more patients than staffed ED treatment beds, and

wait times exceed a reasonable period. Crowding typically involves patients being monitored in non-treatment areas (eg, hallways) awaiting ED treatment beds or inpatient beds. Crowding may also involve an inability to appropriately triage patients, with large numbers of patients in the ED waiting area of any triage assessment category." This issue of ED overcrowding becomes a serious issue, particularly in resource-limited emergency centers.

**Methods**: An ED overcrowding assessment questionnaire was prepared based on the conceptual model of Emergency Department crowding, and was used to assess particular causes of ED crowding. A well validated NEDOCS (National Emergency Department Overcrowding Score) tracking tool was used to assess NEDCOS level of a particular ED.

**Results**: Micro-level causes of ED Overcrowding Summary Table. Average NEDCOS score for one month is 141-180/ Severe Overcrowding.

**Conclusion**: Physical capacity of ED and hospital should be increased. Hospitals should have added express admission units.

| Causes of overcrowding | Percentage |
|---|---|
| Those patients who need emergency care in the ED (seriously ill and injured). | 1.5% |
| Unscheduled urgent care patients in the ED (patients from follow up clinics with acute problems). | 34% |
| Safety net care patients in the ED (patients having barriers even for unscheduled care). | 0.5% |
| Throughput component as a cause of crowding (includes patient length of stay in the ED as a potential contributing factor to ED crowding). | 31% |
| Output component as a cause of ED crowding (involves disposition of ED patients). | 33% |

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## "No Bed Syndrome": Unmet Demand for Hospital Beds in the Emergency Department (ED) of Komfo Anokye Teaching Hospital (KATH)

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**Study/Objective**: To determine the trend of bed usages in the Emergency Department of KATH.

**Background**: The issues of ED bed management are problems of the health sector and to determine if bed usage trends are important for planning and effective management of an ED.

**Methods**: A quantitative, non-interventional, cross-sectional method was used to collect data on the times for all the major events in the ED, and the number of free beds in the main wards for all patients presenting in a 4-weeks duration. The data from the time series and mobile application were entered into a Microsoft Excel Module to determine the averages of the demand, discharge, free beds, and admissions in 24 hours.

**Results**: The results showed an increased demand for beds with multiple peaks: from 0700hrs-1200hrs, 1500hrs to 1600hrs, and 1800hrs to 2000hrs. There are similar times for the discharge and admission to the ward. All values decline from 22hrs toward 00:00 hrs. Although there are demands from 0000hrs to 0700hrs, there are virtually no discharges and admissions during these periods. The free beds had a steady rate across all hours of the day, but have no corresponding response to the pattern of admissions to the wards; $r = 0.16$ (weak correlation).

**Conclusion**: The trend of bed usage is important for planning, and can be a tool to determine the number of staff per shift and reduce ED overcrowding.

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## Overcrowding in a Low Resource Emergency Setting in West Africa: Perceptions by Health Workers in the Accident and Emergency Center, Komfo Anokye Teaching Hospital (Kath) Kumasi, Ghana

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**Study/Objective**: To assess the health workers' perception of overcrowding in the Emergency Department (ED).

**Background**: Emergency Department (ED) overcrowding is gradually becoming a growing trend in many hospitals worldwide. ED overcrowding has negative effects on the quality of patients' care. It increases staff stress and produces poor work satisfaction among health workers. KATH ED receives an average of 84 patients daily with overcrowding and long boarding hours being challenges.

**Methods**: A cross-sectional study which recruited 110 ED health care workers using systematic random sampling was carried out for three months in 2015. Structured questionnaire-based interviews which were pretested and validated were administered. Analysis was done using Epi Info 7 by the CDC.

**Results**: Of the 110 health workers, 59 (53.64%) were nurses and 51 (46.36%) were doctors. Females were 52 (47.27%) and males were 58 (52.73%). The perceived average waiting time of a patient to see a physician at the ED was 30 minutes. 24.54% thought the afternoon shifts were congested. Inappropriate referrals (59.63%) and delays in getting radiological imaging (49.07%) were the main perceived causes of overcrowding. The negative effects of overcrowding on health workers included increased staff stress (71.03%), poor work satisfaction (57.41%), and increased margin of errors (32.41%). 95% said that overcrowding in the ED contributed to poor patient outcome by increasing staff exhaustion (40.37%) and compromising quality of patient care (36.70%). Health personnel strongly agreed that equipping district hospitals to handle non-emergency cases (77.78%), appropriate referral system (75.93%), and provision of adequate logistics and

consumables (57.41%) are ways to curb overcrowding. 98% agreed that six hourly bed occupancy data from the admitting wards was important to reduce ED overcrowding.
**Conclusion**: Overcrowding in the ED is perceived to cause staff burn-out and result in poor patient outcomes. Evidence-based interventions may improve overcrowding in EDs.
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## Waiting Times in a Tertiary Academic Hospital Emergency Department, Iran

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**Study/Objective**: This project was aimed to evaluate waiting times in various processes in the ED of an academic hospital in Mashhad, Iran.
**Background**: Waiting for a physician visit in hospitals is one of the main factors associated with health care quality. Overcrowding is a significant problem in the Emergency Department (ED).
**Methods**: This cross sectional study was conducted in ED of our academic hospital in Mashhad, Iran. Data was gathered as a checklist. Intervals between triage and first visit, getting nursing care and discharge from ED were the main variables in our study. Data was entered using the SPSS version 16; P-value less than 0.05 was considered as significance level.
**Results**: In the first 25 days of the study, 1,250 patients were enrolled the study. Of those, 466 patients (37.2%) were triaged in first and second level and 784 (62.8%) were in third or fourth level. Mean duration between triage and first visit was $13.5 \pm 7.6$ minutes (first and second level of triage) and $16.4 \pm 10.1$ minutes (third and fourth level). Mean duration for receiving nursing care was $12.1 \pm 7.8$ minutes (first and second level of triage) and $15.6 \pm 9.5$ minutes (third and fourth level). There was a negative correlation between number of patients and waiting time for the first visit, in patients were in third and fourth level of triage ($p < 0.001$, $r = 0.654$).
**Conclusion**: Our finding revealed that the number of ED physicians and nurses were correlated with waiting time for patients. So it seems, the use of strategies to reduce ED waiting time could be satisfying for both patients and staffs.
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## Increased Burdens of Emergency Departments - Organizational Challenges

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**Study/Objective**: The paper aims to assess Emergency Department (ED) organizational changes that are necessary due to constant increases of patient volume. We reviewed the ways of facilitating ED organization, and specifically the options of applying Lean analysis to optimize ED operations.
**Background**: The Military Institute of Medicine has one of the largest EDs in Poland, being a part of a multi-profile specialist hospital and regional trauma center for the Warsaw Agglomeration. The increase of the number of patients from 31,554 to 83,530, from 2009 to 2015 (a nationwide trend) was not matched by growth of the number of personnel or ED infrastructure, forcing change in work organization. The annual average of patients referred to the Trauma Center was 691.
**Methods**: Solutions to optimize ED operations were assessed in terms of the need to adapt to the growing ED burdens, specifically based on the results of application of the Lean analysis and the International Emergency Department Leadership Institute (IEDLI) standards.
**Results**: During the six years under review, ED's burdens increased by 264.7%, but neither the infrastructure nor the number of personnel grew accordingly, necessitating a search for organizational solutions to keep up with patient flow and ensure patient safety. The number of patients not in life-threatening condition grew from 37% to 48% of ED patients, proving a major challenge. Continuity of operations requires patient flow modelling, triage system modification and efforts to decrease access block. Elements of Lean analysis and IEDLI recommendations were applied to keep safety standards for patients in life-threatening conditions, and Trauma Center patients (only 0.8% of ED patients but creating long-term burden).
**Conclusion**: The increase of the number of ED patients who have higher expectations and create greater burdens and duties for personnel and ED infrastructure, was not matched by an increase of the number of personnel and ED infrastructure development. Therefore, it is necessary to accept solutions to reduce risk and undesirable effects.
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## Risk Recognition: Rationing Emergency Department Care as a Response to Overcrowding

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**Study/Objective**: The central objective of this research is to examine the relative risks associated with rationing Emergency Department (ED) care. A number of sub-objectives are considered, including: definition and measurement of overcrowding; rationale for managing so-called 'inappropriate' attendees; definitions of primary care patients; range of risks associated with rationing of care; acknowledgment and discussion of ethical issues resulting from these.
**Background**: Overcrowding and the associated impact on ED flow, patient outcomes and staff recruitment, retention and morale are increasingly recognized and reported. However, a core assumption remains that much of this is due to the presence of inappropriate attendees, or those who could be treated in primary care facilities. Efforts to address this include redirection of patients away from EDs, which effectively introduces rationing of care. This has not been made explicit, nor clearly discussed in the public arena, and the allocation of risk remains unequally distributed.

**Methods**: This presentation is derived from research focussing on ED overcrowding, including the author's PhD on defining ED attendance appropriateness, which utilized a Mixed Method research approach incorporating Delphi survey methodology and analysis of qualitative free text responses, as well as subsequent systematic literature reviews and ethical analysis of identified core issues. An international perspective is presented, with the use of a New Zealand health system exemplar.
**Results**: There are specific risks associated with current responses to patient redirection – these include clinical, professional, legal and ethical risks. These risks are disproportionately spread across the key stakeholders in this process (patients, medical staff, managers), with limited recognition of these risks.
**Conclusion**: There is insufficient research and audit follow-up associated with the introduction of many overcrowding mitigation processes. Tendencies exist to focus on a 'quick fix', a highly visible responses to manage primary care patients, which may not be the best use of resources.
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## The Lack of Supra-Specialty/Specialty of Emergency Medicine in Greece: The Necessity, The Steps, The Problems, and the Delays

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**Study/Objective**: The reasons of necessity and the lack of Emergency Medicine Specialty in Greece.
**Background**: Emergency Medicine is a relatively new specialty that constantly develops all around the world. The World Health Organization (WHO) encourages governments to support the development of health services related to Emergency Care, and acknowledging the continuously increasing burden of trauma and other emergency cases. Patient visits to the Emergency Care Units are rising, mostly due to the complications of chronic diseases presented by the growing geriatric population.
**Methods**: We extensively reviewed the Medline-Pubmed electronic databases from 2005-2015, as well as published data in government Greek and international websites related to Emergency Medicine. In addition, we conducted online research using a small questionnaire addressed to the Greek doctors regarding their opinion about Emergency Medicine and the emergency departments. Data are included. Keywords: "Emergency Medicine Specialty;" "Emergency Departments;" "development;" "prehospital emergency medicine;" "emergency health care;" "Greece."
**Results**: The European Society of Emergency Medicine (EUSEM) has made special efforts to establish the specialty of Emergency Medicine (EM) in Europe, and a joint training program. Specialty or subspecialty of EM have not officially been established, although Greece is officially represented in EUSEM since 2007 by the Hellenic Society of Emergency Medicine. Training in EM is inadequate and not well organized. Recent economic crisis with subsequent frequent government changes, the lack of support from other specialties, and the cutbacks concerning health expenses have hindered the continuation of the efforts towards the recognition of the specialty.
**Conclusion**: Our data indicates that Greek doctors strongly support the establishment of the specialty in EM. Under these unfavorable conditions, we should continue the efforts of establishing the specialty, through integrated and documented suggestions, aiming to achieve the provision of high-quality and efficient emergency care to the patients. Improving public health is a priority of any organized society.
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## Turning the Heat Up on Admissions: The Impact of Extreme Heat Events on Hospital Admissions

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**Study/Objective**: This study aimed to investigate the impact of extreme heat events on the admissions to the Royal Hobart Hospital (RHH), Tasmania for the period January 2003 to December 2010. The objective of this study was to determine if extreme heat events lead to an increase in hospital admissions.
**Background**: Extreme heat events are increasing in frequency and duration and cause more deaths in Australia than any other extreme weather event. The total economic cost of extreme weather events in Australia each year is estimated at $6.3 billion with this figure expected to double by 2030. Extreme heat increases the number of presentations to emergency departments and the mortality and morbidity rates. Emergency departments across Australia have experienced a steady increase in presentations over the years with spikes occurring during disaster events. In 2012-2013, Tasmania had the largest percentage increase in emergency department presentations of all the Australian states; there were 147,064 presentations equating to a 3.8% increase on the previous year. This increase in public hospital emergency department presentations across Australia has led to overcrowding of emergency departments.
**Methods**: Non-identifiable RHH emergency department data and climate data from the Australian Bureau of Meteorology were obtained for the period 2003-2010. Statistical analysis was conducted using the computer statistical software 'R' with a Distributed Lag Nonlinear Model (DLNM) package used to fit a quasi-Poisson generalized linear regression model.
**Results**: The Relative Risk (RR) of admission to RHH during 2003-2010 was significant when temperatures exceeded 24°C (75.2 F). The peak effect was noted one day after an extreme heat event ($P < .05$) with a lag effect lasting 12 days. These results highlight the significant impact extreme heat events have on hospital admissions.

**Conclusion**: This study identified the increased demand placed on a tertiary referral public hospital emergency department during extreme heat events and the potential for overcrowding.

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### Impact of Evaluating Patients in Chairs on Emergency Department Length of Stay

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**Study/Objective**: Determine if evaluating low acuity Emergency Department (ED) patients in chairs can decrease Patient Length of Stay (LOS) and if it impacts other low acuity patients' LOS.
**Background**: EDs can utilize an urgent care area to create space for sicker patients. Despite this, overcrowding still results and leads to increased patient LOS. One potential solution is to evaluate patients in chairs as opposed to stretchers.
**Methods**: This prospective case-control study took place in an inner-city ED with an annual census of 95,000. From January 6 to February 9, 2016, patients with low acuity complaints with anticipated short LOS were placed in chairs for their entire stay. Over 15 complaints were included. A specific nurse and care provider were assigned to these patients. Each study patient was matched with a case control with the same complaint from one year prior. Independent-samples Welch's t-test was used to analyze the data.
**Results**: Overall, 258 patients were included in the study. There were no statistical differences in age, gender, race, or resource utilization between cohorts. Patients seen in chairs had an average LOS of 101 minutes compared to the case control cohort of 138 minutes ($p < 0.001$). Patients seen in chairs with complaints of extremity injury, cough, dental pain, otalgia, ocular complaints, and genitourinary complaints had an improvement in LOS compared to their cohorts ($p < 0.05$). Also, during the study period 2,369 patients were seen in the fast track area with an average LOS of 172 minutes. This compares favorably with the year prior which saw 2,022 patients with an average LOS of 178 minutes. Average fast track LOS was decreased despite a 17% increase in total number of patients seen.
**Conclusion**: Treating certain low acuity patients in chairs can decrease patients' LOS and potentially improve throughput of all patients in the urgent care area.

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### Stakeholder Views on Emergency Department Operational Challenges: Causes and Potential Remedies

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**Study/Objective**: To assess Emergency Department (ED) and hospital management views regarding major ED operational challenges, factors causing them and ways of overcoming them.
**Background**: The ED is the main hospital gateway and the initial site for diagnosis and emergency medical care. In recent years, ED overcrowding has worsened in Israel and worldwide. Overcrowding has been shown to adversely affect patient service and care, fostering patient and caregiver dissatisfaction as well as lowering quality of care metrics, such as: time to pain control and time to antibiotic care and even increasing mortality.
**Methods**: Stakeholder views on ED operational challenges can provide insights to the major challenges, their causes and ways of overcoming those challenges. Additionally, differences in perceptions between the stakeholders may themselves present a challenge. Face to face semi-structured interviews were conducted with 51 ED head nurses, ED directors and hospital directors of the 17 busiest EDs in Israel.
**Results**: "Overcrowding" was assessed by interviewees to be the most prevalent and acute operational problem, followed by prolonged waits and lengths of stay. Interviewees considered overcrowding a symptom of other operational difficulties, but also a cause of additional operational and clinical difficulties. While few interviewees attributed operational difficulties to suboptimal process management and decision making, many suggested improving operations management, within the ED and in its hospital interactions as promising interventions. Despite agreement on most topics, a major view difference between ED and hospital managers concerned the importance of interventions to minimize ED boarding.
**Conclusion**: All three interviewee groups mostly agreed with each other and with the recent literature regarding operational challenges and their causes. Disagreement was noted regarding minimizing ED boarding. Most interviewees suggested improving operations management within the ED and in its interfaces with the hospital.

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### The Affordable Care Act and Changes in Emergency Department Usage between Two Michigan Hospitals

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**Study/Objective**: This study's objective is to evaluate how the Affordable Care Act (ACA) has affected Emergency Department (ED) admissions, rates, and total annual visits.
**Background**: The ACA has provided individuals the ability to obtain health insurance. If the ACA has an impact on ED utilization is unknown.
**Methods**: This retrospective observational study occurred at two hospitals in Michigan. One hospital is urban-based in Detroit, Michigan with an ED annual census of 95,000. The other is a suburban hospital in Grosse Pointe, Michigan with an

ED annual census of 10,000. These EDs were evaluated to compare the effects of health care reform on different populations. Admissions data were collected from both hospitals during the period of March 2009 and September 2013. In order to assess influence of the ACA on admission rates, a multivariable binary logistic regression model was computed.
**Results:**

| Time Period | Response | Suburban Hospital | Urban Hospital |
|---|---|---|---|
| Pre-ACA | Admit | 17 (0.16%) | 21,067 (23.61%) |
| | Non-Admit | 10,321 (99.84%) | 68,145 (76.39%) |
| Post-ACA | Admit | 39 (0.12%) | 68,654 (22.41%) |
| | Non-Admit | 32,536 (99.88%) | 237,736 (77.59%) |

**Table 1**. Summary of admission rates by hospital and period.
For patients visiting the suburban hospital, those who visited after the ACA came into effect had a (nonsignificant) 27% (OR: 0.73; 95% CI, 0.42-1.32; P value = .275) reduced likelihood of being admitted as compared to before the ACA came into effect. Finally, there was a (non-significant) 28.4% (OR: 1.28; 95% CI, 0.71-2.23; P value = .391) increase in the odds ratio of admitting post-ACA for the urban hospital as compared to post-ACA for the suburban hospital.

**Conclusion**: There was not a significant change in admissions rates post-ACA implementation for either hospital. Total annual census at both sites decreased the year post-ACA. While there has been a change in ED utilization in the short-term, it may be too early to see the long-term impact of the ACA.

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## Hemin Microglia NLRP3 Protein N-methyl-D-aspartic Acid Receptor 1 Inflammasome

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**Study/Objective**: In this study, we aim to test the hypothesis that NLRP3 signaling pathway takes a vital position in ICH-induced secondary inflammatory damage, and detect the role of N-methyl-D-aspartic acid receptor 1 (NMDAR1) in this progress.
**Background**: Inflammation plays a critical role in secondary brain damage after intracerebral hemorrhage (ICH). However, the mechanisms of inflammatory injury following ICH are still unclear, particularly the involvement of NLRP3 inflammasome, which are crucial to sterile inflammatory responses.
**Methods**: ICH was induced in mice by microinjection of hemin into the striatum. The protein levels of NMDAR1, NMDAR1 phosphorylation, NLRP3 and IL-1b were measured by Western blot. The binding of NMDAR1 to NLRP3 was detected by immunoprecipitation.
**Results**: The expression of NMDAR1, NMDAR1 phosphorylation, NLRP3 and IL-1b were rapidly increased after ICH. Hemin treatment enhanced NMDAR1 expression and NMDAR1 phosphorylation, as well in cultured microglial cells treated by hemin. Hemin up-regulated NLRP3 and IL-1b level, which was reversed by MK801 (NMDAR antagonist) in vitro. Hemin also promoted the binding of NMDAR1 to NLRP3.
**Conclusion**: Our findings suggest that NMDAR1 plays a pivotal role in hemin-induced NLRP3-mediated inflammatory damage through synergistic activation.

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## Improving Efficiencies with Real Time Locating Systems in Emergency Departments

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**Study/Objective**: To demonstrate improved efficiencies in Emergency Department patient flow and performance metrics using Real-Time Locating Systems.
**Background**: Efficiency is key in managing ED overcrowding. Utilizing a Real-Time Locating System (RTLS), our ED effectively manages ever-increasing volumes and acuity of emergency patients, including Mass-Casualty Event (MCE) victims.
**Methods**: RTLS systems are fully automated; they continually monitor locations of patients, staff, and assets, giving instantaneous visual status, measuring key metrics, and reporting key performance indicators. In addition to displaying patients' locations, RTLS measures and displays milestones based on time, location, acuity, and interaction; these are automated via customizable, intuitive software and low maintenance hardware. RTLS allows to identify treatment, space status, and availability, management of waiting room times, wait time to the physician's initial assessment (PIA), and overall length of stay (OLOS). Key assets are easily located when needed. Enhanced RTLS safety features include ability to track staff contacts with Infectious patients, as well as button-press alerts when staff need help urgently. The system displays data in different formats, including overhead floor-plan views displaying treatment space status, patient name, staff locations, and patient assignments. List views give information concerning complaint, acuity, disposition, location, and length of stay. Color flags provide visual warnings when approaching mandated targets for PIA and OLOS. This system is particularly useful in MCE's, where victims can rapidly be tagged and assigned triage levels.
**Results**: Despite the annual volume of ED patient growth of 35% since introduction of RTLS (in addition to other efficiencies), PIA time dropped by 85%. Patient and staff satisfaction improved dramatically. RTLS has been shown to be a useful modality in mass-casualty events.
**Conclusion**: RTLS is a low-cost, highly effective solution to help manage ED overcrowding by increasing efficiency, safety, and satisfaction among ED patients and staff by continuous

real-time monitoring in an often chaotic environment, including MCEs.

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### Emerging Mobile Health (mHealth) in KATH ED: Assessing it's Strengths, Weaknesses, Opportunities and Threats (SWOT Analysis) among Healthcare Workers

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**Study/Objective**: To assess the behavioral attitudes of ward nurses at Komfo Anokye Teaching Hospital (KATH) towards the use of mobile phone app for monitoring bed occupancy to reduce ED overcrowding.
**Background**: Emerging Mobile Health (mHealth) is a component of electronic health which refers to the use of mobile communication technology to promote health by supporting health care practices. Round-the-clock patient transfers to admitting wards using mHealth tools have been found to address the challenge of overcrowding and improve quality care given by physicians to patients in some EDs. KATH ED has these challenges of overcrowding due to long boarding hours of patients. mHealth tools could be useful in addressing them.
**Methods**: We adopted an observational study to critically observe nurses' attitudes towards the use of a mobile phone app to send bed states. Twenty-three mobile phones were dispatched to the various wards that receive patient transfers from KATH ED. Nurses on these wards were trained on how to use the mobile app to send bed state; two hourly, nine times a day.
**Results**: Using Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis model, we found that mHealth enabled a strong teamwork among staff. This tool enabled better communication between the ED and admitting wards, encouraging patient flow in the ED. However, its use was limited by network challenges; there was apathy among ward nurses because they perceived the technology as extra responsibility.
**Conclusion**: The mHealth re-echoes the importance of an institutionalized and functioning Electronic Medical Records (EMR) in KATH, but it will be important to consider a behavioral model that will encourage acceptance and compliance among staff of KATH.

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### Creating a National Capacity for Mass Mechanical Ventilation in Disasters: A Methodology of Capability-building Under Stress

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**Study/Objective**: To describe a structured, reproducible method of a national mass mechanical ventilation capacity building.
**Background**: The threat from disasters due to terrorism, war, and nature producing massive numbers of patients requiring mechanical ventilation requires that governments prepare a surge capacity location for multiple ventilated casualties. A structured methodology for creating such a capability has not been published. We present the approach used in Israel for creating a national mechanical ventilation capacity in a very short period of time.
**Methods**: Sequence of activities:

- Development of relevant scenarios;
- Creation of a multi-disciplinary task force;
- Government guiding document detailing requirements and budget;
- Guiding principles (medical, technical, ethical);
- Concept of operations (system components, manpower, monitoring, command & control);
- Infrastructure (patient units, their distribution, ventilators, monitors, supplies, oxygen);
- Manpower requirements and training;
- Storage and technical support;
- Standard Operating Procedures (SOP) and an ethical framework;
- Request For Proposals (RFP);
- Structured assessment tools for the hardware;
- Structured decision process for choosing the hardware;
- Hardware purchase, storage, and distribution;
- Training of relevant hospital personnel; and
- Ongoing maintenance of hardware and training.

**Results**: Within three months, a comprehensive capability for mass mechanical ventilation was created, including ventilators, monitors, spares, disposables, personnel, SOP, and ethical framework. The system comprises of a mix of low-end and high-end ventilators, monitors, staff, and care locations. It is capable of simultaneously ventilating and monitoring 2,000 patients. It has been maintained and periodically refreshed.
**Conclusion**: It is possible to rapidly create mass mechanical ventilation capacity for disasters via a structured, reproducible methodology. We submit that the methodology we created may help other nations desiring to create such a capacity, and offer this description, as well as access to the relevant documents and gained expertise to anyone interested in so doing.

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### Effect of Multivariate Factors on the Complication of Infection in Lushan Earthquake Victims: A Retrospective Analysis

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**Study/Objective**: In order to reduce the infection rate of victims after an earthquake, resulting in helping doctors make accurate medical decisions, we conducted this study via clarifying the factors associated with the complication of infection in Lushan Earthquake victims.
**Background**: Our previous study indicated that infection played a critical role in predicting the length-of-stay in hospital,

which was crucial for the first-line doctors in evaluating the adequacy of medical resource.
**Methods**: We retrospectively analyzed the information of traumatic patients admitted to West China Hospital during the Lushan earthquake from April 20-27, 2013. Thirteen variables were extracted for the analysis, including gender, age, crush injury, multiple injury, injured time, injured places (in rooms or out), rescued ways (by oneself or others), transferred vehicles (ambulance or others), debridement, white blood cells counts, neutrophilic percentage, hemoglobin, and infection. Univariate analysis was conducted to compare the differences of those indicators mentioned above between the infected and uninfected patients. Moreover, multiple logistic regression analysis was performed to identify the factors associated with the complication of infection.
**Results**: There were 260 victims included in the present study, 90 of whom got infection, with the infection rate at 34.62%. The univariate analysis showed that age and admission to ICU between the infected and uninfected victims are significantly different. The multiple logistic regression analysis indicated that crush injury, hemoglobin, and transferred vehicle had significant correlation with complication of infection, with their odds ratio being 1.482, 0.987, and 0.660, respectively.
**Conclusion**: This study demonstrated that victims with crush injury or (and) low hemoglobin are more prone to complicate with infection during the inpatient period. This provides the evidence for doctors to decide which patients need debridement carefully, and more attendance as early as triage, in order to reduce the complication of infection and improve the efficiency of medical resource allocation after the earthquake.

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## Emergency Health Care Demand

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**Study/Objective**: The five year Emergency Health Services Queensland (EHSQ) study aimed to describe the trends in EHS demand, to identify the factors driving increased demand, and to evaluate strategies which may safely reduce the future demand growth.
**Background**: Emergency health is a critical component of Australia's health system which has been fundamentally reformed over the last four decades. While these changes have improved the standards and quality of care, emergency health services are increasingly congested from the combined impact of growing demand and blocked access to inpatient care. This congestion has proven adverse to clinical, organizational, and staff impacts. However, the public, bureaucratic, and political perspective is that this problem somehow reflects at worst, gaming of the system, and so public policy solutions have been underpinned by blaming someone else for the problem. The feasible alternative proposition is that there are more sick people seeking care and exercising thoughtful and wise choices of the most appropriate source of that care.
**Methods**: This research used a mixed-methods approach comprising of analysis from the Queensland wide operational data, and interviews with 911 patients attending public hospital EDs.
**Results**: Our findings suggest that demand is growing across all developed nations; amongst the more urgent categories of patients, across all age groups, and a broad range of clinical conditions. The ultimate question underpinning this research is "can anything be done to moderate the growing demand while still offering safe, appropriate, and efficient care?"
**Conclusion**: Our analysis of remedial strategies has identified three broad categories:

Enhanced primary and secondary prevention.
Management on location.

Diversion to alternative services including appropriate primary care services. The analysis of policy options has confirmed there is no single, or even small group of, interventions likely to make a difference. One distinct policy alternative is that the current arrangements offer the most efficient and effective means of providing the required care, and so ongoing expansion of those services may be most appropriate. However, the alternative is a comprehensive suite of strategies properly coordinated at both policy and operational levels, to ensure patients have access to a range of services from which they may choose the most appropriate to their needs, after weighing up the social, clinical, and financial implications. Additional research is required to develop and evaluate such an approach including the economic, clinical, professional, and social costs and benefits.

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## Improvement in Success Rate of Intubation, Done by Non-Anesthetist Emergency Physician with the Implementation of Rapid Sequence Intubation (RSI) Protocol in the Emergency Department

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**Study/Objective**: The aim of this retrospective study was to determine whether the current practice of protocolised Rapid Sequence Intubation (RSI) has improved the success rate of intubation done by EP in ED of All India Institute of Medical Sciences (AIIMS) Trauma Center.
**Background**: Rapid Sequence Intubation (RSI) is key for securing airways in Emergency Departments (EDs). Literature on safety and feasibility of RSI by Emergency Physicians (EP) from India is limited.
**Methods**: It is a retrospective cohort study conducted in AIIMS, Level I Trauma Center. Data was collected on various parameters using primary information from the Red Area Patients Registry and Computerized Patient Record System (CPRS) of the period from November, 2007 to July, 2013. "Red area" is the specific area of the emergency department where emergency intubations are performed in cases of severely injured patients.
**Results**: Out of 2,117 intubations EP performed, 89.4% in pre-RSI group vs 97.9 % in post RSI group. Anaesthetists

intubated 10.6 % pre-RSI group vs 2.1 % post-RSI group. The compliance improved to 97.8% in overall intubations. Intubation rates among EP in pre RSI group vs post-RSI group in head injury, spine injury, shock and threatened airway were (90.4% vs 98.3%), (71.4% vs 94.4%), (85.5% vs 97.4 %) and (89.3% vs 98. 2%) respectively.

**Conclusion**: Emergency Physicians of non-anaesthetist training can perform rapid sequence intubation with comparable success rate in trauma patients.

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## Selected Immunological Indicators in the Assessment of, Risk of Severe Complications after Major Trauma

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**Study/Objective**: The aim of this study is to determine the immunological indicators, which depending on the extent of the injury, will have practical significance for the early diagnosis of severe complications after trauma.

**Background**: The pathophysiology of complications in patients with multi-organ injuries is still a subject of intense research.

**Methods**: The study reported in 32 patients admitted to the ER after trauma. Patients were divided into two groups, the group A ISS $\geq 20$ (n = 20) and the group B ISS $< 20$ (n = 12). Laboratory tests and immunoassays were performed at the time of admission to the ER, and then repeated at 3, 6, 12, and 24 hours. The observation included clinical status of each patient, the incidence of complications, the type of treatments and mortality.

**Results**: In group A, 17 patients had complications (5 died), while in group B only 3 patients had complications. The most common complications included respiratory failure and infections. In our study, the highest level of IL-6 and IL-1Ra was recorded in 3 hours of acceptance in patients with late complications compared to the group without complications. Already in the 3 hour study, they could identify a group of people with a high risk of subsequent morbidity and mortality. The Receiver Operating Characteristic (ROC curve) analysis showed that the studied immune indicators can be prognostic markers of complications or death for patients after major trauma. In the groups of patients there was no significant difference for age, gender and basic laboratory diagnostics.

**Conclusion**: Our findings suggest that elevated levels of cytokines tested, a short time after the injury, may have a significant relationship with the occurrence of serious complications later. The diagnosis of early inflammatory response to injury should have an impact on the therapeutic. In addition to basic treatment, a potential target for therapeutic intervention should be taken into consideration; early cytokine response within the first 3 hours of hospitalization.

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## Differences in the Treatment Outcomes of Referred and Non-referred Patients at the Accident and Emergency Department (AED) of Komfo Anokye Teaching Hospital (KATH)

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**Study/Objective**: This study sought to ascertain whether there is a difference in the characteristics and outcomes of patients of these categories - as measured by final triage color, health financing, mode of transportation to the AED, and treatment outcome (discharged home, transferred out to Main wards, or died).

**Background**: The Accident and Emergency Department (AED) of Komfo Anokye Teaching Hospital (KATH) is the main entry point for patients requiring critical care. Patients are either referred from other institutions or come on their own to the facility. The receiving triage room assesses vital signs, triages patients using the Triage Early Warning Score (TEWS), and assigns patients to the appropriate care center - utilizing Yellow ward (urgent management), Orange ward (very urgent management), and Red ward (emergency management). However, the outcomes of these referred and not referred patients are speculated to differ due to the consequences of delay in diagnosis, treatments, etc.

**Methods**: A prospective, cross-sectional study was employed at the Accident and Emergency center at the Komfo Anokye Hospital for six weeks. Data were collected and entered into an Epi information software database, exported, and analyzed using SPSS. Relation between variables was tested using ANOVA and correlation tests.

**Results**: There was no significant difference (0.456) in the treatment outcomes of referred and non-referred patients. Hence, irrespective of how patients came to the hospital for treatment, treatment outcome (discharged home, Trans out to Main wards, or died) will not significantly change. Furthermore, there was no relation between status of patients (referred and non-referred) and by outcome of patients, final triage color, health financing, mode of transportation, type of admission, and drugs ordered.

**Conclusion**: There are no significant differences or relations in the treatment outcomes of referred and non-referred patients reporting to the Accident and Emergency Department (AED) of Komfo Anokye Teaching Hospital (KATH).

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### Improving Attendants Flow and Reducing Emergency Unit Crowding in Emergency Department of Black Lion Specialized Hospital, Addis Ababa Ethiopia

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**Study/Objective**: The objectives of this project were improving attendants flow to reduce emergency unit crowding from the baseline Patient:Attendant ratio 1:6 to 1:1 for patients within a six-month period at Black Lion Hospital's Emergency Unit.
**Background**: Emergency department overcrowding is a circumstance in which demand for service surpasses the capability to provide care within a reasonable time, causing physicians and nurses to be unable to provide quality care. The Organized Emergency Unit establishment at Black Lion Hospital commenced with celebration, Ethiopian Millennium in August 2009 GC. The Emergency Unit of Black Lion Hospital serves more than 20,000 patients per year. It was distinguished and emergency department crowding is one of the leading problems facing emergency physicians, nurses, and their patients. Multiple factors identified a cause for emergency unit crowding.
**Methods**: Before the implementation of the project, the root cause of the emergency unit was overcrowding (patient process hold up); the input and output was analyzed using Ishikawa Cause and Effect Diagram in order to identify the factors that affected the emergency unit crowding.
**Results**: Since 2014, there have been significant improvements regarding the attendant/patient flow in the emergency unit following interventions that were implemented. Some of the interventions identified included: proper indoor waiting areas which have adequate space and audio visual aids; patient identification cards; a separate entry/exit point for patients, attendants, and health professionals, as well as a scheduled patient visiting time; an information desk at the front gate; and encouraging ownership and collaborative activities in the emergency unit flow by all members of staffs and other stakeholders. Separate diagnostic, pharmacy, and cashier areas from patient examination and triage areas are all interventions that were implemented.
**Conclusion**: The way forward is to work towards 100% compliance, with 1:1 Patient:Attendant ratio at 100 %, through the strengthened implementation of all the strategies identified.

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### Alleviating Emergency Room Patient Overload during a Disaster (AERPOD)

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**Study/Objective**: The prehospital EMS system is uniquely positioned to care for 911 patients, and to assist less emergent patients with transport to the most appropriate care setting based on medical and social needs. Such an approach may reduce the total cost of care, provide more patient-centered care and may reduce the burden on Emergency Departments (EDs).
**Background**: Emergency departments provide a significant source of medical care in the United States, with over 131 million total emergency department visits in 2011. Many patients who are treated in the emergency room could have been treated at primary, or urgent care centers. Often patients seek care in the emergency department for non-emergent complaints, knowing that using the emergency department for nonemergency purposes puts a strain on the health care system,
**Methods**: The Health and Human Services (HHS) and the Department of Transportation (DOT) jointly collaborated to develop a draft white paper that presents one example of an analysis and models of preventable EMS transports, particularly during disasters. Under the supervision of the Health and Medical Team of the NYC Emergency Management (NYCEM), the researcher will work to accomplish the following:

- Research current/updated white paper models, regarding altered EMS delivery models integrating ambulatory/urgent care facilities.
- Develop a preliminary outline of proposed implementation of ambulatory/urgent care site surge in the NYC EMS system.

**Results**: Research is ongoing.
**Conclusion**: There is significant potential for innovation in healthcare systems that may transform the delivery of emergency medical services, reduce the total cost of care, and increase health for a population. Innovations may also change the model of acute care, to one that is more patient-centered, as many of those experiencing an acute event can be evaluated in their home (or current location), and triaged to an appropriate care setting that is compatible with their level of severity. Encouraging clinic-based health care providers to accept more unscheduled visits will ensure greater continuity of care for patients.

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### Is Emergency Medical Services (EMS) in Islamic Republic of Iran Practical and Efficient in Facing Ebola?

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**Study/Objective**: Modern biotechnology provided humans with the opportunity to use microorganisms in a better, faster, and more meticulous way. One of the genetic-modified viruses that threaten the world's security is Ebola hemorrhagic fever. The training of Emergency Medical Services personnel to provide care for disaster victims is a priority for the physician community, the federal government, and society as a whole. There are a few conducted studies about the preparation level of these centers in counter biological threats, especially an

emerging infection like Ebola in Iran. So we decided to design and conduct a study with the aim of evaluating the preparation level of EMS, Iran's counter to Ebola hemorrhagic fever.

**Background**: The public health personnel in different countries need to be ready in case they find themselves facing a biological threat. Being prepared to face these threats is extremely important, and the Emergency Medical Services (EMS) are the first organizations that act and interfere with these threats.

**Methods**: The present study is cross-sectional and somewhat descriptive. We used a standard questionnaire that was designed by the Center for Disease Control and Prevention. This questionnaire was captioned "Emergency Medical Services (EMS) Checklist for Ebola Preparedness." We collected a lot of data by studying that questionnaire, and every manager in every province of Iran were informed about this information in 2016. These data were analyzed by using SSPP software, version 16.

**Results**: Findings have showed that the average score related to the preparation level of EMS in facing Ebola in Iran was 63/73 (SD = 12/77) percent.

**Conclusion**: The acquired average score in this study is higher than standards, considering the increased threat of the breakout of biologic threats, especially Ebola infection. Using and practicing these measures in order to enhance the preparation level of Emergency Medical Services counter infection and similar infectious diseases is inevitable.

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## Harmony in Emergency Departments

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**Study/Objective**: Emergency Departments (ED) are becoming more crowded with less arrangements. Without harmony, it can cause lot of problems in EDs throughout the world, in developing and undeveloped countries, for a multitude reasons, including an increase in patient volume, lack of equipment, specialists and so on.

**Background**: Crowding and overcrowding in EDs has been an important topic in the hospital systems for many years. Every country makes special rules and policies for emergency care delivery, and every hospital has one. EDs are the first place where Patinas go if they have serious conditions, without making appointments, thinking they have easier access.

**Methods**: Study of some emergency departments in some countries for a few years. Joining emergency management experts in clinical, administrative, education, and policy planning. Critical Pathway Guidelines. Process mapping. Checklist.

**Results**: Because of this experience, there is no harmony in the EDs that I have visited, many of them closely. I see departments full of patients and staff, narrow hallways were full of extra beds and equipment, next to the patient's bed were one or two people (relatives, friends, sometime with children) what's going on in there? Some patients have a serious situation and need special care. Some of the clients don't need special care, but they are in the emergency room with their family, waiting. Sometimes the emergency room looks like a clinic, people come over looking for simple medical treatment.

**Conclusion**: Leadership is an essential component of management in Emergency Department and critical situations. Have strong knowledge about structure, policies, networking, capacity, and priorities. Have a general policy for local county EDs. Have knowledge of emergency hospital networking. Have a smart Emergency Department. Several measures have been developed to better quantify and make safety a priority, to having a Harmonious Emergency Department. Those are presented in the main article.

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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## Point of Care Ultrasound at Emergency Department (ED) Shaping our Emergency Care to a Great Effect: Experience from Tikur Anbessa Specialized Tertiary Care Hospital

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**Study/Objective**: To assess and review Point of Care Ultrasound (POCUS) done at tertiary care hospital ED for 6 months
**Background**: POCUS is an ultrasound that is performed and interpreted by a provider at the patient's bedside, in real time in many medical specialties. Point-of-care ultrasound has been a part of the specialty of emergency medicine for two decades, and is referred to within the specialty as Emergency Ultrasound (EUS). Emergency physicians are confronted with critically ill patients with undifferentiated complaints, and must make time sensitive diagnostic decisions or perform therapeutic interventions based on limited available information.
**Methods**: A review of logbooks and charts were done for 6 months, and traced in comparison to radiology examinations when available.
**Results**:

| POCUS type | Percentage |
|---|---|
| FAST and E-FAST | 41% |
| IVC Scan | 30% |
| DVT scan | 10% |
| Cardiac/Echo | 9% |
| Pneumonia | 5% |
| Therapeutic tap | 3% |
| Others | 2% |

**Table 1**. A Six-Month Review of Emergency Ultrasound Procedures at Emergency Department.

No major reading discrepancy when available readings
**Conclusion**: Point of care ultrasound when performed at EDs for critical patients is time saving and helps for quick intervention.

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## The State of Emergency Radiology Service among Public Hospitals in Tanzania

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**Study/Objective**: We aimed to analyze resources available for emergency care in public hospitals, which includes acute care services in the Emergency department and Supportive service (Pharmacy, Laboratory and Radiology). This abstract will focus on availability of radiological services for emergency care.
**Background**: During a disaster or a non-disaster state, Emergency Departments function at their best when there are readily available supportive services from Radiology, Laboratory and Pharmacy.
**Methods**: The study was a prospective, cross-sectional design covering 98% of both regional and district hospitals. We directly inspected facilities and equipment, and use structured checklist to collect the data. The investigator also interviewed both the head of radiology, and the staff working in the radiology departments to check the accuracy of the information collected.
**Results**: Among all hospitals surveyed, an X-ray and Ultrasound service was absent in 39% and 38% respectively, and none of the hospitals had a CT scanner. Among those not having X-ray service, 27% have the machine but it's not working. A similar trend is seen for ultrasound services as 29% of the hospitals state their machine defaulted. When we asked the reason, the majority (75%) stated waiting for repair. Regional hospitals are referral points for District and Health center facilities, and hence expected to have better services. In a sub-analysis of Regional hospitals we found increased crisis as the X-ray and Ultrasound services were missing in 35% and 44% respectively. Among these 30% of X-rays and 35% of Ultrasound machines were available but not working.
**Conclusion**: There is deficit in radiological services across hospitals in Tanzania, with long waiting repair time significantly contributes to the burden observed. In turn, this might compromise the management of acutely ill patients and hence their outcome.

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## Radiology and Emerging Asymmetric Threats in Urban Settings

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**Study/Objective**: To explain the role of radiologists in unconventional CBRNE threats, highlighting the most critical, vital, and paramount role of military diagnostic imagers, being at the forefront of today's asymmetric warfare.
**Background**: Today, nation-states are engaged in 4th, 5th, and 6th generation warfare with non-state actors. The conventional and emerging CBRNE threats in this unconventional warfare pose significant challenges to both military and civilian medical planners and operators. This form of non-linear and unrestricted requires seamless and flawless communication, collaboration, and cooperation between the civil and military authorities of any nation state.
**Methods**: Introduction of First Generation linear Warfare (massed manpower). World War 1, 2nd Generation Warfare (massed firepower), and evolution of combat radiology. World War II, 3rd Generation Warfare, (armored-maneuver). Iraq and Afghanistan, 4th Generation Warfare, and imaging spectrum of trauma in non-linear battlefield. Radiologists as defenders in radiological, nuclear, and blast related threats in asymmetric 4th Generation warfare. Introduction of 5th Generation (unrestricted) Warfare, Inhalational Anthrax, and Radiology. Introduction of 6th Generation (distant no-contact systems versus systems warfare, cyber warfare, manipulation of sea-air-land-space and time), and 7th Generation (environmental) warfare.
**Results**: The civil and military medical responders previously trained in handling the casualties of 3rd Generation warfare have to start thinking out of the box, and steadfastly, and expeditiously adapt themselves to the asymmetric and unconventional CBRNE challenges of the modern day non-linear battlefield. The role of the diagnostic radiologist is more vital today than ever before.
**Conclusion**: The importance of the radiology community in preparation of emerging unconventional threats cannot be overstated. Whether it's a stolen industrial unshielded radiation source, hidden in a mall, a homemade IED, or detonation of a 1-10 Kiloton improvised nuclear device, radiology has to be, and will be, at the forefront of prevention, mitigation, preparation, response, and consequence management of such a catastrophe.

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## Evaluation of Health Care Professionals Knowledge - Care of Patients with Radiological Exposure

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**Study/Objective**: Cross-sectional, multi-center study. To evaluate the knowledge of different groups of health care professionals concerning the priority of treatment and decontamination of critically ill patients exposed to cesium-137.
**Background**: Radiation injuries have been an infrequent occurrence; however, as careful as we may be, with the expanding use of radioactive materials in medicine, science, and industry have significantly increased the potential that under emergency conditions the medical professional may be presented with a patient who has been contaminated or exposed to radiation. Caesium-137 has been involved in several radiological accidents; the best-known case is the Goiania accident in 1987.
**Methods**: Cross-sectional, multi-center study. Research was carried out through a questionnaire with a fictional scenario about what to do if a patient contaminated arrived in shock at an emergency department. This questionnaire was administered to physicians, residents, medical students, nurses, nursing assistants, and technicians at three teaching hospitals; Clinicas's Hospital-Porto Alegre/Brazil, Kings County Hospital/SUNY Downstate Medical Center, Brooklyn, New York, and Northwestern Memorial Hospital, Chicago, Illinois. The results were analyzed. The diference was considered significant, $P < .05$.
**Results**: All 170 health care professionals responded to the question posed for the fictional scenario, and 29.41% of all responses was for "treatment." The responses in each group, for all three hospitals was: Emergency Physicians 46.42%, Pediatricians 38.46%, Medical Residents 20.93%, nurses 18.51%, technicians 27%, nursing assistants 58%, and medical students 33.33%. There was a significant difference between the total numbers of correct answers (ie, "treatment") of health professionals from hospitals groups.
**Conclusion**: Many health care professionals from three Hospitals did not respond correctly when posed with a question concerning patients with radiation exposure. Knowledge of radiation safety for patients and health care workers is limited, regardless of medical specialty. These findings emphasize the need for educational initiatives.

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## Compare the Setup Time and Safety of Intraoperative (O ARM) with Traditional Intraoperative Fluoroscopy (C ARM), and Nursing Implications in Neurosurgery Over a 12 Month Period

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**Study/Objective**: To compare the setup time and safety of Iintraoperative (O ARM) with traditional Intraoperative Fluoroscopy (C ARM) and nursing implications in Neurosurgery over a 12-month period.
**Background**: Radiation exposure remains a concern with traditional methods of Intraoperative (OARM) imaging's in spinal surgery. The use of OARM has been proposed for more accurate and efficient in spinal instrumentation. However, there are concerns with setup time and other nursing concerns.
**Methods**: Study Design: Comparative Study. Setting: Neurosurgery Operation Theater. Period of: January 1, 2015 to December 31, 2015 (12-month study). Data collected from Nurses Records: for the period January 1, 2015 to December 31, 2015.

The time duration for each case was collected separately from OARM and CARM cases.
**Results**: A total of operated cases under both C ARM and O ARM were 327 (Cervical-211, Dorsal-61, Lumbar-55). Mean time O-ARM required was x hours (range 2 hours 45 minutes to 12 hours). Mean time required for C-ARM was x hours (range 1 hour 10 minutes to 9 hours).
**Conclusion**: From the comparative study, both techniques resulted in accurate screw placement; images acquisition with the O ARM was consistently faster than with the C ARM. Additionally, radiation exposure to health care professionals (including nurses) was less with the O ARM.
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### Diagnostic Imaging in Disasters: A Bibliometric Analysis

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**Study/Objective**: This study aims at analyzing recent articles depicting the roles of diagnostic imaging in disaster management.
**Background**: Disasters, natural or human-made, can cause significant mobility and mortality, leading to substantial economic and human loss. It is thus important to analyze how imaging has been utilized in disaster management and the lessons learned in order to develop future disaster management plans.
**Methods**: MEDLINE search was conducted via OVID to identify various natural and human-made disasters, and was restricted to articles published since 2000. Only original research articles depicting the roles of diagnostic imaging in the clinical diagnosis and management of patients in response to disasters were included. Review articles, meta-analysis, and studies without human subjects were excluded.
**Results**: A total of 67 articles were included in our analysis. The most studied disaster types were armed conflict (31 articles), earthquake (16 articles) and terrorist incident (10 articles). The most studied disasters were the Sichuan earthquake (China) in 2008 (13 articles), the War in Afghanistan, 2001-2014 (11 articles), and the Iraq War, 2003-2011 (7 articles). Countries producing the most articles were the United States of America (20 articles), People's Republic of China (16 articles), and the United Kingdom (6 articles). Thirty-three first authors were affiliated with the Radiology department (49.3%), and 2 affiliated with Nuclear Medicine (3.0%). Articles were published in 50 journals, including 19 Radiology journals and 1 Nuclear Medicine journal. Fifty-seven studies were retrospective (85.1%), and 10 studies were prospective (14.9%). Computed tomography (CT) was the most utilized modality (51.0%), followed by conventional radiography (25.5%) and ultrasound (16.7%). A list of the 20 most cited articles was also compiled.
**Conclusion**: Our results offer important insight into the roles of diagnostic imaging in disaster management and could help guide future research in development of disaster management plans.
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### Comparison between Two-Point and Three-Point Compression Ultrasound for the Diagnosis of Deep Vein Thrombosis

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**Study/Objective**: To examine the sensitivity and specificity of Two-Point Compression (2PLCT) versus Three Point Compression (3PLCT) ultrasound test, for the diagnosis of lower limb Deep Vein Thrombosis (DVT). Both tests would then be compared to Duplex ultrasound - the gold standard test.
**Background**: DVT is a major cause of morbidity and mortality, and a frequent cause of admission in emergency departments (EDs). Although the ultimate gold standard for diagnosis is Focused Duplex Compression test (FCDU) conducted by a radiologist; the current test for diagnosis of DVT in the emergency department (ED) is a compression ultrasound. To date no comparison has been made between the two and three compression point ultrasound and FDCU.
**Methods**: A prospective diagnostic study of patients coming to the ED suspected of having DVT. The ED physician performed the two and three compression tests, and then the patient was sent to radiology for a comprehensive FDCU. Sensitivity, specificity, Positive Likelihood Ratio (+LR), Negative Likelihood Ratio (-LR), Positive Predictive Value (PPV), Negative Predictive Value (NPV) were calculated.
**Results**: There were 200 patients admitted to the ED with DVT suspicion enrolled. Diagnosis of DVT was made by FDCU in 46/200 (23%) patients. Common femoral vein and popliteal vein were the most common sites (25/80 (31.2%). The 2plct diagnosed 43/46 patients with DVT and was falsely positive in 2/152. The 3plct diagnosed 45/46 patients with DVT and was falsely positive in 3/151. The sensitivity and specificity of 2PCL was 93.48%, 98.7%, respectively. The sensitivity and specificity of 3PCL were 97.83%, 98.05%, respectively.
**Conclusion**: The 3PLCT is superior to 2PLCT for diagnosis of lower limb DVT and both highly correlate to the results of the FDCU exam.
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### Rad-Aid UTHealth Houston Chapter, in Morocco, 2017 Project

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**Study/Objective**: Presentation of Rad-Aid UTHealth Houston Chapter, in Morocco, 2017 Project

**Background**: Morocco is classified by the World Health Organization (WHO) as a low-middle income country. With more than 34 million people, 40% living in rural under-served communities, access to emergency care can be challenging. Lack of education, limited implementation of safety measures, poor infrastructures protecting from natural disasters, and limited access to healthcare; with complications of chronic diseases, requiring emergency diagnostics and care.

**Methods**: The study will follow the criteria of the WHO guidelines for radiology in emergency care in Morocco. Health is one of the 6 priorities of the 2017-2021 United Nations Development Assistance Framework (UNDAF). The following are the pertinent strategic priorities, with the main focus of WHO's cooperation: #1: Enhancing access for all, to quality services at affordable cost to achieve universal health coverage, by supporting the development and implementation of a quality and safety care strategy. #3: Supporting strengthening essential functions of public health by developing capacities required by the International Health Regulations, to cope with public health emergencies and ensure patient safety. #4: Supporting advanced regionalization dynamics and strengthening governance of the health sector, by supporting the implementation of health system regionalization, including through capacity building

**Results**: Quality of care includes accurate diagnostics involving Radiology. Implementing basic radiology services would align with the strategic priority #1. Assisting local stakeholders in developing technical and educational capacities in Radiology Departments would fulfill strategy #3. Responsible equipment donations would help capability building as recommended by strategy #4.

**Conclusion**: Radiology is an integral part of standard care. Basic imaging equipment and education should be part of emergency care in developing countries. We hope to achieve a reasonable contribution through our chapter. A report of the results will be published subsequently, with discussion of positive outcomes and in-depth analysis of the program weaknesses.

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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## From the Front Lines: Trialing Research Ethics in the Time of Ebola

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**Study/Objective**: Focused on first-person accounts of clinical trials conducted during the West Africa Ebola outbreak, this study unpacks challenges and strategies for the ethical conduct of research during public health emergencies, adding evidence to existing recommendations for the ethical conduct of research in public health emergencies.
**Background**: Research conducted during the 2014-15, West Africa Ebola outbreak presented a number of documented, ethical and practical challenges. Alongside the recruitment and consenting of participants amongst patients subject to isolation and quarantine, research involved the testing of unproven agents with no known alternative. Research occurred in the context of widespread fear, distrust of hospitals, foreigners, vaccines, and/or local authorities. It involved a little, understood Level 4 Pathogen. The Ebola research context presented the coexistence of all these challenges in one research context, and the possibility – due to the number and variety of studies carried out in three countries – to compare experiences and innovations to the challenges of upholding ethical standards during an emergency of this scale.
**Methods**: Data was gathered through Skype and in-person semi-structured interviews (N = 110) with stakeholders directly involved in research at trial sites in Guinea, Sierra Leone, and Liberia (as survivors, proxy decision-makers local and international research ethics board members members, research and Ebola Treatment/Management Center staff).
**Results**: Different trials and trial contexts presented some similar, but also unique ethical challenges. Examined in depth are two case studies: one showing gaps in guidelines and resources available to support the ethical conduct of research, the other illustrating the importance of creative, context-tailored responses to exceptionally challenging clinical research settings.
**Conclusion**: This study builds on a growing body of knowledge directly engaging ethical and practical experiences and challenges, of conducting ethical research during public health emergencies.

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## Ethical Dilemmas during a Refugee Crises

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**Study/Objective**: Describe why humanitarian actors should prioritize the welfare of the community, and decline transfers of critical patients in a refugee camp through a case study.
**Background**: While providing care in a Syrian refugee camp in Greece, referrals were frequently received for transfer of critical patients to our camp given superior infrastructure. One such referral was of a 5 year-old child in end-stage heart failure.
**Methods**: Evaluation of current ethics literature to justify decline of transfer of this patient.
**Results**: The Sort, Assess, Lifesaving Interventions, Treatment/Transport (SALT) system, in disaster settings, is the most ethically accepted rapid assessment triage system. Its ethical foundation is no different during a prolonged humanitarian crisis. Under utilitarianism, critical patients should not be allowed to be transferred given the constraints placed on resources, because they should be used to maximize life years and Quality-Adjusted Life Years (QALYs) saved. One cannot justify the consumption of resources to save a single life for a short period of time, when they could be used to care for many for a prolonged period of time. Egalitarians would support the care of patients that are worse off, yet, the principles of prioritarianism places weight on the ability to provide the greatest benefit. One would argue that such patients should not receive priority of care. Although having the fewest lifetime QALYs, one is unable to provide the greatest benefit. Finally, we are ethically responsible to practice international medicine within the standard of care. Critically-ill patients require advanced specialty care, which would require advanced tools not available.
**Conclusion**: The ethical arguments as to why it is our responsibility, as humanitarian actors, to prioritize the welfare of the entire community in these complicated situations has been outlined. During a humanitarian crisis, our responsibility is to provide the best care possible. This task is frequently difficult and comprised of a magnitude of ethical dilemmas.

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## Moral Entanglement and the Ethics of Closing Humanitarian Medical Aid Projects

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**Study/Objective**: We aim to clarify the obligations that humanitarian medical organizations hold towards recipients of aid when a decision is made to end a humanitarian project.
**Background**: Humanitarian organizations and their staff regularly make and implement decisions to close projects.

Such decisions are frequently challenging to make, and may be contested within an organization. They also have enormous ramifications for the communities who are receiving assistance.
**Methods**: Drawing on field cases of project closure, and an examination of the literature around this topic, we conducted a normative and conceptual analysis of humanitarian organizations' obligations.
**Results**: Humanitarian projects have intrinsic, as well as instrumental value, and thus create moral entanglements between humanitarian actors and local communities that require careful consideration due to the responsibilities that ensue. Basing our proposal on an analysis of the nature of relationships between providers and recipients of humanitarian aid, we argue that ethical exit strategies should reflect five commitments. In closing projects, humanitarian organizations should demonstrate respect for recipients of care, and seek to minimize harm and disruption by acting in ways that are characterized by: (1) transparency, (2) predictability, (3) adaptability, (4) participation, and (5) evaluation. In addition, humanitarian organizations have responsibilities toward their staff who will implement the closure of a project. These responsibilities include ensuring that relevant policies and resources are in place, and that training and support are provided to those who require it.
**Conclusion**: Closing projects is an inescapable aspect of humanitarian action – indeed, almost all humanitarian projects will come to an end. Making and enacting such decisions is ethically fraught, and may be a source of distress for humanitarian workers and local communities. Careful attention to ethical exit strategies that follow through on obligations toward local communities is therefore a vital component of ethical humanitarian action.

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## Ethical Challenges of Providing End of Life Care in an Ebola Treatment Unit (2014-2015)

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**Study/Objective**: To identify and explore the ethical challenges faced by UK Defence Medical Services personnel working in an Ebola Treatment Unit (ETU) established in Sierra Leone.
**Background**: British military were deployed as part of the UK Government's response to the Ebola outbreak in West Africa (Op GRITROCK). This included establishing a small, well-resourced ETU for Ebola-infected international responders and local healthcare workers. The End of Life Care (EoLC) provision in humanitarian disaster response is discussed very little in bioethics.
**Methods**: Twenty personnel who deployed between October 2014 and April 2015 were interviewed about the ethical challenges they faced. Participants included doctors (7), nurses (6) and other healthcare related (7). A largely conventional approach to content analysis was taken using the data to draw conclusions about themes in the participants' thinking. Data was organized using NVivo. Only the EoLC theme is reported here.
**Results**: EoLC caused particular ethical difficulties, even though most participants were accustomed to dealing with the dying and dead. Specific issues included: uncertainty about the course of the disease in individuals, which resulted in, amongst other things, a 'hybrid' approach to palliation; the trade-off between infection control and providing 'normal' end of life care and comfort; moving dying patients long distances to receive palliative care; preparation of the dead for burial. The duty to care for patients ('normal' professional obligations) was constrained by public health measures (containment) and the need to protect staff from infection (obligations to employees/self/colleagues). End of life care, where human contact seems especially important, was particularly impacted.
**Conclusion**: Meaningful end of life care is difficult to provide during a mass outbreak of a highly infectious and serious disease. The difficulties of providing meaningful care need to be taken into account when deciding how to prioritize and deliver EoLC in a disaster response.

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## Ethical Challenges at the Intersection of Policy and Practice in Humanitarian Contexts

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**Study/Objective**: To explore how policies and ethics inform each other, in order to better understand where problems arise in humanitarian healthcare organizations, and how policy can be improved in this regard.
**Background**: Researchers have just begun to understand the range of ways in which humanitarian healthcare organizations' policies can shape ethical dilemmas in the field. This study lays out some of the ethical tensions that affect the profession by identifying ethical challenges that arise from aid agency policies and practices, or that trigger the need for improved policy development.
**Methods**: We interviewed 14 Organizational Members (OMs) from Canadian and international offices of humanitarian healthcare organizations to explore the questions and objectives guiding our study. In order to understand how problems and ethical issues are identified in humanitarian aid organizations, and their relationship to policies and practices in this regard, we used interpretive description (ID) methodology. We prioritize understanding to go beyond description and more deeply into the interpretive aspect of ID, in order to unpack problems and ethical issues in humanitarian aid.
**Results**: Three key themes were identified: participant perceptions of tensions related to 1) institutional memory loss; 2) priorities within different departments of humanitarian healthcare organizations; and, 3) social norms and expectations of humanitarian healthcare organizations and local communities.

**Conclusion**: It is important for humanitarians to identify and discuss ethical challenges and problems, to ensure responses to emergencies are not disconnected or lead to negative impacts. While this paper cannot show saturation of the types of ethical challenges facing humanitarian healthcare organizations, it is a move to bring stories forward and formalize and capture histories so we can learn from them.

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## Aid - When There is "Nothing Left to Offer": A Survey and Qualitative Study of Ethics and Palliative Care During International Humanitarian Emergencies

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**Study/Objective**: How can humanitarian organizations support ethically and contextually appropriate palliative care in humanitarian crises? This ELRHA (R2HC) funded study explores the ethical complexities of doing so, asking how existing standards of palliative care may be adapted to support delivery of ethically and contextually appropriate palliative care in humanitarian action.
**Background**: There is a lack of evidence clarifying ethical and practical possibilities and consequences of humanitarian organizations, addressing or failing to address patients' palliative needs. This study seeks to inform realistic, context-sensitive guidance, education, and practice for the provision of palliative care during humanitarian emergencies. Beginning with a survey of international aid organizations, we aim to identify a baseline of current palliative care provisions for clinical and psychosocial care in humanitarian action.
**Methods**: Concurrent exploratory mixed-methods involving 1) survey to investigate to what extent humanitarian organizations enable staff to provide palliative care, 2) interviews with stakeholders (local/expatriate humanitarian staff, local care providers, community members) to better understand lived experiences of palliative care needs in humanitarian emergencies.
**Results**: Survey results and preliminary analysis of interviews will be shared. Responses cover: preparedness to deliver palliative care in humanitarian emergencies (disasters, conflict areas, epidemics); resources currently available to support the delivery of palliative care in humanitarian contexts, and ideas/concerns related to integration of palliative care into humanitarian healthcare.
**Conclusion**: Palliative care is an area of growing global concern. It is increasingly recognized as necessary, yet simultaneously seen as outside the realm of possibility, particularly in humanitarian settings, where care in life threatening conditions may be logistically and ethically challenging. The 67th World Health Assembly resolved on "strengthening palliative care as a component of comprehensive care throughout the life course." Our study helps illuminate ethical and practical concerns for applying palliative care in humanitarian crisis.

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## Developing the Disaster Medical Assistant Team Education and Training Program (DMAT)

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**Study/Objective**: The study objective is to create the contents and program in disaster medical training system.
**Background**: Disaster medical education and training were not mandatory in Korea, but several kinds of programs existed. The disaster medical education and training has been mandatory in Korea since 2014. The newly developed official disaster medical education and training system, which should be applied from 2015, was necessary.
**Methods**: We reviewed the disaster medical education and training program in advanced countries including the US, EU and Japan, and compared them with the existing programs in Korea. After analysis and comparison, a new contents and program for Korean situations was developed, and they were applied to the pilot program repeatedly for confirmation of adequate educational effect.
**Results**: First, the official national disaster medical manual was developed, and the contents and programs were developed after that. The program includes the following;

- disaster medical system
- Disaster Medical Assistance Team (DMAT) operation
- logistics
- sample activities of DMAT
- radiologic disaster
- chemical disaster
- disaster mental health support
- communication system in disaster
- in hospital disaster
- equipment preparedness for EMAT
- table top simulation
- comprehensive disaster drill The pilot program operated appropriately.

**Conclusion**: For medical response in a disaster, the standard minimal requirement for disaster medical education and training should be developed, and disaster medical personnel should participate in this program.

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## Vulnerable Populations: Investigating Ethical Implications for Policies and Practices of International Humanitarian Organizations

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**Study/Objective**: To explore how the notion of "vulnerable populations" is understood and used in the policies and practices of international humanitarian organizations, and to consider its ethical implications for crisis-affected populations and humanitarian actors.
**Background**: Humanitarian organizations have responded to evidence that particular groups may be differentially affected in crises by adapting their policies and practices to better promote equity. Women and disabled people are two "vulnerable populations" who have been the focus of recent efforts. We wish to examine how the concept of "vulnerability" is understood and operationalized in humanitarian health assistance, and its ethical implications. To what extent does the concept of vulnerability promote equity (eg, through improved access to services), and to what extent does it generate other kinds of ethical concerns for recipients and humanitarian actors?
**Methods**: We propose to: (1) interview humanitarian health workers and policy makers about their expectations and experiences concerning assisting vulnerable populations, and (2) to review relevant humanitarian guidance documents and policies. We also (3) propose to interview aid recipients, especially women and the disabled. We will use the theoretical lens of "epistemologies of marginalization" to examine how humanitarians understand and operationalize vulnerability, and consider possible implications for humanitarian actors and aid recipients. Might constructions of vulnerability threaten the moral agency of recipients and perpetuate notions of otherness? Might they obscure background conditions of justice? Might they forestall other models of relations between humanitarian actors and crisis-affected populations? How do responses to one category of vulnerability shape responses to others (eg, how do responses to gender shape responses to disability)?
**Results**: Pending.
**Conclusion**: Our study will inform humanitarian policy and practice to better support all people in need of assistance. It will contribute to the evidence base on the efficacy and ethics of interventions targeting "vulnerable populations" and inform future policy and practice for humanitarian actors.

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## Human Right to Healthcare: Equitable, Evidence-Informed Policy on Refugee Healthcare in Canada

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**Study/Objective**: This study aims to examine how the Interim Federal Health Program changes impacted the health and availability of care for refugee populations, particularly by assessing how the rates of ER admissions and/or adverse events are associated with reduced health care service access, before and after policy reform implementation.
**Background**: In 2012, the federal government limited access to essential healthcare services through retrenchments to the Interim Federal Health Program (IFHP), a policy of healthcare coverage for refugees. In response to the federal court's decision, some services were restored in 2014 for select categories of refugee populations through a more complex system of health coverage. However, health care coverage gaps continued to exist for refugees and refugee claimants under the new program, resulting in the formulation of provincial government-led programs and clinics for newcomers, aimed to bridge the gap for refugees to access healthcare. As of April 2016, the newly elected federal government of Canada has reinstated comprehensive coverage provided through the IFHP, restoring fairness and equity to refugee healthcare. However, there is no evidence regarding the efficacy of the 2016 reforms, and the impact the 2014 reforms have had on the health and availability of care for refugees.
**Methods**: A quantitative analysis will retrospectively analyze the 2012 and 2014 reform periods, examining Emergency Room admission rates and adverse outcomes, such as in-patient stays, for refugee populations before and after reform implementation.
**Results**: The findings expect to reveal the relationship between policy reformation, specifically the retrenchment of health services and ER visits.
**Conclusion**: With the global refugee crisis on the rise, and the nation's active efforts to receive thousands of refugees, examining the IFHP reforms will reveal lessons learned on which to build to provide equitable access to a vulnerable population of future Canadians.

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## ETHICS in Disaster Response: The Development of an Ethics Disaster Response Program.

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**Study/Objective**: Report on the development of an Ethics curriculum for disaster responders.
**Background**: In addition to treating the acute injuries of survivors in the aftermath of a disaster, health care workers must confront significant ethical issues that are unique to the disaster setting. This can lead to moral distress and uncertainty about appropriate responses. Massachusetts General Hospital (MGH) has delivered first responders to disasters since the 1917 maritime harbor explosion in Halifax, Nova Scotia. The department of Global Disaster Response at MGH (MGH GDR) was formed in 2011 after the Haitian earthquake to centralize training and certification of MGH providers as disaster responders. This report summarizes our establishment

of an ethics forum to address our experiences, lessons learned, and ongoing ethical challenges to health care providers working in a disaster setting.

**Methods**: The first day-long ethics forum for disaster responders was held at MGH in May 2016. The forum was advertised through the internal MGH electronic newsletter, email lists, and physical posters. Seventy-five people registered and 68 participants attended. Participants included nurses, doctors, lawyers, and hospital administrators.

**Results**: Topics discussed included ethical frameworks, standards of care, disaster tourism, professionalization of response, moral courage, and medical malpractice and liability in disaster response. Table 1 summarizes the disasters discussed and the ethical issues that were confronted.

**Conclusion**: As disaster response teams become more professional, one important aspect of pre-response training and after-action debriefing will be to confront and analyze ethical issues in the field. MGH and GDR are developing a curriculum in disaster response ethics as part of required training for disaster deployment.

| | Disaster | Ethical Issues |
|---|---|---|
| Domestic | | |
| | Katrina Hurricane | Lawlessness, security, triage |
| | Super Storm Sandy | Evacuation of hospitals |
| | Boston Marathon Bombing | Moral distress, treating the bomber |
| International | | |
| | Haitian Earthquake | Scarce resources, medical triage |
| | Nepal Earthquake | The dying patient |
| | Ebola in eastern Africa | Racism, experimental drugs during epidemics |

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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## Adaptation of START Triage Training Program for Hospital Personnel in West Africa

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**Study/Objective**: As part of a multi-year hospital resilience-building program at the John F. Kennedy Medical Center (JFKMC) in Monrovia, Liberia, the purpose of this program was to introduce the Simple Triage and Rapid Treatment (START) mass-casualty protocol to clinical employees and health professions students, in order to increase individual provider readiness to respond to disaster events.

**Background**: Individual provider resilience and clinical readiness is a key component of overall hospital resilience during a disaster or crisis event. The primary objective of this component of the hospital resilience program was to provide clinicians and health professions students the opportunity to learn the START triage system, and practice making high-consequence triage decisions under stressful conditions.

**Methods**: Training was coordinated with relevant medical and nursing departments and student learners in the facility to ensure maximum participation. Powerpoint slides featured Standard Liberian English phrases when appropriate, and the authors produced a skills video using Liberian clinicians and actors speaking Liberian English. The 30 minute didactic training was followed by serial skill practice stations, in which participants had the opportunity to serve as rescuers/triagers. Instructors assigned to each station monitored the practice sessions and provide just-in-time feedback following every skill repetition.

**Results**: Over 150 learners participated in the course. Based on feedback from participants and hospital administration, the training was successfully adapted. The START video was widely praised during and after the training. A major limitation was that students had widely variable basic life support clinical skills. Future implementations of this program should include a basic life support course. Future instances of training also will provide an opportunity to test recall knowledge of previously trained personnel.

**Conclusion**: The START training program can be successfully adapted for West African audiences, and can serve as an important component of overall hospital resilience-building efforts.

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## Central Ohio's Regional Response to the Largest Botulism Outbreak in 30 Years

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**Study/Objective**: Describe the strengths and challenges of regional health care preparedness coordination, as it pertains to the largest Botulism outbreak in 30 years.

**Background**: This session will discuss the central Ohio region's response and perspective to the foodborne Botulism outbreak in central Ohio. The Central Ohio Trauma System (COTS), and the Healthcare Incident Liaison (HIL) received notification at approximately 12:45 pm on April 21, 2015, from Fairfield Medical Center, regarding suspicion that several people who had attended a local church potluck, may have been affected with Botulism. The COTS HIL was able to utilize their pre-established communication systems to assist FMC in notifying 31 hospitals within minutes, collecting and sharing information, identifying open critical care beds and the activation of portable ventilator caches. Communication was established with the Ohio Department of Health, CDC, hospitals, and local public health facilities. The COTS HIL worked with other regions in the state of Ohio to provide situational awareness, and request bed availability from their hospitals. The session will also discuss the identification of Botulism and response at Fairfield Medical Center, along with the local and regional public health infectious disease investigation.

**Methods**: This session will begin with background information on the central Ohio Healthcare Coalition and Response. Fairfield staff will present case studies on the patients that presented to their facility. Regional public health will add to the presentation by discussing how local public health worked alongside regional and state public health, to conduct the infectious disease investigation.

**Results**: A total of 56 people presented for evaluation; 24 confirmed cases of Botulism; 11 patients were intubated; two deaths; and 25 doses of antitoxin were given.
**Conclusion**: Many lessons learned will be presented, including how our extensive planning for Ebola assisted us in this Botulism response. We determined that our hospital transfer centers were an untapped resource.
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## Challenges of Establishing National Public Health Rapid Response Teams during an Emergency

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**Study/Objective**: To highlight the common challenges of establishing national public health Rapid Response Teams (RRTs) during an emergency, and to identify potential solutions to avoid delays in future responses.
**Background**: The International Health Regulations dictate the need for countries to establish disease outbreak response capacity. RRTs, multi-disciplinary teams trained in public health emergencies, can help fulfill this need as a component of a larger emergency response infrastructure. However, the need for RRTs is often only realized during the onset of an emergency, leading to substantial delays in effective response measures.
**Methods**: National public health RRT challenges were identified through direct observation of RRTs during emergencies, as well as discussions with RRT managers involved in outbreak responses in seven African and Asian countries in 2016.
**Results**: Three common challenges were identified. One challenge is the lack of a trained, ready, and deployable workforce. In addition to public health core competencies, RRT members require training on the country's emergency response infrastructure and deployment processes, as well as exercises to translate their subject matter expertise into timely, actionable, and data-driven objectives. Another challenge is insufficient human resource capacity for response during large and/or growing emergencies. A surge-capacity mechanism is needed, such as rostering personnel with key skills required for common emergencies, including the enrollment of people who are not directly involved in emergencies day-to-day. Finally, the lack of delineated emergency response mechanisms, such as roster activation processes, financial allocation and disbursement, pre-deployment briefings, and in-the-field logistics, can delay RRT response activities.
**Conclusion**: These challenges highlight the need for pre-emergency planning for RRT implementation, specifically delineating the mechanisms and processes for an effective RRT before an emergency occurs. Countries without an existing RRT, and those in the process of establishing an RRT, should preemptively address these challenges to ensure a rapid and effective response.
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## An Effective Health Resource Availability Mapping System for Decision Making in Crises Contexts

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**Study/Objective**: An assessment aiming at analyzing the ability of the health system to provide priority emergency services, and at developing a recovery plan was conducted using the WHO HeRAMS: Health Resources Availability and Mapping System
**Background**: During a major crises like what the Central African Republic (CAR) is experiencing, it appears very challenging to have reliable information to plan emergency responses and for the restoration of essential health services. HeRAMS provides the state of health infrastructures, their functionality and reasons of their non-availability or non-functionality.
**Methods**: Briefing and mobilization of health stakeholders, followed by adaptation of a standardized questionnaire that was administered to key informants from each level of care (primary, secondary and tertiary) and health coordination offices, by telephone and/or site visit, or filling of a hard copy. The questionnaires were collected and verified by central, regional and district health officials and information triangulated by health partners who worked in the field.
**Results**: Two assessments were done in 2014 and 2015 on respectively 814 and 1008 health facilities. A detailed overview on human resources, clinical equipment, availability of health services and infrastructures was done: where 68% and 52 % were respectively functional in 2015 and 2014. An overview on key services such as: essential trauma care, neonatal and maternal care, STIs and HIV/AIDS, and noncommunicable diseases including mental health; as well as reasons of non-functionality: human resources, equipment and medical supplies. The result is help in identifying geographical areas with major service gaps, and developing restoration strategy and plans, including the health sector transition plan for 2015-2017.
**Conclusion**: The assessment with HeRAMS coupled with epidemiological data helped to set humanitarian priorities and develop lifesaving services, along with the restoration plan of public services. It provided a baseline for further medium and longer term planning. It should be envisaged in major humanitarian crises.
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## Approaches to the Use of Research Knowledge in Policy and Practice during the Syrian Refugee Crisis

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**Study/Objective**: With an increasing demand on health systems to respond to the Syrian refugee migration crisis, there couldn't be a better time to conduct rigorous research to examine approaches to evidence informed decision-making in healthcare delivery for the Syrian refugees. The purpose of this

research is to: a) Identify approaches to supporting evidence informed decision-making in health systems serving Syrian refugees, b) understand some of the barriers and facilitators to using these approaches in health systems serving the Syrian refugee crisis. The first study of its type done as an integrated KT, where it was completed in close partnership with the ultimate users Médecins Sans Frontières, also known as Doctors Without Borders (MSF).

**Background**: Providing essential healthcare is becoming a huge undertaking requiring a multifaceted approach for over four million Syrian refugees. The scarcity of available resources makes it imperative that resources are used based on research evidence, to maximize the health outcomes among vulnerable populations. The challenge is that there is still a gap on how to best utilize research evidence to inform decision making in the field.

**Methods**: Document analysis and key informant interviews utilizing semi-structured questions at Médecins Sans Frontières, to identify some of the barriers and facilitators by using Knowledge Translation (KT) approaches in health systems serving the Syrian refugee crisis.

**Results**: Facilitators to MSF's use of research evidence in decision-making include MSF uses surveys to assess and identify research gaps in the field. Barriers to MSF's use of research evidence in decision-making include lack of a receptive climate for research remains a barrier to the utilization of research knowledge in decision-making and lack of a formalized process for field staff to acquire research evidence.

**Conclusion**: Understanding the findings of the above research questions would enhance the quality, effectiveness and coverage of healthcare programme delivery for Syrian refugees and enable the health system to be more responsive to the healthcare needs of the Syrian refugees.

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## Verification of an Area Disaster Resilience Management System Model for Healthcare During the 2016 Kumamoto Earthquake

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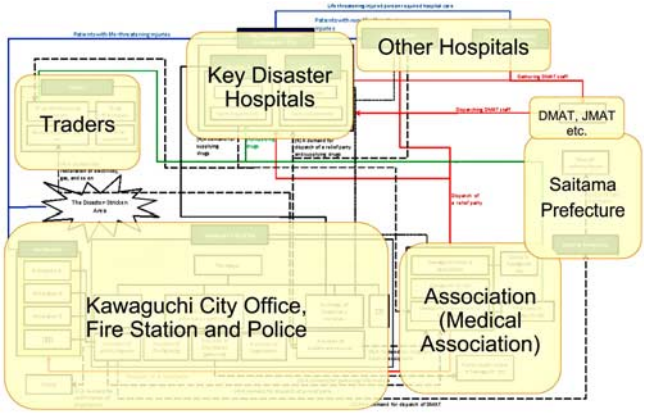
**Study/Objective**: The research group is developing an Area Disaster Resilience Management System Model for Healthcare (ADRMS-H), composed of municipal and health care organizations, to enhance the health care resilience of a community (Figure 1). This model is an extended form of a Business Continuity Management System for a single organization. We are introducing the model to Kawaguchi City in Saitama Prefecture. In this study, we investigate successes and failures of disaster medicine during the Kumamoto Earthquake in April 2016, with the intent to verify the ADRMS-H model.

**Background**: Japan faces a high risk of natural disasters such as earthquakes, during which it is urgent that countermeasures are taken to secure business continuity. To enhance the health care resilience of a community, ADRMS-H must be established.

**Methods**: We interviewed the medical staff of the Japanese Red Cross Kumamoto Hospital, and other disaster-based hospitals, to investigate successes and failures of disaster medicine performed during the Kumamoto Earthquake. We also interviewed medical assistance teams, such as the Disaster Medical Assistance Team (DMAT), the Disaster Psychiatric Assistance Team (DPAT), and so on. We investigated if a function to achieve a positive result or a function to overcome negative results has been incorporated in the ADRMS-H.

**Results**: In disaster medicine during the Kumamoto Earthquake, "information collection," "chain of command," and "provision of relief supplies" were the main failures. The functions to overcome these issues have already been incorporated in the ADRMS-H model. On the other hand, the successes of assistance by the DMAT command headquarters outside of the disaster area (Tokyo and Osaka in this case) were effective. The organizational plan and function to achieve similar success in the future have not been incorporated.

**Conclusion**: We confirmed that the ADRMS-H model is valid for disaster management, and, to improve it, we must add a medical assistance team headquarters.

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## Changes in the Functions for Continued Healthcare Services during a Disaster

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**Study/Objective**: This study aims to identify the organizational functions that are needed to ensure continued health care services during a disaster. Moreover, this paper reveals the roles

of each organization, and their relation to each other, by creating a matrix of the functions and organizations.
**Background**: When a natural disaster or mass-casualty incident occurs, a large number of injured people visit hospitals. During these times, hospitals need to provide additional services. Thus, it is necessary for various related organizations such as hospitals, municipalities, medical associations, and trade associations, to collaborate. There is a pressing need to establish an Area Disaster Resilience Management System for Healthcare (ADRMS-H) to increase medical resilience. It is necessary to identify the functions of, and coordination between, organizations needed to develop ADRMS-H.
**Methods**: We identified the medical care requirements during a disaster and the functions that guarantee ongoing health care by investigating disaster records and interviewing several doctors who provided health care services during the Great East Japan Earthquake. In addition, we analyzed the changes in the functions by the hour, and divided the phases based on the changes. Furthermore, we identified the organizations that are needed to fulfill each function and created a matrix between the functions and organizations of each phase.
**Results**: We created the matrix based on each of the seven phases. The functions included those that must be fulfilled by hospitals, such as providing treatment, and those that must be fulfilled by municipalities, and so on, such as establishing aid stations. Some functions are fulfilled in cooperation with various organizations.
**Conclusion**: When large earthquakes occurred in Japan, it was difficult to understand the functions needed to ensure continued health care services. Creating the matrix of each phase enables us to understand the changing roles of each organization by the hour. This facilitates in the establishment of ADRMS-H.

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## A Systematic Review of Human Health following Flood and Storm Disasters

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**Study/Objective**: The objective of this review was to elucidate the health problems over time, following flood and storm disasters.
**Background**: The health care response to a flood or storm disaster should be guided by the expected health needs of the affected population, for both existing conditions and those caused by the disaster. It is essential to know how the burden of disease varies during different phases after the disaster, but there are few studies on the quantifiable changes in health, or in comparing the difference between floods and storms.
**Methods**: A literature search of the databases Medline, Cinahl, Global Health, Web of Science Core Collection, Embase, and PubMed was conducted in June 2015, for English-language research articles on morbidity or mortality and flood or storm disasters. Articles on mental health, interventions, and health care workers were excluded. Data were extracted from articles that met the eligibility criteria and analyzed by narrative synthesis.
**Results**: The review included 113 studies. Poisonings, wounds, gastrointestinal infections, and skin or soft tissue infections all increased after storms. Gastrointestinal infections were more frequent after floods. Leptospirosis and diabetes-related complications increased after both. The majority of changes occurred within four weeks of floods or storms.
**Conclusion**: Health changes differently after floods and after storms. There is a lack of data on the health effects of floods alone, long-term changes in health, and the strength of the association between the disaster and health problems. An analysis of how contextual factors affect health problems would be a useful complement to the results. The review highlights areas of consideration for medical response, and the need for high quality, systematic research in this area. The study was funded by the Swedish National Board of Health and Welfare.

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## Mass Fatality Management in the US

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**Study/Objective**: This study was conducted to assess the infrastructure's capacity and capability to effectively respond to Mass Fatality Incidents (MFI).
**Background**: In recognition of the increasing incidence of Mass Fatality Incidents (MFI), a large and complex multi-level infrastructure has been developed in the US to prepare and respond to these types of disaster events.
**Methods**: In 2013, anonymous online surveys were distributed to representatives of 5 key sectors comprising the MFI infrastructure (medical examiners/coroners, the death care industry, health departments, faith-based organizations, and offices of emergency management). Three new metrics were developed to measure "preparedness:" (1) organizational capacity, (2) operational capability, and (3) resource sharing capability (between response partners).
**Results**: A total of 879 respondents reported highly variable organizational capacity: 15% had previously responded to mass fatality incidents (MFI); 42% reported staff trained for MFI, but only 27% for complex MFI (ie. involving hazardous contaminants). Less than half (48%) participated in jurisdiction-wide MFI drills. An estimated 75% of staff would be willing and able to report to duty for MFI, but that declined to 53% if contaminants were involved. Most perceived their organization as "somewhat prepared," but 13% indicated "not at all." Fewer than 25 additional fatalities in a 48-hr period would exceed

existing capacity to respond. Operational capability scores ranged from 33% (death care industry) to 77% (offices of emergency management). Resource sharing capability analysis indicated that only 42% of possible reciprocal relationships between resource-sharing partners were present. The overall cross-sector composite score was 51%; that is, half of the key capabilities for preparedness were in place.
**Conclusion**: Results indicate that the US mass fatality infrastructure is sub-optimally prepared for MFI that exceeds 25 or fewer additional deaths in a 48-hr period. National leadership is needed to ensure sector-specific and infrastructure-wide preparedness, with a special focus on training, drills, and planning activities for large-scale or complex MFI.
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## Preparedness of US Health Care Volunteers Who Deployed to the West Africa Ebola Epidemic

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**Study/Objective**: To identify the preparedness of US health care volunteers for hot zone (West Africa Ebola) deployment.
**Background**: Each year, an estimated 200,000 US health care workers voluntarily deploy to provide care and expertise to disaster events worldwide. Many of these involve bioevents (outbreaks, epidemics, and pandemics), and sometimes these bioevents involve extremely dangerous and novel pathogens. The preparedness of these volunteers to work in high risk "hot zones," had not, to our knowledge, been previously assessed.
**Methods**: In 2015, a sample of 16 US health care volunteers who had recently returned from West Africa were recruited for qualitative interviews. Data on preparedness for each phase of deployment (pre, peri, and post) was collected and analyzed using thematic analysis and constant comparison methodology.
**Results**: Prior to deployment, most participants reported very limited preparation for the deployment. Training, especially in the early days of the epidemic, was highly variable, and in some cases consisted of simply reading a manual on lethal viruses. During the deployment, extreme resource limitations and poor management of the mission was a serious source of frustration and concern. The necessity for altered standards of care delivery was also very troubling. Upon return home, participants were unprepared for the negative reactions and resentment of their friends and family members. The isolation they felt during the quarantine period was reported as one of the most stressful aspects of the entire experience. Depression, stigmatization, and interpersonal difficulties were also common upon return to the US.
**Conclusion**: Preparedness of healthcare volunteers was sub-optimal at each stage of deployment. All stakeholders, including volunteers, sponsoring organizations, government agencies, and professional organizations have a shared responsibility in ensuring that volunteers to medical missions are adequately prepared.
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## Health Emergency Operation Center to Face Public Health Events in Africa: Senegalese Experience

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**Study/Objective**: To share the experience of a low-income country on setting up a Heath Emergency Operation Center (HEOC) to face health threats.
**Background**: The last Ebola outbreak in West Africa was a great alert for our countries on the importance of preparedness, and to face public health events with international concern. For Senegal, after managing our imported case, our big lesson learned was to establish a national structure, which can involve an all-emergency management cycle. It's why we set up a HEOC; the HEOC is in charge of all health events, beyond epidemics.
**Methods**: The HEOC was established in December 2014. A participative approach was developed during the process of setting up, with the ministry of health, other ministries and partners, which was part of the process.
**Results**: The HEOC brought some added value:

- Coordination: the incident management system is now adopted for the management of emergencies and disasters.
- Plans and procedures have been developed, for the HEOC and for some risk
- Exercises and drills were conducted to test SOPs and the response efficiency
- One health approach was adopted.

**Conclusion**: Shared experiences of a low-income country, on setting up a Health Emergency Operation Center (HEOC) to face health threats.
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## Hazard Vulnerability Analysis: Practices in Boston Hospitals

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**Study/Objective**: To determine what instruments and methods Boston hospitals and hospital systems use to perform Hazard Vulnerability Analysis (HVA).

**Background**: Assessment of hazard vulnerability is a critical stage in the disaster preparation cycle. This process determines the relative priority of each disaster subtype to the organization, and provides guidance to the organization for allocating time and resources. Since 2001, the Joint Commission International requires all hospitals in the United States to perform a hazard vulnerability analysis annually, and use their findings to guide planning efforts. To date, there is no officially recommended method for the hazard vulnerability assessment of health care institutions, and little literature on best practices. As such, methods utilized are heterogeneous and institution specific.
**Methods**: Qualitative and quantitative methodologies are used for this study. Surveys are administered by email and on paper to emergency managers at hospitals in Boston, Massachusetts USA, who are queried regarding their method for hazard vulnerability assessment, the instrument used, who completes the analysis, what guidance/training is given, and if subanalysis is completed when the hazard profile changes from previous years. Responses are analyzed using quantitative and qualitative methods.
**Results**: This study is in progress, with results expected by March 2017.
**Conclusion**: The study is currently ongoing. We anticipate that hazard vulnerability analysis methods and instruments will reflect a lack of standardization of practice in the field. Relative strength and weaknesses of different instruments will be highlighted, and common practices at health care institutions will be reviewed. Our hope is that such discussion will encourage greater standardization, and the development of best practices for this critical stage in the disaster preparation cycle.
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## Hazard Vulnerability Analysis: Practices in Massachusetts Hospitals

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**Study/Objective**: To determine what instruments and methods Massachusetts hospitals and hospital systems use to perform Hazard Vulnerability Analysis (HVA).
**Background**: Assessment of hazard vulnerability is a critical stage in the disaster preparation cycle. This process determines the relative priority of each disaster subtype to the organization and provides guidance to the organization for allocating time and resources. Since 2001, the Joint Commission International requires all hospitals in the United States to perform a hazard vulnerability analysis annually and use their findings to guide planning efforts. To date, there is no officially recommended method for the hazard vulnerability assessment of health care institutions and little literature on best practices. As such, methods utilized are heterogeneous and institution specific.
**Methods**: Qualitative and quantitative methodologies are used for this study. Surveys are administered by email and on paper to emergency managers at hospitals in Massachusetts USA, who are queried regarding their method for hazard vulnerability assessment and the instrument used. Responses are analyzed using quantitative and qualitative methods.
**Results**: This study is in progress, with results expected by March 2017.
**Conclusion**: The study is currently ongoing. We anticipate that hazard vulnerability analysis methods and instruments will reflect a lack of standardization of practice in the field. Relative strength and weaknesses of different instruments will be highlighted and common practices at health care institutions will be reviewed. Our hope is that such discussion will encourage greater standardization and the development of best practices for this critical stage in the disaster preparation cycle.
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## Fitness Requirements for DMAT Teams: A Systematic Review

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**Study/Objective**: To review the physical fitness requirements for disaster responders serving on Disaster Medical Assistance Teams (DMATs) in the United States.
**Background**: The United States has trained and credentialed teams of disaster responders which may be rapidly deployed to assist with search and rescue efforts, and to provide essential medical care. This field work is physically and mentally demanding, placing team members themselves at risk. On prior deployments, literature suggests significant numbers of team members have sustained injury or illness requiring medical attention and, in some cases, extraction for off-site treatment. This significantly depletes teams capabilities, and may involve other team members in the treatment further depleting the DMAT response. Military responders must maintain a level of physical fitness to minimize their risk of injury or illness, should DMAT teams have the same requirement, or do they presently?
**Methods**: Publicly available policy documents were collected for each DMAT from their respective websites. A comparative analysis of physical fitness requirements for DMATs was undertaken.
**Results**: The study is ongoing with results expected by January 2017. Of the DMAT teams in the United States, 14 have publicly available documents referencing fitness requirements.
**Conclusion**: The study is currently ongoing. Based on preliminary work, it appears that no minimum physical fitness standard currently exists for federal disaster responders in the United States. Individuals may deploy with unknown physical liabilities, placing themselves and team members at risk of illness, injury, or mission failure. Given the hazardous nature of deployment to disaster zones which are, by their very nature, resource limited and may be physically remote from care, efforts

should be made to develop and standardize minimum fitness standards for responders. By mitigating the risk of illness or injury to disaster responders, the likelihood of mission success and provider wellness can be increased.

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## Review of Instruments Used in Hazard Vulnerability Analysis of Hospitals

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**Study/Objective**: To perform a qualitative comparison of instruments used for hazard vulnerability analysis of hospitals.
**Background**: Analysis of hazard vulnerability is the process by which a hospital determines the relative priority of each potential threat to the organization when allocating resources for disaster preparation and mitigation. While all hospitals in the United States are required to perform a hazard vulnerability analysis annually and use their findings to guide planning efforts, no officially sanctioned instrument exists for this task. Thus, a variety of tools exist in the public domain to assist hospitals in analysis of hazard vulnerability.
**Methods**: Hazard vulnerability analysis instruments were identified using a standardized online search technique. For each instrument, we compare the hazards identified for analysis, the method of determining probability, magnitude, and mitigation for each hazard, as well as the method used to determine risk using qualitative methodology.
**Results**: This study is in progress, with results expected by December 2016.
**Conclusion**: The study is currently ongoing. We anticipate that instruments will vary significantly in the specific threats assessed, calculation of probability, and measure of severity. Relative strength and weaknesses of different instruments will be highlighted. It is of concern that the hazard vulnerability analysis of hospitals in the United States may be skewed by the specific instrument chosen, and that no recommendations currently exist to guide the efforts of emergency managers. Our hope is that this review of available instruments will lead to further research into best practices, resulting in the standardization of the hazard vulnerability analysis of hospitals in the United States.

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## Modern Strategies of Collaborating Centers for Emergencies

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**Study/Objective**: The main goal is an analysis of their particular activities and tools of coordination.
**Background**: The number of Collaborating Centers in Disaster Medicine working under the leadership of the World Health Organization (WHO) has been reduced. There are only seven centers that have been accredited by WHO – Great Britain and France (joint Center), Switzerland, Italy, Indonesia, Netherlands, Russia, and the US. Twenty years ago, there were approximately 20 Collaborating Centers in Emergencies.
**Methods**: Analysis of Disaster Medicine Collaborating Centers and issues addressed at their annual meetings.
**Results**: Main functions of the promoted Centers: GB and France Center – Support of secretariat for certification; registration and training of international emergency medical teams; providing sustainability and preparedness in vulnerable countries; crisis management. Switzerland Center: All problems of refugees and temporary displaced persons. Italian Center: Support of health system resistance to emergencies, disasters, and crisis. Center develops four programs of research activities and four programs of education – training. Center implements a complex program of evaluation in 15 Italian hospitals. Center proposed a system of distant computer education and training, opened for all registered users. This virtual software lends itself to play out practically any intervention in any scenario of emergency. Netherland Center: On-site courses of education, postgraduate education; analysis of national health strategies in emergencies; information sharing and distribution of information about health systems in developing countries. Indonesia: Program of crisis management in emergencies and in large scale disasters – floods and earthquakes. Every year, all collaborating centers arrange a joint coordinating meeting for information sharing and for arranging bilateral and multilateral agreements for their future activities.
**Conclusion**: All collaborating centers participate in the WHO International Programs. There is no collaborating center in Africa or in the Extreme Orient. The US Center realizes its activities in isolation from the network.

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## Understanding the Emergency Preparedness Programs of Academic Health Systems

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**Study/Objective**: We surveyed US academic health systems to understand structure, functions of, and resources dedicated to system-level emergency preparedness (EP) programs.

**Background**: In recent years, US hospitals have dedicated significant resources to improve their EP, especially following September 11, 2001. Over the same period, cost containment pressures and consolidation within the US health care system had lead to more hospitals owned by single parent organizations. As hospitals are under continued pressure both to be ready for disasters, and to maximize value, there is limited data describing the role of the system's administrative organization in supporting the preparedness of their hospitals.
**Methods**: We developed and administered a survey regarding health systems' EP efforts to 97 academic health systems. Data gathered included program funding, governance, preparedness and response roles, and resources provided to system members
**Results**: Of the 38 responding health systems, 87% were non-profit. Median revenues were nearly $2.5B USD. Systems had a median of 16,500 employees and nine member entities. 74% reported having system-level EP staff. 24% had an annual operating budget of $100,000 - $1M. Most frequently occurring activities included: creating plans, trainings, or exercise templates (68%); providing access to subject matter experts (68%); promoting staff preparedness (68%); and developing plans (66%). We identified discrepancies between respondents' descriptions of the resources their system provides for member entities compared with resources they believed should be provided.
**Conclusion**: Currently, there is wide variation in the resources, capabilities, and programs supporting EP at the system-level among academic health systems. The most common system-level resources provided to system entities include a mass-notification system, subject matter expertise during planning and emergencies, centralizing emergency supply contracts, and providing support for training and exercises. It is unknown which of these systems and resources may be most needed and/or most effective, as outcome data has not yet been collected.

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## Emergency Services Rapid Assessment Tool in San Salvador, El Salvador

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**Study/Objective**: Our study assessed the emergency care system of the hospitals in the San Salvador metropolitan area in El Salvador. San Salvador is the capital and largest city and the epicenter for trauma and emergency care need.
**Background**: In El Salvador, over 32% of all deaths are due to trauma, and cardiovascular emergencies are a rapidly rising incidence of both morbidity and mortality. Doctors working in Emergency Wards (EWs) are on the front line of caring for trauma patients. However, emergency medicine training is not yet developed nor standardized.
**Methods**: This study utilized the SidHARTe Emergency Services Rapid Assessment Tool (ESRAT), which analyzes resources related to emergency care within a hospital. Survey teams went to the 8 public hospitals to interview key stakeholders in the EW as well as hospital administrators. Structured interviews were conducted about hospital capacity and resources, and observations regarding emergency care supplies were recorded. Epidemiological factors such as access to essential supplies, services and medications were determined using simple statistical methods.
**Results**: A total of 8 hospitals were surveyed with responses obtained from 97.2% (70/72) of the individuals sought. Emergency care in 100% of hospitals surveyed is free to the patient. As well, 100% reported consistent electricity, though 37.5% reported inconsistent access to running water. All 100% reported access to all essential lab studies listed in the survey, and reliable access to supplies of blood. Half of EWs surveyed report access to an ultrasound machine, and only 37.5% report the ability to contact trained staff after-hours. EWs were stocked with, on-average, 60% (31.9/53) of "Essential Emergency Medicines," 81% (52/64) of "Essential Emergency Supplies," and 90% of "Essential Emergency Equipment" (5.4/6).
**Conclusion**: This survey establishes a baseline capability of the public hospitals in San Salvador, and serves as an important benchmark for the continued development of emergency care resources and services nationwide.

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## Impact of Participation in Focus Groups on Perceived Preparedness for Emerging Threats

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**Study/Objective**: To examine the impact of participation in focus groups on perceived emergency preparedness for an emerging threat of attack on civilian populations.
**Background**: Health care systems are required to develop preparedness for all hazards that risk public health and safety. Policies for managing emerging (newly evolving) threats should be prepared based on multi-disciplinary perspectives that promote an effective and comprehensive response. Focus groups are instrumental in designing policies, but their impact on perceived emergency preparedness has not as yet been presented.
**Methods**: Five multi-disciplinary focus groups were created to review risk assessment and recommend policies for managing an emerging threat of missile attacks against civilian populations, including: providing community health care services; hospitals' operational continuity; casualty evacuation; continuous medical care to vulnerable populations; and providing medical services in 'closed military zones.' Fifty-nine national and regional managers of the Israeli health care services rotated between the focus groups, recommending applicable policies for all identified challenges. A survey concerning perceived individual and systemic preparedness for the emerging threat was completed pre-post participation in the focus groups.

**Results**: Based on focus groups' outputs, holistic policies for managing the emerging threat were created and approved by the national/regional authorities. Analysis of pre-post perceptions of focus groups' participants showed an increase in numerous elements including perceived proficiency ($3.71 \pm 0.67$ vs $4.60 \pm 0.53$, respectively; $P < .001$), and trust in colleagues' competencies in emergency response ($3.56 \pm 0.75$ vs $4.37 \pm 0.61$, respectively; $P < .001$). Correlations were found between perceived individual preparedness and systemic readiness (rho = .410; $P < .001$) and proficiency in risk assessment (rho = .630; $P < .001$).
**Conclusion**: Participation in focus groups facilitated design of policies for emerging threats and contributed to increasing perceived individual preparedness and empowerment. It is recommended to include operators and managers of health care entities in the process of policy making, in order to improve capacity-building and strengthen readiness to manage expected and unexpected emergencies.

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## Developing a Minimum Summary Sheet for Sudden Onset Disasters: The UK, EMT Approach

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**Study/Objective**: The WHO has, for some time, been working to standardize and professionals in the humanitarian field. One branch of this work has been to develop a minimum data set for daily reporting of Emergency Medical Team (EMT) activity during Sudden Onset Disasters (SODs). This minimum data set is under final development following expert stakeholder consultation in Tokyo and Jerusalem during 2016.
**Background**: The UK EMT have developed a minimum summary sheet for each patient seen in field hospitals during SODs. This sheet has been designed with the most recent updates, from the WHO stakeholder consultation in mind. As representatives of the UK EMT were able to contribute to the consultation, they were able to collaborate and understand other teams' approaches to patient records. This international level idea-sharing has allowed the UK EMT to develop a record, combining paper and electronic formats in a way similar to the CMAT and B-FAST approach. The record has been further developed to exist simultaneously (both integrated and standalone) in paper and electronic format, in order to match the technology available in the field at any one time.
**Methods**: Once finalized and aligned with the final WHO minimum data set output, this summary sheet will be field tested.
**Results**: Modifications will be made to ensure it collects patient data accurately and efficiently, with the primary aim of providing patients with a useful care summary, and a secondary aim of collecting much needed field data in order to continually improve practice.
**Conclusion**: The results of this field testing will be the subject of future work.

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## Development of a Secure and Resilient IT System to Deliver an Electronic Patient Record System for Use in a Disaster

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3. UK Med, Manchester/United Kingdom
4. Xenplate, Cambridge/United Kingdom

**Study/Objective**: Electronic patient records are in widespread use in high-income countries. The factors that make electronic records useful in everyday practice are magnified in a disaster response, particularly the ability to:

- minimize poor/absent data due to paper management and handwriting;
- identify patients consistently eg, using barcodes;
- take pictures/video;
- automate workflow – "if patient has low O2 saturations, a Chest X-ray is ordered;"
- share information in real-time enabling pro-active rather than reactive management;
- ensure consistent data capture, enabling meaningful analysis; and
- automate reporting, minimizing burden on front-line staff.

**Background**: The situations in which the IT will be used, throw up a formidable group of challenges to the designers and users of IT; the design brief included the following:

- data security certified to ISO 27001 standard;
- need to be able to operate "off-line" – wireless data transmission is notoriously unreliable; and
- ability to reconfigure data collection in-country without local support.

**Methods**: • Resilience

- the isolated nature of disaster medicine means that any IT system must be highly resilient eg, automatically "self-healing." This includes being able to deal with foreseeable problems including:
- failure of any single point ("failover"); and
- recovery ("failback").

With no human intervention and no loss of service (see diagram in Conclusion).
**Results**:

- Ability to integrate with medical devices and certification to ISO 13485 standard.
- Information governance issues – all patient identifiable data must stay in-country.
- Ability to integrate paper use prior to electronic system activation.
- Power needs of servers and clients.

**Conclusion**: The presentation will describe deployment in field hospital use (Oct 2016), and also during a formal assessment of the Xenplate system by the World Health Organization in a large-scale multi-day disaster simulation in the UK (Dec 2016), together with plans for future development.

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## Establishing mHealth Injury Surveillance Systems in Kenya

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**Study/Objective**: To use the mHealth injury surveillance tool to improve data quality, reduce feedback time, enable data sharing and improve the efficiency of the existing process.
**Background**: Trauma registries play an integral role in injury surveillance, and in the monitoring and evaluation of trauma care. Success in establishing and maintaining trauma registries is limited in low-resource settings. Efforts have been made to establish hospital-based trauma registries at multiple sites in Kenya. Data was initially collected on a paper form upon patient interview, later transcribed into computer software, and exported monthly for review and analysis. Challenges included: missing data, errors in transcription, backlog of data entry, and lack of reliable software for data management and export.
**Methods**: A literature review was performed for low-cost and freeware solutions, taking into consideration ease of programming and functionality to the end-user. Using FormEntry, the existing paper surveillance tool was adapted for mobile devices, and designed for real-time upload to a web-based database upon completion of each entry.
**Results**: Successful registries have been established in five sites in Kenya with a patient population of 24,000 over a period of two years. Feedback from end users was positive, with increased efficiency of the process from data collection to analysis. In addition to expected outcomes, the use of mobile technology has decreased human resource requirements, while increasing interest and awareness for the program.
**Conclusion**: Trauma registries are an important source of injury surveillance data and developing quality of care processes. The use of appropriate mHealth injury surveillance tools can be used to bridge the data gap in low-resource settings such as Kenya with further potential to scale-up.

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## Development of an Electronic Patient Record Structure for use in a Disaster Response

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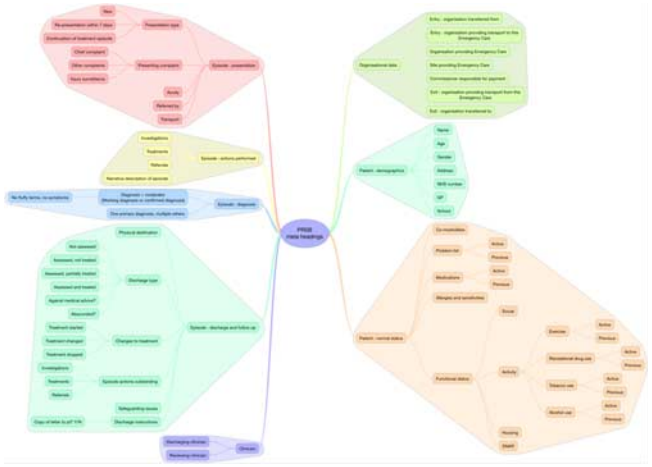
**Study/Objective**: Analyzing and optimizing the response to a disaster is made very difficult by the use of unstructured data captured on paper. Such data is difficult to aggregate and analyze in a consistent and meaningful manner – both in real-time for management and clinical quality assurance, and afterwards for comparative analysis and 'whole system' learning to improve disaster management.
**Background**: The SENDAI framework challenged the disaster management community to standardize core medical data in disaster situations; however it is not always clear what should be collected. If poorly designed, the data fields overlap and duplicate each other, which results in frustrated clinicians and dubious analysis.
**Methods**: We describe how the UK-EMT has tackled this challenge, building on the data-set work that has been coordinated by WHO. We have worked with informatics experts from the Royal College of Emergency Medicine, to develop a data set based on the UK National Health Service 'Emergency Care Data Set' (ECDS) that is being implemented across England in 2017.
**Results**: Every care episode includes a 'chief complaint', a measure of acuity (P1/P2/P3), investigations, treatments and a diagnosis and discharge/follow-up arrangements. The UK-EMT form codes into this structure, enabling reliable analysis – both real-time and post-hoc.
**Conclusion**: The scale of the NHS (25 million ECDS episodes per year) will enable evidence-based pathways, outcomes, patient information and decision support to be adapted for use in a disaster response where appropriate. A key principle in the NHS ECDS is that although acute/emergency care as a whole is nonlinear, each episode of care is linear (see diagram), and episodes can be linked to understand how people are using health care. The same principles apply in a disaster response and adapting the ECDS record structure has enabled rapid progress to a usable electronic clinical record. The data structure is shown in this diagram:



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## High Prevalence of Acute Pancreatitis during the Ramadan Fast

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**Study/Objective**: Our study tried to identify different patterns of occurrence during the Ramadan fast of Acute Pancreatitis (AP).
**Background**: Acute Pancreatitis (AP) is an acute inflammatory process of the pancreas. The aim of this is study is to retrospectively screen and record the Muslim and non-Muslim patients, admitted to the emergency department with acute pancreatitis over a ten-year period, in order to identify different pattern of occurrence during the Ramadan fast.
**Methods**: The study was conducted at the Emergency Department of Rabin Medical Center (Beilinson campus) in Petach Tikva, Israel. We compared the occurrence ratio of AP in Muslim populations and non-Muslim populations during the Ramadan fasting days, versus the rest of the year. We reviewed the medical records of Muslim patients admitted to the emergency department during the Ramadan fast period, to identify those who had reported that they fasted. In order to calculate prevalence of acute pancreatitis, we recorded the overall admissions to the emergency department during the years 2006-2016, of Muslim and non-Muslim patients.
**Results**: Over the 10-year study period, 1,167 patients were admitted to the emergency department with a diagnosis of acute AP. The number of patients with AP during the Ramadan periods were statistically significance between the non-Muslim and the Muslim groups 95 (8.8%) patients vs. 17(17.3%) patients, $p = 0.01$, respectively). The prevalence of AP during the Ramadan periods among Muslim were 11.28 for 10,000 vs. 8.9 for 10,000 for Muslims in other periods vs. 7 per 10,000 for the cohort population in ant period ($p < 0.001$).
**Conclusion**: We found a high prevalence rate of acute pancreatitis in the Muslim population during the Ramadan fast. Physicians should be aware of this link and suspect it, for Muslim patients presenting with epigastric pain during the Ramadan fast. The proposed mechanism for the development of pancreatitis is acute gastric dilation.

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## Patient Safety in Greek Hospitals

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**Study/Objective**: This paper aims to investigate the problem of patient safety in Greek hospitals.
**Background**: Safety issues for hospitalized patients have been a great concern for health care providers over the last 15 years. In developed countries, one in 10 patients experiences the consequences of a medical error during hospitalization. The World Health Organization (WHO) defines patient safety as their protection from preventable injuries that occur during the provision of health care, and at the same time, it sets patient safety as a world priority regarding health issues.
**Methods**: Greek and international publications in PUBMED during the last 10 years, and data collected by highly certified international organizations (WHO, OECD, HCDCP, JC, and AHRQ), have been extensively reviewed. We also present the results of a small indicative questionnaire on Hand Hygiene. Keywords: "Patient safety;" "Medical error;" and "Greek Hospital."
**Results**: The majority of Greek citizens believe that health care services provided in the country are inferior compared to countries of the European Union. In most hospitals, there are neither established protocols on the safe management of patients nor integrated reporting systems of the adverse events. Informed consent is inadequate. Prescription of antibiotics is two-fold compared to the average rate in the OECD countries. The shortage of nursing staff worsened after the economic crisis emerged. The average number of nurses per 1,000 residents is 3.6, compared to 9.1 in OECD countries. Burnt out syndrome is reported by 78% of the nursing staff. The most of medical errors are reported by Surgery and Obstetrics (20% and 16%, respectively). On the other hand, there is good monitoring and recording of adverse events in blood transfusions.
**Conclusion**: It is obvious that we need better education, development of reporting systems, supportive work environment, loyal implementation of internationally recognized practices, and collaboration among the different health care structures.

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## An Epidemiological Survey Correlating with Survival Probability in Cases of Abdominal Trauma in a Rural Setup

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**Study/Objective**: The study was designed to assess epidemiology of abdominal trauma in a rural setup, and correlate it with survival probability of the patient, through revised trauma score.
**Background**: Trauma is a major public health problem in every country, with abdominal trauma being 3rd most common. The profile and pattern of abdominal trauma is changing with a progressing civilization. Understanding mechanisms of injury is crucial, while managing a patient with abdominal trauma. An epidemiological assessment of trauma can help to predict mortality and morbidity. Early diagnosis, sound clinical judgement and prompt intervention in abdominal trauma is necessary.
**Methods**: The study comprised of 50 patients of abdominal trauma attending the emergency department, in whom the epidemiological profile of trauma was recorded as 'per prescribed proforma', and later correlated with revised trauma score and survival probability.

**Results**: A total of 50 patients (mean age of 32.98 ± 12.61 years) were included in the study. Majority (86%) had blunt abdominal trauma, (14%) had penetrating injuries and associated polytrauma was seen in 34%. Majority of patients were brought by personal vehicles (42%) followed by ambulance only 34%. The mean duration of injury till hospitalization was 17.68 ± 21.78 hrs, with 50% patients getting hospitalized within 6 hrs. Prehospital Care, by ambulance, police or referring hospitals could only be offered in 68%. The most common cause was road traffic accidents (42%). Mean GCS and Revised Trauma Score were found to be 13.76 ± 2.33 and 7.28 ± 0.92. Mean hospital stay was 11.5 ± 3.64 days while mortality was 2%.
**Conclusion**: A young productive age group is more vulnerable to abdominal trauma. Considering the fact that road-related accidents are quite predictable and controllable; therefore, the quality promotion of traumatic patients care, and road safety should be strengthened, as the majority still come in late beyond golden hours.

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## Budgeting of a Local Government for Disaster and Health Crisis in Indonesia

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**Study/Objective**: To describe a disaster and health crisis budget by local government in Indonesia; to see if districts with a higher disaster risk had been developing adequate budgets for preparedness and disaster management.
**Background**: Adequate financing is one of the main facets of implementing disaster and health crisis management. It is not just a national responsibility, it must be a local responsibility also. In the past 5 years (2009-2013) the 'prone' districts have experienced many disasters and health crisis, and must have a good plan, including a budget for preparedness and disaster management.
**Methods**: This study used descriptive, with cross sectional design. The subject study was in 6 districts in North Sumatra, South Sulawesi, and Papua Province. Three provinces were representative of Regional Health Crisis of Indonesia for east, central, and west part. Unit analysis of this study was budget allocation from a program planning and budgeting document of the health district office 2012-2013.
**Results**: There was no budget for disaster in the Health District Office (HDO), because it was allocated in Local Emergency and Management Authority (LEMA). Whereas, many health issues are impacted due to a disaster event. Commonly, they just budgeted for preparing and managing out-break diseases (0.26% of local expenditure and 7.37% from eliminating communicable diseases program in HDO) and some districts have a budget for emergency incidents (0.32% of local expenditure and 7.71% from eliminating communicable diseases program in HDO). In fact, just some districts had allocated a budget for outbreak diseases due to disaster, particularly in 2012.
**Conclusion**: An inadequate budgets for disaster and health crisis by District Health Offices (DHO). Budgeting for disaster and health crisis still depends on the government's will to do so. It must be considered by local disaster and health crisis analysis; by local governments. Disaster experiences have not been a basis for planning and budgeting disaster programs yet.

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## Overview of the Project for Strengthening the ASEAN Regional Capacity on Disaster Health Management (ARCH Project)

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**Study/Objective**: Through the three-year period (July 2016 – August 2019), the Project aims to strengthen regional coordination capacity on disaster health management in the Association of Southeast Asian Nations (ASEAN).
**Background**: In the ASEAN region, a total of 425,000 people were dead due to natural disasters from 1975 to 2015 [1], which disturbed economic growth and human security. The ASEAN has continued to attach the importance of cooperation related to the prevention of, and response to disasters. In addition, disaster health management was defined as one of the priority issues in the ASEAN Post-2015 Health Agenda. Through the preliminary survey and discussions, all ASEAN Member States (AMS) reached a common understanding on the importance of a regional collaboration mechanism in disaster health management. Based on that, the Project of Strengthening the ASEAN Regional Capacity on Disaster Health Management (the Project) was formulated. The Project was officially endorsed by Senior Officials Meeting on Health Development (SOMHD) of ASEAN in September 2015, and the Committee of Permanent Representatives (CPR) in January 2016.
**Methods**: To achieve the above objective, the following four activities will be conducted in cooperation between National Institute of Emergency Medicine (NIEM) of Thailand and Japan International Cooperation Agency (JICA) with involving all AMS: (1) Discussions on strengthening coordination capacity on disaster health management at the regional coordination meetings; (2) Cooperation and experience sharing through conducting regional collaboration drills; (3) Development of tools on effective regional collaboration on disaster health management; (4) Designing and conducting trainings on disaster health management.
**Results**: The Project has commenced in July 2016 and the first regional coordination meeting was held on September 29-30, 2016. In the meeting, all of the stakeholders shared the objective and methodology of the Project, and agreed to continue collaborating to share an idea on future regional coordination on disaster health management.
**Conclusion**: The start-up drill will be held in January 2017. Based on the lessons learned, recommendations and discussions

will be referred to development of regional collaboration tools and human resource development programs.

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## A New Framework and Guideline for Hospital Disaster and Emergency Planning in Turkey

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**Study/Objective**: A new regulation and guideline for hospital disaster and emergency plans in Turkey have been launched. This study presents the content of the guideline and shares the experiences regarding the process.

**Background**: Since the 1999 the Marmara earthquake in Turkey, health officials have taken steps towards preparing the health system for disaster situations. The new framework for hospital disaster and emergency plans (Hastane Afet ve Acil Durum Plani – HAP) is one of these steps. Until March 2015 hospitals were preparing their plans without a standardized format. Following the regulation No: 29301 dated 2015, all hospitals (public, private, university, military) have been obliged to prepare their plans according to the new framework and a corresponding guideline.

**Methods**: The guideline was prepared by a team of experts from the field and academia with different backgrounds. International guidelines such as WHO-EURO's notes for Hospital Emergency Response Plan, Hospital Incident Command System (HICS), WHO-PAHO's Hospital Safety Index were used as references, but the guideline was prepared considering the national experiences and needs.

**Results**: The framework covers all phases of the disaster cycle. HAP is an umbrella plan, which includes three sub-plans; emergency response plan, incident action plan, special sub-plans. The guideline has three main chapters and a comprehensive annex. Parallel to the guideline is a set of training materials, such as slides and drill and exercises that have been prepared. To date nearly 200 health personnel in six sessions have been trained as HAP trainers.

**Conclusion**: With this new framework hospitals will have comprehensive plans, hence better prepare themselves for and respond more effectively to the next disaster. HAP will also enable hospitals to work in harmony during emergencies and disasters, as they have been using the same framework and format. Additionally, it will be easier for hospitals to be part of upper level planning. But there are still challenges to overcome, such as the integration of all disaster plans at all levels, low levels of motivation among health personnel for disaster preparedness, and time and source limitations considering the trainings.

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## Using Rapid Improvement Event Methodology for Disaster Planning Improvement During Information Technology Failures

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**Study/Objective**: We describe a use of process improvement methodology in disaster planning.

**Background**: Modern hospitals are very dependent on Information Technology (IT) systems to function. Over the past decade, most US hospitals have transitioned to Electronic Health Records (EHR) with integrated laboratory and radiology systems. Unplanned IT failure represents an internal disaster threatening patient care. The University of Colorado Hospital experienced a complete IT loss for 10 hours impacting care. Many planning assumptions about reverting to "paper" processes were challenged by the large number of changes needed immediately, coupled with the lack of staff familiarity. The incident management system was overloaded with the detailed tasks required for effective response. The traditional disaster response of an After Action Review (AAR), followed by an improvement plan, was felt to be insufficient to rapidly develop the needed corrective processes. Typically the AAR assigns future improvement changes to be made but doesn't make real-time decisions.

**Methods**: A Rapid Improvement Event (RIE) was performed focusing on the emergency department with results designed to be applicable throughout the hospital. The RIE was preceded by a structured preparatory phase, consisted of a two-day participatory phase with key leadership present to make immediate decisions, and followed by a dissemination phase. Very detailed hospital plans were developed for processes of downtime registration, patient flow, laboratory testing, and radiology processes. Additionally, the process for obtaining specialty consults and admitting patients to the hospital were developed. These templates are now in use in the emergency department and undergoing revision for internal hospital use for future unplanned IT downtimes.

**Results**: The use of rapid improvement events is reviewed in the context of disaster, after action reviews, and examples of developed downtime processes will be discussed.
**Conclusion**: Rapid improvement event methodology can be used to effectively develop disaster preparedness plans.
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## An Accelerated Incident Command System Course for Hospital Leadership

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**Study/Objective**: To design and implement a four hour Incident Command System (ICS) course for training hospital leadership personnel.
**Background**: Incident management is a key component in hospital disaster response. The higher level US classes, designated FEMA IS-300 and 400, are recommended for training leadership involved in disaster management. Both classes are 16 hours in duration each, and this length of time is prohibitive to getting senior leadership trained. We recognized the cohort of hospital leadership to be taught, represents a select group of highly educated learners who would be capable of rapidly learning ICS.
**Methods**: We developed a four hour accelerated course that pulls elements of general incident management together in a hospital specific curricula. Online IS 100, 200 and 700 are required as prerequisites. The course integrates basic ICS principles with elements of IS 300 and 400 applicable to hospitals. This material is taught as a blend of review, new lecture content and practical exercises.
**Results**: The curricula has been successfully piloted with 20 senior physicians and nurse managers. Initial results show they were able to comprehend the material and demonstrate practical application.
**Conclusion**: An accelerated ICS training course can be used to successfully train hospital leadership in disaster management.
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## Emergency Preparedness amongst Health Professionals for a Mass Casualty Incident (MCI) in the State of Assam, India

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**Study/Objective**: The objective of the study was to identify the basic skills and knowledge of the Health Professionals; impact of the training provided by experienced Doctors and Public Health Professionals of our NGO 'Academy of Trauma' (AOT); and to spot the barriers in handling Mass-Casualty Incident (MCI) in the state of Assam, India.
**Background**: Assam is prone to natural disasters (flood, earthquakes) and manmade disasters due to its unique geopolitical position. Such disasters slow development, causing massive impact on existing health care services. Realizing that there is a gap in preparedness of the health care system in handling MCI, our NGO "Academy of Trauma" has imparted training amongst 850 Doctors and 1,250 paramedics for capacity building in Emergency Trauma Care in all districts of Assam.
**Methods**: Academy of Trauma (our team) followed the World Health Organization (WHO) module for trauma training for disasters, with modifications to suit local needs/conditions. Pre- and Post-training evaluation was conducted to evaluate and determine the impact of the training. We conducted trauma simulations regularly. Interviews were held with focus groups. Field Studies were done to assess the vital barriers of MCI.
**Results**: A significant improvement of skills and knowledge post-training. Inadequate ATLS knowledge. Under-trained Human Resources. Poor Transport & Communication facilities. A lack of Mock Drills. Insufficient logistics & infrastructure. Improper on-site management. Lack of Community Participation. A pessimistic attitude of the Doctors. Techno-bureaucratic hindrance. Financial Constraints.
**Conclusion**: The reports of the training were submitted to the responsible authorities periodically and steps are being initiated to improve the quality of the health services. Existing programs, like training of Medical Professionals, increased within the number of Trauma Centers; provisions of well-equipped ambulances and boat-clinics; procurement of basic logistics; establishment of a telemedicine system; and public awareness campaigns are on the fast track to improve mass-casualty incident handling in the state of Assam.
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## Health Risks of First Responders following a Meteorological Disaster

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**Study/Objective**: The objective of this study is to create a comprehensive list of health hazards following meteorological disasters, to aid first responders in preparation for their deployment.
**Background**: Globally there were a total of 125 meteorological disasters in 2016, a number of which required international deployment of first responders. Deploying responders arrive at the location of the event in various states of their personal health, and thus will have different responses to existing health hazards. If previous deployments are not taken into consideration, for example, they can hinder response efforts by introducing contaminants to an already vulnerable population, as was the case in Haiti which caused 8,300 deaths from Cholera bacterium. It is imperative to effectively prepare first responders for their deployment to prevent them from becoming victims themselves, using limited local resources and to ensure that they are available to perform their duties for the duration of their deployment.
**Methods**: There are three models for studying health; they are biomedical, sociological, and political economy (Birn, 2009, p133). Each model identifies areas of concern and directs research methodology, however, neglects to consider the complexity of health that would address an individual's vulnerability

based on issues such politics, economy and social factors. This paper utilizes a biomedical perspective, by integrating epidemiological studies related to health effects due to the exposure to various pathogens or hazardous materials immediately following a natural disaster, as well as the epidemiological studies of populations affected by natural disasters.
**Results**: Meteorological disasters include extreme temperatures and storms, and have their own health risks such as lightning, hail, strong winds, among others. Health hazards and their associated harm are listed in a table along with suggested preparedness measures.
**Conclusion**: We created list of health hazards that can be used as a tool for health risk mitigation planning, strategy development, and resource allocation towards the wellbeing of first responders.
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### Functional quality indicators for assessing health care initial response to societal disturbances for education

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**Study/Objective**: The purpose of this paper is to describe the procedure of identifying and developing quality indicators during educational activities. In addition, the steps taken to assure the validity and reliability of the indicators are presented.
**Background**: In Sweden a national effort has been made to structure the work processes for crisis preparedness. That is, the process for regional health point of contact and the designated duty officer, has been modified in an attempt to support a shared view regarding collaboration and command during societal disturbances. The effort consists of education and training of designated duty officers, while also developing quality indicators for assessing the work process before the designated duty officer declare a major incident.
**Methods**: The work of identifying and developing the quality indicators was carried out in focus groups with domain experts.
**Results**: Initially the work processes of the designated duty officer were thoroughly analyzed and described. The work process was separated into three distinct phases. Focus was on the first two phases. These process steps, have thereafter been connected to concrete behaviors or products that are assessed. The quality indicators are directed towards two levels; if a process step has been carried out within the time-frame, and also the performance quality of an indicator. For example, has an operational picture been established within three minutes of the alarm call? If so, what was the quality of the decision based on, the event description, the consequence description, or the measures description?
**Conclusion**: The aim of the quality indicators is to make sure that educational activities that are performed does in fact result in actual, and measurable impact. This approach confirms to what extent the activities are successful.
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### A Cognitive Aid for Anesthetic and Operating Room Management during a Hospital Power Failure

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**Study/Objective**: The objective of this study was to create standard processes to guide the immediate anesthetic care of patients, and the rapid triage of operating room status and needs during a power loss event.
**Background**: Hospital power failures can occur because of extreme weather events, regional disasters, local disruption of municipal power, or an internal problem. Case reports of operating room power outages demonstrates that generator failure, inadequate emergency supplies, poor communication, and chaos due to lack of emergency plans are common issues.
**Methods**: Our team developed a strategy to prepare for hospital power failure, focusing on 32 operating and procedural rooms in 3 buildings. The battery life of our equipment was researched and/or tested. A concept of "room triage" using color indicators was developed to create a standard language, to describe status of the staff and patients in a room and the need for help. A cognitive aid to guide anesthetic care was developed and tested (Figure), and emergency monitoring kits with headlamps were placed in each room. A process for rapid assessment of the safety of each room by a central command area was established.
**Results**: Five table-top and live exercises of the new process were performed. Approximately 6 months later, our hospital experienced a brief power interruption. The expected lights and monitors were offline for a short period. We initiated our emergency plan immediately. Using runners with paper and pens, the perioperative command team had an accurate assessment of the safety and functionality of all rooms within 10 minutes. Many clinicians in the rooms had already opened up their emergency kits and were using the cognitive aid.
**Conclusion**: Hospital power failure can jeopardize patient and staff safety. Careful planning, preparation and practice is necessary to prevent adverse outcomes in the event of this emergency.
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### Achieving 'Buy-In' for Climate Resiliency Initiatives in Health Systems

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**Study/Objective**: We designed a climate risk-assessment project that demonstrates value to leadership and expert stakeholders, and ultimately creates understanding of climate threats facing our health system, in order to implement effective interventions.
**Background**: Climate change is influencing weather intensity and patterns creating new, increased threats for health care facilities. Historical data are no longer sufficient in determining risk, as evidenced by the 2016 Louisiana floods where one-third of flooding occurred outside of the 100-year flood zones. Health care organizations must consider the surrounding built environment and community networks, which could influence the impact of an extreme-weather event upon their operations. Conducting the detailed, forward-looking analysis required to make informed decisions requires broad leadership and subject matter, expert collaboration internal and external to the organization.
**Methods**: A multidisciplinary project team was formed comprised of senior leaders in real-estate, emergency preparedness, risk management, insurance, and external climate experts. Together, these representatives could address structural, operational and fiscal challenges and opportunities related to climate threats based in science. Three data collection tools were chosen: (1) detailed, multi-scenario climate modeling; (2) completion of a climate-resilient health care facilities checklist; and (3) stakeholder meetings with insurers, public utilities, and public transportation agencies to understand external vulnerabilities and opportunities. Finally, analysis was conducted with near and long-term horizons, allowing two-points of intervention: operational changes in the near-term, and facility construction changes addressing long-term threats.
**Results**: Phase I of the project was completed for 30 sites across the health system. Results were shared with key leaders at the enterprise and institution level. Key findings include a system-wide threat from extreme heat events and vulnerabilities to critical infrastructure which may place an indirect burden on our facilities.
**Conclusion**: Building climate resiliency requires a multi-disciplinary approach. Assessed at multiple time horizons, facilities upgrades, operational enhancements, and improved coordination with interdependent agencies and institutions can occur.

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## A Proposed Disaster Casualty Classification Framework

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**Study/Objective**: To design a disaster-casualty classification framework.
**Background**: "Casualty" is a key term in the discipline of disaster medicine. Searching and rescuing disaster casualties is the main work of a health care task force in a disaster zone. However, the term is often erroneously used for the seriously injured and dead. Until the term "casualty" had been clearly defined and classified, we couldn't get a full picture of casualty flow in disasters. There is a difference in managing patients with treatable traumas and diseases versus those who struggle resulting in death.
**Methods**: Multiple web searching tools (Pubmed, Wikipedia, Yahoo search, etc.) were used for relevant articles, abstracts, and grey literatures covering the period January 2000-December 2015. A qualitative survey questionnaire was designed based on search results. An informal, multi-disciplinary, expert working group was established, including 18 individuals representing the discipline of emergency management, public health, clinical medicine, and military medicine. The experts were invited to write comments on the questionnaire separately. The comments of the experts were synthesized into a comprehensive report. In July of 2016, an expert meeting was held on our campus to discuss the report and reach a consensus about the disaster-casualty classification framework.
**Results**: Eleven documents were considered highly relevant. The experts believed that before giving a definition to "casualty," "disaster scene" and "health care facility in the disaster zone" should be defined. We then define "casualty" as "anyone incurring a trauma or illness, or dying as a direct result of disaster." Disaster casualty must include the deceased and can be classified into two parts: casualties with trauma and casualties with illness. Each part has three sub-groups: death on the scene, casualty coming to a health care facility for treatment, and casualty who needs medical treatment but didn't come to any health care facility. For casualty coming to a health care facility for treatment, it can be classified into three portions: death in the health care facility, the inpatient, and the outpatient. Each associated term must be defined carefully and explicitly. Disaster casualty has its unique classification method; each part and sub-group need different public health and medical interventions and treatments.
**Conclusion**: This is a tentative study to draw a picture of disaster casualty. Disaster exerts tremendous influence on disaster casualty and the process of casualty production is complex and complicated. Our disaster-casualty classification framework is proposed to be tested and improved.

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## The Challenges on Implementation of Pre-Disaster Efforts of Health Crisis Center (PPKK), Indonesia Ministry of Health (MoH) in 2014

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**Study/Objective**: Disasters in Indonesia have a positive trend showing that the average disaster has increased every year.
**Background**: isaster management circumstances can reduce the risk of disaster, but it is technically concern on pre-disaster mitigation efforts. This research was a field study in PPKK which had been done from January 12, 2015 until February 16, 2015. The purpose of the research is to know the challenges on implementation of pre-disaster efforts of PPKK in 2014.
**Methods**: This research was using a qualitative approach by through in-depth interviews and also from program reports of PPKK. The information and data collected then processed by Root Cause Analysis (RCA).
**Results**: The challenges that may caused a high incidence of health crisis in Indonesia related to the pre-disaster efforts of PPKK were that (1) inadequate amount of staff, (2) lack of control PPKK to Regional Health Department as the implementer; (3) irrelevant data analysis and display; and (4) capacity building of human resources did not involve all regionals.
**Conclusion**: N/A

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## Preparing the Public Health Workforce to Meet the Challenges of Rising Sea-Levels, Virginia

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**Study/Objective**: The objective of this paper is to outline the key components of a new initiative in the Hampton Roads region of Virginia, aimed at preparing future public health professionals for the health challenges posed by rising sea-levels.
**Background**: Many of the most serious impacts of rising sea levels are those affecting human health. Bigger storm surges and increased flooding can result in deaths and injuries in affected communities, population displacement and dislocation, and associated mental health impacts. Higher sea-water levels can also result in the rapid growth of mosquito populations and the spread of disease, since stagnant bodies of brackish water provide ideal breeding grounds for disease-carrying mosquitos. Examples of other health impacts include the loss of vital fresh water supplies due to the intrusion of salt-water, damage to essential healthcare and public health facilities, and the spread of biological and chemical contaminants. Because the direct and indirect health impacts of rising sea levels are expected to grow significantly in the coming years, and it is crucial that future public health professionals be trained, and have practical experience with the health issues and implications of rising sea-levels.
**Methods**: In the Hampton Roads region of Virginia, an area that is already experiencing significant effects from rising seas, an innovative effort has been launched to help prepare the future public health professionals to meet the health challenges of rising sea-levels. Based on the Masters of Public Health (MPH) program, sponsored jointly by Old Dominion University (ODU) and Eastern Virginia Medical School, the initiative includes several inter-related components. One part involves the incorporation into the MPH curriculum of new rising sea-level educational content and training modules. In addition, because practical experience with rising sea-level issues is also essential, classroom and related curricular efforts are being complemented with newly-developed practicum sites and other practice opportunities at agencies and organizations already grappling with real-world rising sea-level issues in the region.
**Results**: Initial efforts to incorporate rising sea-level content and training into the MPH curriculum began in 2014, and have continued to expand since that time. Meanwhile, close links were established with agencies and organizations currently addressing rising sea-level issues in the region, and in 2015, the first student practicum site focused specifically on rising sea-levels and public health was created. Additional practicum sites and other practice opportunities related to rising sea-levels were developed in 2016 and are slated to expand further. Through this developing initiative, future public health professionals have the opportunity to learn about rising sea-levels and health issues, and be part of real-world rising sea-levels adaptive planning and preparedness activities.
**Conclusion**: Many of the most serious impacts of rising sea levels are those affecting human health. Thus, it is crucial that future public health professionals be familiar with, trained in, and have practical experience with, the health issues and implications of rising sea-level. The new initiative now under way in the Hampton Roads region of Virginia, though still in its early stages, is already helping prepare future public health professionals in the region to better meet the emerging health challenges posed by rising sea-levels.

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## Hospital Health Resources Management: Impacts and Legacy of a Disaster in Brazil

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**Study/Objective**: To analyze the impacts and legacy on human resource management, from the care provided to victims of a fire at a hospital in Southern Brazil.
**Background**: Responding to disaster situations challenges hospitals, which have to be prepared to respond to a sudden increase in emergency presentations, while still providing services to existing patients. In January 2013, a fire in a nightclub resulted in 160 people injured, 18 of which were transferred to the Hospital de Clínicas de Porto Alegre.
**Methods**: A qualitative case study was undertaken. This included semi-structured interviews with 17 health professionals who were involved in the clinical care of these injured victims. Also documents, such as Institutional Contingency Plans for External Catastrophes, and reports specifically related

to the experience were used as sources of data from August to November 2014. Data was analyzed using thematic analysis.
**Results**: After the disaster was communicated to hospital management, medical and nursing teams were recruited. A list of willing health professionals wasn't available, making the access to and organization of human health resources dependent on professionals' willingness to attend. The proportion of the disaster caused a national outcry. This community concern was reflected in the positive response of health professionals who volunteered to come to work. They were however challenged with severe conditions, which demanded a very high level of response and care during the admission of patients. This very intense situation and workload impacted negatively on a number of health professionals who had volunteered to respond.
**Conclusion**: Although health professionals and hospital management staff were able to mobilize and adapt to this sudden external demand, the identified impacts on health professionals indicated the need for better preparation. As a legacy, a structured plan for the hospital was developed using internationally recommended procedures to disaster preparation and response.
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### What Should an African Health Workforce Know About Disasters? Proposed Competencies for Strengthening Public Health Disaster Risk Management Education in the African Region

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**Study/Objective**: The objective of the article is to provide information and opportunities which could be used to improve health Disaster Resilience Management (DRM) training in Africa.
**Background**: As part of efforts to implement the human resources capacity building component of the African Regional Strategy on disaster risk management for the health sector, the World Health Organization, Regional Office for Africa (WHO/AFRO) in collaboration with selected African public health training institutions, developed core competencies and training curricula for training African health workers, on public health disaster risk management. This article will describe the methods used to develop the competencies, and present the competencies and training curricula which were identified.
**Methods**: A curriculum development process was implemented through a consultative, multi-stage process involving a team of African emergency public health academicians and practitioners. In-depth reviews of the existing emergency public health training programs in the Region, and the skills and knowledge required to implement regional strategy were conducted. Core competencies required by African health workers to effectively engage in DRM were identified.
**Results**: Fourteen core competencies and 45 sub-competencies/training units grouped into five thematic areas were identified, namely 1) introduction to DRM; 2) operational effectiveness; 3) effective leadership; 4) preparedness and risk reduction; 5) emergency response and recovery were defined as the skills and knowledge that African health care workers should possess in order to be able to effectively engage in health DRM. Three levels of training courses were proposed, to suit the needs of various categories of African health care workers.
**Conclusion**: In adopting these competencies, African member states should ensure that they are adapted to the local contexts, and the resulting training courses should be as practical and field-based as possible. We recommend urgent finalization of the learning materials for the courses, and establishment of a system for monitoring and evaluating the quality and impact of public health DRM training programs, trainees and trainers in Africa.
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### A Survey on Career Development Plan among Healthcare Workers in Komfo Anokye Teaching Hospital (KATH)

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**Study/Objective**: To assess knowledge, attitude and perceptions of healthcare workers on their career development plan.
**Background**: Healthcare systems worldwide are adversely impacted by the growing and changing health needs of the population. Absence of clarity of career pathways, will create distortions in orders of service for many health professionals, and will result in stagnation in career advancement of staff and loss of significant number of health workers to other competing institutions.
**Methods**: A cross sectional study was conducted in March-April 2015 at Komfo Anokye Teaching Hospital (KATH). Clinical health workers were interviewed on their knowledge, attitude, and perceptions on career development plans. A stratified sampling technique was used to recruit 142 clinical health workers into the study.
**Results**: It revealed high literacy levels (n = 102, 71.9%) of respondents who had at least attained tertiary education as their highest form of formal education. Majority of respondents

(n = 108, 76.1%) had goals that related to career advancement. Thirty-one (21.8%) respondents did not have such goals to improve themselves as health professionals, 86.6% (n = 123) respondents felt it was important to develop one's professional health career, 77.5% (n = 129) respondents had taken steps to develop their career to a certain level, and 76.1% (n = 108) out of 142 respondents agreed that KATH had supported them in their career development.

**Conclusion**: Developing one's health career is a way to improve and increase on previous knowledge gained through practice or formal education. A well-structured career pathway will help health workers to be more receptive to new and improved ways of patient care and management.

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## Health Sector Preparedness for Disaster in a Small Island: A Case Study in West Seram District, Maluku Province

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**Study/Objective**: The objective of this research was to measure the health sector capacity to face disaster in the West Seram District.

**Background**: The West Seram District is one of the Districts in Maluku Province that has high vulnerability to disasters. It is vulnerable to earthquakes, tsunamis, floods, landslides and sea transport accidents. In emergency situations, the Health Sector plays an important role in saving human lives. The ability of the health sector is to keep functioning without interruption, it's about life and death.

**Methods**: Health Sector Preparedness by Center for Health Policy and Management, Faculty of Medicine, Universitas Gadjah Mada (CHPM FoM UGM) were used to assess the District Health Office, Hospital, and their Primary Health Care disaster preparedness levels. The Center for Health Policy and Management Faculty of Medicine UGM Health Sector Preparedness measures four elements: disaster policy and organization, procedures for disaster, facility and human resources, and monitoring evaluation. The tools classify and scale the scores of health sector preparedness into three categories: A = 0-0.35, low level; B = 0.36-0.65, medium level; and C = 0.66-1.0, high level of preparedness.

**Results**: The overall CHPM FoM UGM health Sector preparedness in West Seram District was on the low level of preparedness. Health sector preparedness index of West Seram District Health office, Piru Hospital, and Luhu Primary Health Care was 0.04, 0.13, and 0.00 respectively. The level of preparedness on policy and organization, procedures, facility and human resources, and monitoring evaluation were on the low level also.

**Conclusion**: The current level of health sector preparedness status is low in all health sectors (district health office, hospital and primary health care). Multiple elements of disaster preparedness are also on the low level. Urgent interventions are recommended to improve several elements of health sector preparedness to protect a community during and after a disaster.

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## A Chain Approach to Risk Assessment for Regional Continuity of Care in Emergency and Disaster Medicine

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**Study/Objective**: A risk based approach to Emergency and Disaster medicine in the South West region of the Netherlands

**Background**: Wildavsky argued that a mixed strategy of anticipation and resilience is optimal for managing risk. In the Netherlands, the most emphasis is on resilience. The General Board of the Acute Care Region of South West Netherlands aims at better informed decisions for disaster medicine, and decided to develop a risk based approach instead. From a regional perspective the focus is on collective care (interdependencies in the medical chain) and the opportunities for cooperation. A multi-annual project was started to determine the priorities for the near future, and to decide on risk acceptance and insurance, prevention and mitigation. The first step of risk assessment and priority setting has been finalized and will be presented.

**Methods**: A long list of risks was derived from literature, and was transformed into a short list of relevant groups of risks, for the acute care and the public health care. Risks were grouped by stakeholder, and specified by the dynamics and knowledge of the incident, and the direct response and aftercare. The hospitals, ambulance services, dispatch centers, general practice centers and acute mental care institutions were requested to assess the business impacts. The public health services and the authorities assessed the societal impacts. Together, they determine the priorities. Several workshops were held, and a help desk was installed to facilitate the assessment process.

**Results**: A project team including all participating parties will propose priorities. The General Board decides on the priorities for the first year(s). Priorities are expected to be the highest risks and/or the best opportunities.

**Conclusion**: A risk based approach is the logical next step for disaster medicine. Risk management enables better informed decision making on disaster medicine, and provides an opportunity to reinforce the mutual cooperation between all partners in disaster medicine.

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## When Disaster Strikes what is the Role of the Local Primary Healthcare Doctor?

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**Study/Objective**: To examine the role of Primary Health Care (PHC) doctors in disasters.
**Background**: Research shows that primary health care strengthens population health outcomes across developing/developed nations and disparate health groups. Life expectancy is increased, infant mortality decreased, and access to health care more equitable; a strong element of this is continuity-of-care. However, in disasters, this care can be disrupted as PHC doctors are not linked into disaster response, with potential adverse effects on population and individual health in the months to years following the aftermath. Existing disaster management systems currently focus on local capabilities. PHC doctors are locals; part of the local community and health care with a unique contribution to offer to patient care during any adversity.
**Methods**: The epidemiology of health consequences of disasters was reviewed. A temporal pattern of the prevalence and incidence of health effects and health deterioration over time emerges. Interviews were conducted with PHC doctors and disaster management experts involved in the November 2010 E.Australian floods, the 2010-2011 Christchurch earthquakes, 2013 NSW bushfires, and the 2014 Sydney Siege, exploring the diversity of roles played by PHC doctors across the PPRR of disasters.
**Results**: Roles that the PHC doctors undertake in disasters varies considerably. Many are spontaneous and unsupported, with few involving planning or preparedness. Key messages from the PHC doctors involved in disasters are consistent across the different disasters.
**Conclusion**: In order to improve the health of people affected by disaster, there is an urgent need to define the role of primary care in existing disaster management systems, using evidence from the literature and experience from the field. Pre-disaster involvement on local disaster planning committees, as well as patient and practice preparedness; during-disaster continuity-of-care for the local population; and post-disaster involvement in health surveillance for emerging disease and deterioration of existing health conditions are crucial to strengthen and optimize community health outcomes following disasters.

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## Analysis of Disaster Related International Frameworks 2015-2016: Implications for WADEM

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**Study/Objective**: To analyze disaster related International Frameworks 2015 - 2016, and identify implications for WADEM
**Background**: In the period 2015 - 2016, a number of influential international disaster-related Frameworks evolved, including the: Sendai Framework for Disaster Risk Reduction 2015 - 2030; Sustainable Development Goals-2030 Agenda; Paris Climate Change Conference; World Humanitarian Summit; Rockefeller Foundation's 100 Resilient Cities Project; WADEM's Disaster Research and Evaluation Frameworks; and, ALNAP's Evaluation of Humanitarian Action Guide. Our research question asked if there were commonalities and potential interactions between these Frameworks and if there were possible implications for WADEM?
**Methods**: A desktop review and thematic analysis of the definitive documents from these Frameworks was undertaken.
**Results**: These international Frameworks all had substantial theoretical and / or evidence based underpinnings, and evolved from structured processes over a period of time. The Sendai Framework, Sustainable Development Goals (SDG), Paris Climate Change Conference and World Humanitarian Summit all had major political and government influences, while the Rockefeller, WADEM and ALNAP Frameworks were led by applied, professional influences. A number of the SDGs include targets specifically related to natural disasters. Common themes included: the desire to improve the quantum and quality of the science, evidence-base and accountability in this domain; the use of 'Resilience' as a concept and as a framework to consider interventions; commonalities and interactions between the new generation 'humanitarian and development' concepts and traditional 'disaster' concepts, particularly in the global trend towards greater urbanization; and, new paradigms, eg the international influence of Rockefeller's 'Acute Shocks'; and 'Chronic Stressors' concept, which shares commonalities with the SDG's.
**Conclusion**: The Rockefeller, WADEM and ALNAP Frameworks provide useful guidelines on how the objectives of Sendai Framework, Sustainable Development Goals, Paris Climate Change Conference and World Humanitarian Summit may be achieved and measured. All Frameworks have implications for the direction of WADEM and for WADEM to globally influence.

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## Facilitating Decision-Making and Provision of Medical Care during Disasters through Utilization of a Comprehensive Computerized Information System

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**Study/Objective**: To present contributions of a comprehensive computerized information system to decision-making and provision of medical care during disasters.
**Background**: During disasters the healthcare systems are required to ensure provision of medical services to vulnerable populations. In order to monitor vulnerable patients and ensure efficient management of resources, information systems are needed.
**Methods**: "Meuhedet", an HMO which insures 1,200,000 patients, developed a comprehensive information system which

includes a database concerning patients, infrastructure and personnel, as a unique management tool. The GIS-based system enables to identify the location and current status of patients and providers at all times. During large-scale fires that occurred in Israel between November 22-27, 2016, which necessitated mass evacuation of populations, the information system was used to locate vulnerable patients and plan provision of needed services.

**Results**: Following the decree of mass evacuation of all populations from the risk zones due to the fires, the information system enabled the HMO to locate all vulnerable patients within minutes, and plan provision of specifically needed services: 2 patients from a nursing home and 1 home-care ventilated patient were located and evacuated within 2 hours. Specific medications were supplied within two hours to patients who were evacuated to absorption centers or hotels, based on their personal files available through the information system. One terminally ill patient was tracked and treated by the home-care unit within 3 hours, based on the data provided by the information system.

**Conclusion**: The comprehensive information system facilitated decision-making and improved ability of primary health care workers, to provide efficient and continuous medical care in the community during the disaster. During the recent fires in Israel, vulnerable patients were located within minutes and provided with individually-needed medical care within 2-3 hours, due to the availability of the information system that provided vital data concerning each patient.

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## The Introduction of Hospital MIMMS, A United Kingdom Based Hospital Mass Casualty Response Course to Australia: Needs, Issues and Solutions

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**Study/Objective**: An outline of the introduction of a standardised, national, mass-casualty response course to Australian hospitals, including review of obstacles and issues experienced together with adopted solutions.

**Background**: Although the Advanced Life Support Group (ALSG) Major Incident Medical Management and Support Course (MIMMS) has been well established in Australia for several years, there was no corresponding, nationally consistent course providing hospital care providers with a similar framework for response. Several jurisdictions utilized locally applicable education, but an overall consistent national approach was absent.

**Methods**: Since a nationally consistent approach to hospital-based mass-casualty response had been identified as desirable by the National MIMMS Working Group (NMWG), efforts were made to identify an appropriate, credible, and internationally recognized course. Funding was sought from the National Critical Care & Trauma Response Center (NCCTRC), and negotiations with the UK based Advanced Life Support group ensued. In October 2014, two UK-based instructors traveled to Australia to provide an introductory course, and to train an initial cadre of Australian instructors with subsequent local roll out.

**Results**: The course was subjected to a process of iterative improvement based on participant feedback and instructor review. Many initial perceived issues revolved around definitions and terminology, which differed between the two nations. Significant attention was paid to the requirement for a course with a national remit, but which remained sufficiently flexible to adapt to the varying systems, processes, and procedures of the various Australian jurisdictions. HMIMMS has subsequently been adopted by four of six participating Australian jurisdictions, with 18 courses being run nationally between October 2014 and October 2016.

**Conclusion**: HMIMMS was successfully adapted to the Australian context, and adopted by four of the six participating jurisdictions. The remaining two may adopt HMIMMS at a later date. Australian implementation of HMIMMS demonstrates a successful collaboration of jurisdictions within a federated system.

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## Maintaining Continuity of Care in the Recovery Phase With Family Medicine

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**Study/Objective**: The recovery period of a disaster often requires re-establishing health care and maintaining continuity of care for a large number of victims. This means recruiting primary care physicians who are preferably trained to provide healthcare to all ages, as well as having the ability to provide treatment covering a wide range of specialties. The specialty of Family Medicine is well-positioned to lead the healthcare recovery phase of disasters, prevent breach of medical care, manage chronic care issues, and provide urgent care treatment, thus alleviating the burden on the local emergency departments.

**Background**: The medical recovery phase of a disaster is a chaotic period where re-establishing health care, and re-connecting the affected population to their primary care physicians becomes a complex challenge. This is partially due to displacement of the affected population, including the local physician force, as well as destruction of local clinics, both which are a necessity in resuming healthcare to full capacity.

**Methods**: Analysis of the recovery periods of multiple disasters over the past decade, and in different geographical locations for loss of primary care capacity.

**Results**: Deficit of primary care providers during the recovery period, breach in continuity of care for many patients, and lack of clinic guidelines were all identified in varying degrees in each disaster examined.

**Conclusion**: Activating specialists in Family Medicine to assume the lead during the disaster recovery phase will preserve

continuity of primary care for many, as well as strengthen and accelerate the re-establishment of healthcare in the post-disaster period.

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## The Role of Hospital Volunteers in Disaster Planning and Response

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**Study/Objective**: Discuss hospital volunteers in disaster planning and response in a large, urban tertiary care center.
**Background**: Volunteer Services at The McGill University Health Centre (MUHC) began participating in disaster response and training following the 1989 École Polytechnique massacre in Montreal, Canada. Over time the program has grown and is now comprised of over 80 volunteers across two hospitals.
**Methods**: The MUHC volunteers were deployed in 2 official emergency situations (Concordia University massacre in 1992 & Dawson College shooting in 2006), and provided support during the January 1998 North American ice storm. In addition, they participate in hospital emergency planning meetings, yearly disaster response training including live mass casualty simulations, and fan-out testing drills. The MUHC Volunteer Department has provided 10 to 80 simulated patients for each of the training exercises conducted since 2012.
**Results**: Through participation in disaster planning and response, hospital volunteers were found to be a reliable, well trained, independent, un-costly and flexible source of manpower, familiar with the hospital environment and functioning. Specific roles have been identified and integrated into the external disaster response plan:

- Assist ED Nursing and Security teams, directing patients to designated disaster triage entrance
- Assist ambulatory patients to treatment areas after ED triage
- Perform regular ED Duties with an expected increased workload
- Participate in the Psychosocial Response with other members of the multidisciplinary Psychosocial Response Team
- Perform regular inventory of disaster response materials Frequent turnover and limited funds for training are factors limiting further involvement of hospital volunteers in emergency management.

**Conclusion**: Hospital volunteers are a valuable asset to the hospital during an external disaster. Their involvement in emergency management activities including regular attendance at planning meetings and participation in simulations are key to successful collaboration when external disasters occur.

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## Catastrophic Data Disruptions: A New Frontier for Disaster Preparedness

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**Study/Objective**: To outline the causes, effects, and mitigation strategies of catastrophic health care data disruption.
**Background**: Recent years have seen a surge in disruption of health care delivery due to various causes. Health care data has become a target for a variety of actors, especially in the field of cyberspace. As we become more urbanized, we have increasingly become dependent on information technology to retain and retrieve long and complicated patient medical records to allow us to practice medicine safely and efficiently. Thus, the cyber-physical system has become a key infrastructure item that needs to be protected against threats.
**Methods**: A detailed Internet search was conducted to look for possible causes, effects, and mitigation strategies of catastrophic data disruption. The findings were listed in the results.
**Results**: **Risks to Patient Data Systems emanate from:** 1. Targeted cyber-attacks:

- Disgruntled employees;
- Cybercriminals– especially for Ransomware;
- Nation states.

2. Business risk to any part of the data chain:

- Attack on database provider's cloud;
- Financial bankruptcy of any part of the chain (vendor/sub-vendor);
- Physical infrastructural damage to servers/storage systems.

3. Power outage and related IT failure. 4. Solar flares. 5. EMP weapons. **Immediate effects on health care delivery are**: 1. Cascading failure of health delivery. 2. No medical records can be retrieved, bringing care to a halt. 3. Medications cannot be served safely. 4. Impaired care of patients on critical care support - ICUs, EDs, hemodialysis, and chemotherapy units. 5. No refilling of prescriptions. **Best Practices in Operations Continuity involve**: 1. Crisis Communications protocol for a confirmed outage. 2. Scenario-based preparedness exercises: Downtime Protocol. 3. Easy-to-deploy paper-based recording material: Downtime toolkit. 4. Service recovery with alternative off-site hardware and software providers. 5. Cloud-based backup redundancy arrangements.

**Conclusion**: Catastrophic Data Disruptions are a new frontier in disaster preparedness. It involves everyone and can be crippling if not prepared for in advance.

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## Ensuring Operational Continuity of Community Healthcare Services During Disasters

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**Study/Objective**: To present contribution of a national guideline on the capacity of community primary care health care systems to establish and sustain operational continuity during disasters.
**Background**: "Meuhedet" is the 3rd largest Health Maintenance Organization (HMO) in Israel, insuring 15% of the population (~1,200,000 members). The HMO is committed to

provide continuous medical services to its members in routine and crises. Ongoing operation is dependent on the availability of manpower, infrastructure, medical equipment, information technology, and computerized systems. Advanced planning is required to ensure sustainability of services, even during significant disasters.

**Methods**: An operational continuity plan was established, basing the sustainability efforts on international standards. Through adaptation of a process of Business Impact Analysis on the health care system, core vulnerabilities within the HMO were identified, priorities, and criticality of each service were defined as follows: HIGH: Recovery Time Objective (RTO) immediately or up to 24 hours; MEDIUM: RTO within a week; LOW: RTO within four weeks. The plan encompasses all critical elements and services, including computerized system, manpower, infrastructure, and vital equipment.

**Results**: The operational continuity plan was evaluated and approved by the senior Executive Board of the HMO and has been adopted as a perennial work plan. A designated organizational structure was developed as responsible for the implementation and management of the recovery plan during a crisis. Once a year, training and exercise of the recovery plan is conducted, cross-cutting all critical services including: primary care, nursing, pharmacy, laboratory, radiology, home care for vulnerable populations, mental, and emergency dental health services. The aim is to achieve participation of at least 25% of the pre-defined population in the annual training program.

**Conclusion**: Implementing preparedness for various disasters ensures recovery within the designated objectives, which were defined in the operational continuity plan. A significant budget needs to be allocated in order to facilitate an effective preparedness.

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## What are the Most Effective Methods of Disaster Preparation for Health Professionals and Support Staff? Perspectives from Staff at St Vincent's Private Hospital, Sydney - Phase 1 of a Multi-site Study

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**Study/Objective**: A multi-site study aiming to identify preferred methods and content of disaster preparation for medical, nursing, allied health, and hospital support staff. This research can guide preparation at the site hospitals and beyond.

**Background**: St Vincent's Private Hospital Sydney (SVPHS) conducts a range of disaster preparedness programs which have not been comprehensively evaluated. An integrative literature review identified little high-quality research evaluating best practice preparedness. The most effective methods of preparedness could not be established. The review also identified that health professionals may not be fully prepared, and may elect to not work during disasters. Research to date mostly focused on doctors and nurses (Gowing, Walker, Elmer & Cummings, in press). Quality research is required, which engages all disciplines of health professionals and support staff, as hospitals require this range of staff to function effectively.

**Methods**: Qualitative multiple case study design. Phase 1 conducted during 2016. Semi-structured interviews with health professionals. Focus groups with hospital support staff. Purposive sampling. Interview and focus group guide – developed using hospital experience and the literature review. Validated with PhD supervisors and disaster managers. Ethics approval obtained from the University and Hospital.

**Results**: The results will be analyzed to understand the what, how, and why. Case comparisons between occupational groups. The results can be discussed at the WADEM Congress 2017. The SVPHS "case" will later be compared to "cases" at two other Australian teaching hospitals.

**Conclusion**: Given resources available for health services and increasing prevalence of disasters worldwide, it is important that data are available to guide health services and professionals in the most effective methods of disaster preparedness. To promote an effective response, all disciplines in the health team should be included to inform such data.

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## Disaster Management and Emergency Preparedness within Turkish Healthcare System

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**Study/Objective**: This paper aims to describe disaster management and emergency preparedness within health care system of Turkey and review related publications.

**Background**: Turkey is facing regular natural and manmade disasters. Earthquakes, landslides and floods are the most frequent natural disasters. Turkey has terrorism problems too, and has lost more than 35,000 people to terrorist events since the 1980s. Since the beginning of the Syrian civil war in 2011, Turkey experienced an increased number of bombings, including the deadliest attack in its history at the capital on October 2015, with more than 100 casualties.

**Methods**: Policy guidelines and previously published government reports were reviewed for policy recommendations, and a summary of literature is presented.

**Results**: The Disaster and Emergency Management Authority has been developed after the 1999 Golcuk earthquake, and currently has 81 provincial branches and coordinates all emergency response and disaster recovery efforts. The Ministry of Health (MOH) has its own disaster and emergency response directorates, and has medical management and training responsibilities (image 1). The National Emergency Response Team (NMRT) is working under MOH and is responsible for on-site medical

management and rescue efforts during disasters. Local municipalities have their own emergency response centers. Major shortages within healthcare systems for disaster preparedness were described as lack of investment on building infrastructure, and deficiency of preparedness levels of the health care workers. MOH provided hospital disaster plan templates and materials for healthcare facilities. Hospital administrations are required to follow this plan and improve facility resiliency. Investments were planned for improving healthcare facility infrastructures.

**Conclusion**: With increased terror since 2013, we have emphasized the importance of a developed all hazards approach for healthcare systems. Quality and practicality of hospital disaster plans, and readiness levels of the healthcare facilities and their workers needs further research. A national disaster plan should be revised with an all hazards approach, addressing healthcare readiness problems, including infrastructure issues and training deficiencies of healthcare workers.

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## Developing a Context Appropriate Emergency Department Disaster Preparedness Protocol in Black Lion Hospital, Addis Ababa, Ethiopia

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**Study/Objective**: The objective of this project was to create a disaster preparedness protocol for the emergency department of Black Lion Hospital.

**Background**: Emergency medicine is new to Ethiopia. Disaster preparedness is one of the integral parts of emergency medicine. The objective of this project was to create a disaster preparedness protocol for the emergency department of Black Lion Hospital.

**Methods**: A draft of a context appropriate disaster preparedness protocol was prepared by one of the investigators. This was modified and edited by the team of investigators. This was then presented to different stakeholders for discussion and modification. The final version was prepared and tested by a disaster drill.

**Results**: The hospital was recognized for its preparedness and response during the disaster drill by the Federal Ministry of Health. There were good reviews and overall good team organization. The protocol was adopted in the emergency room.

**Conclusion**: Disaster preparedness protocols should be context appropriate. It is important to mobilize and involve different professionals for a better result.

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## Facilitating Decision Making During Disasters to Ensure Continuity of Home-Care Services to Vulnerable Populations during Disasters

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**Study/Objective**: To present contribution of a comprehensive computerized system to decision making and provision of medical care during disasters.

**Background**: During disasters, the health care systems are required to ensure provision of medical services to vulnerable populations that require designated medical community services or home care. In order to facilitate provision of medical care to the vulnerable population, and ensure efficient management of all resources, information systems and defined standard operating procedures (SOPs) are needed to ensure full control and monitoring of all patients.

**Methods**: In order to ensure continuity of community and home care, "Meuhedet," an HMO which insures 1,200,000 patients, developed a comprehensive information system which includes a database concerning patients, infrastructure, and personnel as a unique management tool. The GIS-based system enables us to identify the location and current status of patients and providers at all times. SOPs were developed to guide medical and management teams in their use of the system.

**Results**: The information system is user-friendly, accessible to all relevant providers, and enables access to data on insured population in real-time. The computerized system serves as a management and control tool, used by the national administration to control and monitor activities during crisis, as well as a vital tool for physicians deployed to provide home care. The data concerning each patient can be accessed, processed, and integrated as part of the treatment in any location in which medical care is being provided.

**Conclusion**: Provision of effective medical care to patients requiring home care requires access to information concerning medical backgrounds and needs. The creation of a comprehensive information system, in tandem with organizational SOPs, facilitates decision making and improves ability of primary care health care workers to provide efficient and continuous medical care in the community.

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## Provision of Primary Care Services to Civilian Populations following their Evacuation During Crisis

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**Study/Objective**: To ensure provision of primary care services to civilian populations following evacuation during crisis.

**Background**: At various crises, Populations under risk may need to be evacuated to alternate locations. Health Maintenance Organizations (HMOs) are responsible to ensure continuous provision of primary care services to those populations, which includes diverse groups of patients with an array of medical needs, ages, cultural, and religious backgrounds. Designated information systems and defined standard operating procedures (SOPs) are needed to ensure functional continuity and provision of services during crisis.

**Methods**: To ensure continuity of services to evacuated populations, "Meuhedet," the 3rd largest HMO in Israel,

developed a comprehensive management system which includes a database concerning patients, infrastructure, and personnel. "Meuhedet" also prepared the expansion of clinics' opening hours, personnel, and identified alternative sites for service provision. A computerized toolbox was developed that enables provision of primary care during disasters, to individuals not insured by the HMO. SOPs were developed to guide medical and management teams in using the system, and caregivers' documentation sets were prepared for electronic/manual documentation of care given.

**Results**: The computerized system is used by national, regional, and local administrations to control and monitor activities during crisis, as well as a vital toolbox for physicians and other health professionals to provide care for evacuated populations. Data concerning each patient and staff member can be accessed from every work site via internet connection, processed, and integrated as part of the treatment in any location in which medical care is being provided.

**Conclusion**: Provision of effective medical care to evacuated populations requires access to information concerning the medical backgrounds and needs of the patients. The qcreation of a comprehensive information system in tandem with organizational SOPs, facilitates decision making, and improves the ability of primary care health care workers to provide efficient and continuous medical care to displaced populations.

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## An Overview of Emergency Medicine Services within the National Park Service: Highlights and Selected Case Studies

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**Study/Objective**: The National Park Service (NPS) has provided Emergency Medical Services (EMS) to park visitors since its inception one hundred years ago. Each year, this amounts to approximately 15,000 patients spread over 84 million acres in 50 states, the District of Columbia, and US territories. EMS training for park rangers has evolved from simple first aid to the formal Parkmedic program initiated in 1978. This program takes EMT level providers to the Advanced EMT (AEMT)/Parkmedic level with an expanded Scope of Practice (SOP), specifically tailored to the unique situations in the NPS. The University of California, San Francisco-Fresno (UCSF Fresno) has provided EMS oversight to the Parkmedic program since its foundation, and serves as National EMS medical advisors to the NPS. Parkmedic level providers have an expanded SOP including drug administration and procedures that are uniquely tailored to NPS needs. To achieve this designation, an EMT must attend a 6-week course at UCSF Fresno. At the end of this course, they achieve an NPS Parkmedic and AEMT certification. To maintain Parkmedic certification, these providers must attend 72 hours of Continuous Education (CE) every two years. Continuous Quality Improvement is integral to the Parkmedic system. Some Parkmedic rangers will see less than ten patients in an entire season. In many parks, it is possible to review 100% of the EMS patient encounters to provide remediation, continuing education, and address system improvement issues. This poster presentation summarizes the NPS EMS system and provides an overview of continuing education, operations, and continuous quality improvement. Specific case studies will highlight the unique challenges that NPS EMS providers face, and how the NPS and Parkmedic program have adapted the SOP to address these challenges.

**Background**: See Study/Objective.

**Methods**: See Study/Objective.

**Results**: See Study/Objective.

**Conclusion**: See Study/Objective

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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## Medical Conditions and Treatments in a Transit Camp in Serbia for Syrian, Afghani and Iraqi Migrants

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**Study/Objective**: This study describes the health conditions, treatments and demographic correlations of migrants from Syria, Afghanistan and Iraq, treated in a transit camp clinic in Serbia, on their way to Europe.

**Background**: Europe faces waves of migrants from war-torn countries. Many have multiple health conditions. To help camp clinics use scarce resources effectively, it is crucial to map the health problems and their correlates.

**Methods**: A total of 3,723 migrants visited an Israeli-German clinic between December, 2015 and February, 2016 in Preshevo, Serbia. Complete data was available for 2,981 patients. The equipment at the clinic was basic, eg. a sphygmomanometer, glucometer, a pulse oximeter, gynecological ultrasound machine, thermometers, etc.. Diseases were grouped into eight categories: Chronic diseases, pain, infection, trauma, obstetrics and gynecology, dental problems, environment related and psychiatric. Beyond descriptive statistics, we examined the associations between diagnostic and treatment groups with age, gender and country of origin.

**Results**: The most prevalent diagnosis was infections followed by pain. While the most prevalent treatment was analgesics, these were prescribed for pain and fever. Concerning specific types of diagnoses and age, the diagnosis of pain among infants (2.5%) and pre-school children (3.9%) was considerably lower compared with their percentage in the study sample (7.7%, $p < 0.001$ for infants, and 15.4%, $p < 0.001$ for pre-school). In contrast, 79.3% of patients diagnosed with pain were adults, considerably higher than their percentage in the sample (59.9%; $p < 0.001$). Finally, while a higher proportion of men had upper respiratory infections than women, an equal proportion of men and women had gastrointestinal infections.

**Conclusion**: Infections and pain were most often diagnosed, disproportionately more in adults than children. Gender differences were observed in types of infectious diseases. Medical teams should be aware of demographic differences in health conditions, and increase sensitivity to children's health conditions.

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## Spontaneous, Self-Organized, Non-Professional International Disaster Response in the European Refugee Crisis - The Case of Chios, Greece

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**Study/Objective**: To research the dynamics, advantages, and flaws of non-governmental, non-professional humanitarian aid through the perspective of the European refugee crisis.

**Background**: It is impossible to disregard the widespread phenomenon of young people leaving their lives behind for a significant period of time with the purpose of aiding refugees and with no apparent incentive (monetary or other) or having previously dedicated their lives to a related profession. This has the potential to encompass significant value in a crisis, but it also holds risk of actual harm. This research was aimed at understanding the dynamics of non-professional aid and its formation into the NGO environment in a crisis situation.

**Methods**: A qualitative, descriptive, exploratory study was developed. The researcher travelled to Chios, Greece to accompany young groups of international, non-professional "aid workers" to discuss their motivation and observe their handling – absorption, first aid, further treatment - of 100s of daily refugees arriving from Turkey. In addition to using observation as a research method, 15 in-depth interviews were conducted in March/April 2016. Further, 20-30 surveys and interviews shall be conducted by March 2017 to strengthen and validate the initial results.

**Results**: Initial results show that while these young, untrained responders were quickly and remarkably well organized, they struggled meeting organizational challenges and obstacles. A significant amount of time was spent in meetings between different groups to discuss, even fight over, the allocation of resources and responsibilities. Furthermore, interesting results have been obtained as to their motivation for their involvement. While all responders mentioned the will to help as their motivation, further questioning revealed "finding oneself" and "hopes for better career options" possibly serving as "postponed" material incentives.

**Conclusion**: Next to serious responsibility and accountability concerns, major obstacles in operating non-professional humanitarian aid teams lie in the scaling up into a comprehensive system that includes intra-relations and contact between different organizations.

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## From Syria to Canada: A Critical Evaluation of Service-Delivery and Coordination along the Journey of Forced Migration

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**Study/Objective**: The objective of this field research study is to advance learning to improve coordination and service-delivery to crisis-affected populations; highlighted by Canadian Red Cross (CRC) engagement with Syrian populations along the continuum-of-care from Syria to Canada.
**Background**: Syria is the biggest humanitarian and refugee crisis of our time. Per the United Nations High Commissioner for Refugees (UNHCR), 4.8 million Syrians have fled to surrounding nations, and 6.6 million are internally-displaced. In 2015, the Canadian Prime Minister-elect pledged to bring 25,000 Syrian refugees to Canada. CRC deployed technical personnel along the entire migration journey: Jordan, the Mediterranean Sea, Greece, Germany, and Canada. Service-delivery coordinated by CRC included clinical health, referral, Psychological Support Services (PSS), Restoring-Family-Links (RFL) protection, transportation, lodging and other services.
**Methods**: End of Mission (EOM) reports (n = 8) were analyzed. CRC Syria Response Evaluation was reviewed, which included key informant interviews (n = 24), focus groups (n = 125 participants), and a survey of volunteers (n = 583). Based on this data and operational experience we have identified recommendations. The EOMs and Response Evaluation will be used to develop an informed set of questions to panel members who can speak to their extensive experience involved in the response; including deployed technical personnel, a Syrian who journeyed from Syria to Canada, and frontline service-providers.
**Results**: Approximately 42% of the refugees arriving in Canada were assisted by CRC. Challenges included coordination, providing basic-health and PSS during migration, and system-navigation and referral upon arrival to Canada. Engaging at various points along the migration journey provided unique opportunities for RFL. Recommendations arising from both successes and challenges included: ensuring human-resource systems are prepared; increasing focus on managing health, including child PSS; and using international experience to improve reintegration services.
**Conclusion**: Knowledge generated from this response models challenges and solutions in supporting service-delivery and coordination with populations affected by crisis throughout the migration journey.

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## ANA Light Field Hospital: A New Model of Civilian Cooperation and Response during Disasters, Emergencies in Austere Environments, Italy

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**Study/Objective**: The authors describe an Italian Model of Mobile Light Field Hospital of ANA (The Italian Association of Alpini) as a flexible, mobile hospital structure, self contained and self sufficient health care design for rapid deployment, expansion or contraction. This structure is designed to work, and to be deployed in disasters/emergencies. The Field Light Hospital is a new conceptual hospital, designed in a new architectural structure, lighter and easy to use to support of the local emergency services. Civilian personnel are trained as volunteers to work together, improving training programs in emergency preparedness and response.
**Background**: During disasters/emergencies local health services can be overwhelmed, and damage to clinics and hospitals can render them extremely unsecure or useless. Lessons from past complex disasters such as civil conflicts, wars, and humanitarian emergencies show that Field Hospitals(FHs) as temporary hospitals, civilian or military, plays a significant response role in disasters.
**Methods**: The Hospital on the Field of Alpini actually operates in Italy in support to the activities of civil protection, but also works in different national and international context, based on the activity of volunteers, experts in maxi-emergency, critical medicine and with military tactical backgrounds.
**Results**: The Alpini Light Field hospital shows a new model of civilian cooperation, and is able to be rapidly deployed in national and international (long) missions. The authors would like to underline how, during complex disasters the need of a rapid public health response, is crucial to prevent the occurrence of new cases, coupled with treatment of victims and maintenance of a viable healthcare delivery system.
**Conclusion**: During disasters it is useful to utilize FH as support to population affected countries, suggesting a new form of civilian cooperation in support of civil protection activity; and also implementing a new form of research program in training, preparedness and response.

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## A Multi-Level and Multi-Sectoral Coordination for an Effective Response to the Cholera Outbreak in Central African Republic

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**Study/Objective**: This paper aims at sharing a lesson from a specific coordination mechanism to control a cholera outbreak that could have been a major one, due to all the risk factors and the weak response capacity.
**Background**: A cholera outbreak that started on July 27, 2016 (vibrio Cholerae, serotype O1 Inaba), was declared on August 10, 2016, in the southern part of Central African Republic

(CAR), in a context of a weak, safe water supply system (less than 55% people in rural areas in 2015), and a poor sanitation system (7% people in rural areas), as well as a weak capacity to deliver health services. The outbreak reached the capital city exposing 1.7 million people and 243,000 Internally Displaced Persons (IDPs). A strong multi-sectoral coordination was set up.
**Methods**: A case study on a field experience.
**Results**: Twenty deaths and 265 persons were notified as the result of the cholera outbreak from week 27 to 37. Three levels of coordination:

The Public Health Emergency Operation Center (COUSP) where a technical strategic coordination was taking place to define and implement the response plan. Within the COUSP different experts, decision makers and support teams were analyzing the situation and organizing means for the response, including the rapid response teams, community engagement and communication to stop the spread.
Taskforce cholera is made up of different humanitarian relevant cluster partners (Health, WASH, Camp management, Food Security/nutrition, education and logistic), and implementing technical advices from the COUSP including case investigation and management.
The Outbreak multi-sectoral committee that involves national relevant ministerial departments to ensure joint interventions.

**Conclusion**: A strong technical and operational coordination contributed to mobilizing all available resources, and guide the response in order to win the race against cholera and avoid further risk to about 1.7 million. This experience should guide future responses to disease outbreaks.
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## Developing Smart Practices for Prehospital Field Staff in Situations of Insecurity through Knowledge Co-Construction

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**Study/Objective**: The Community of Action for Ambulance and Prehospital Emergency Care Providers in Risk Situations is a network of experts and other relevant actors, committed to improving the operational security in situations of insecurity, in order to better access people in need of emergency medical assistance. There is a lack of high-quality case studies that document the experience and practice of prehospital care.The Community of Action requires effective tools to build its network, develop high-quality knowledge, and foster learning between its members.
**Background**: Almost irrespective of the country or the services, prehospital care providers risk being exposed to violence and/or the threat of violence. The extent and frequency of the violence will vary, but threats, insults and physical attacks are a reality for ambulance and prehospital personnel even in the most peaceful contexts. Considering the serious consequences of such violence, there has been very little research done on this problem, and the solutions that have been developed to address it. Therefore, it is challenging to advocate for change and help the providers to safely deliver on-the-job that they are mandated to do.
**Methods**: A 4-week digital course using Scholar - a system for learning through knowledge co-construction, was developed in partnership with the Geneva Learning Foundation.
**Results**: Each participant developed a draft case study, then peer reviewed the drafts of three of their colleagues, and finally revised their initial draft using the feedback from their peers. Through the four weeks, participants engaged in a private, shared space for dialogue.
**Conclusion**: The Scholar process, based on peer review that models how prehospital practitioners solve problems, learn and collaborate, produces an immediate benefit for those involved as both authors and reviewers; quality; strengthened professional relationships that outlast the process and productive diversity.
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## Teaching Public Health in Disasters using Massive Open Online Course and Building the Global Humanitarian Response Community

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**Study/Objective**: To reveal the spatial and temporal pattern of student enrollment in the Public Health Principles in Disaster and Medical Humanitarian Response (PHPID), Massive Open Online Course (MOOC), and to examine the degree to which socio-demographic variables can predict the course achievement.
**Background**: The first cohort of the PHPID online course was launched by Collaborating Centre for Oxford University and CUHK for Disaster and Medical Humanitarian Response in June 2014. This online course aims to enable students to gain insight and theoretical understanding of the public health issues related to disaster and medical humanitarian relief in the Asia Pacific region, through making lessons learned from previous disasters.
**Methods**: This study collected registration data from the four completed cohorts during June 2014 to May 2016. The registration data consists of participants' socio-demographic factors, residential location, related experience in disaster response, reason of taking, and the channel of 'first hear' the course. Descriptive and multiple logistic regressions were conducted via SPSS.
**Results**: In total, 3,457 participants, from 150+ different countries, registered in the PHPID Model platform; 711 completed and obtained certificates, and 510 left contact information for further collaboration. The most 10 frequently reported countries of origin were consistent with natural disaster hotspots. The first month of each cohort was a peak period of new registrations. Generally, men were 27% more intent to complete the course (OR = 1.268, 95%CI: 1.068-1.505). Moreover, the participants, who have achieved the

qualification of public health and medicine, were 21% more inclined to obtain certificates than others.
**Conclusion**: MOOC can provide a tool to enable worldwide students' collaborative learning, improve individual's knowledge in public health and disasters, and build up a global humanitarian response community. More research is required in teaching global students public health through online platform.
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## Disaster Governance through Opening Up Public Data: Trends and Perspectives

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**Study/Objective**: This study is aimed to map and review existing uses of open public data for disaster preparedness and management, from both a top-down (international organizations, public authorities) and bottom-up (formal and informal civil society entities) end, and to provide specific recommendations for developing and delivering effective a disaster response mechanisms.
**Background**: Sharing data and creating open systems promotes transparency, accountability, and ensures a wide-range of actors are able to participate in the challenge of building resilience aiming to reduce the impact of disasters. Empowering decision makers with better information and the tools to support their decisions is considered to be essential for better planning, preparedness, and response activities. Open data are therefore recognized as key enablers towards this direction.
**Methods**: A comprehensive review of the peer-reviewed and grey literature, as well as internet research and mapping of existing open public data sets and their use by country and by data provider (international organization, public authority)
**Results**: A comprehensive search was performed to identify the specific challenges that the open data movement are facing in the disaster risk management context, as well as existing experience from early attempts at building open data initiatives around both natural and manmade disasters. As crucial parts of disaster management are the acquisition, assessment, processing, and distribution of information, opening up public data can become a powerful enabler in enhancing preparedness and raising awareness for both natural and manmade disasters. They are beginning to play an important role in boosting disaster management capabilities for cities and towns, engaging residents and civil society representatives in facing disaster management efforts challenges; or for their effective use that policy makers and the public must have access to the right data and information to inform good decisions. Too often, this data and information are fragmented across government ministries, and in the private sector, is unavailable to decision makers and at-risk populations.
**Conclusion**: Strengthening public and civic resilience to disasters can be found by using open public data, an ally enabling all community members to contribute their unique skills and perspectives; promoting transparency, accountability, and ensuring that a wide-range of actors are able to participate in the challenge of disaster preparedness, management, and recovery while building resilience.
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## International Emergency Medical Teams, A Working Group on Training

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**Study/Objective**: To establish a "core curriculum" for the Emergency Medical Teams (EMTs) internationally, by conducting a systematic mapping study of all training programs currently targeting EMTs internationally.

**Background**: Standardized education and training are essential components to improve global emergency response, by providing mechanisms to ensure the coordination, quality and accountability of deployable national and international EMTs. The purpose of this Working Group is to guide the development of global EMT training standards, and to foster a collaborative approach to the production and procurement of tools and frameworks for effective and operational EMT training. The working group will need to provide technical advice based on their own expertise, follow an evidenced-based approach, and coordinate inputs from EMT stakeholders to help generate consensus and deliver implementable outputs for training. The WADEM EMT Training Working Group will also assist with the process of setting a standardized curriculum for all EMTs.
**Methods**: Using a systematic approach, organizations, academic institutions, professional bodies and EMTs involved in training and deployment will be approached. Members from each will be requested to complete a standardized questionnaire on training competencies and curriculum, and to provide information on the trainings offered or used. Data will be organized and analyzed as to common content or competency themes and presented at WADEM.
**Results**: of the mapping study will be reviewed to identify current and potential elements of a core curriculum for EMTs.
**Conclusion**: The findings will be presented at WADEM and the ensuing discussion incorporated into the final conclusions.
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### Syrian Refugees in Turkey, Life Conditions

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**Study/Objective**: The objective of this study is to clarify basic information about Syrian refugees who are living in Turkey and to share formal data about refugees' life conditions in Turkey.
**Background**: Throughout history, migration is one of the most important problems of humanity. Particularly in some areas where people suffer from conflicts, violations, and lack of basic needs, this situation is more difficult. Since the beginning of the Syrian conflict in 2011, increasing number of refugees have come to Turkey for asylum. Most of them are children and women. Unfortunately, this dangerous voyage from Syria has ended up with not only social or economic problems, but also dramatic humanitarian needs.
**Methods**: In this study, authors have conducted descriptive data analysis by viewing formal data from government authorities and scientific articles from the literature.
**Results**: From the outset of the conflict, Turkey has followed an open door policy to refugees. Since that time, about 3-million people have come to Turkey and try to adopt a new life. Currently 300-thousand of the refugees have been living in 26 temporary protection centers (TPC) that were established in 10 different cities near the Syrian border. The protection centers have been managed by the Emergency Authority of Turkey. The other 2.7 million refugees have been living in different cities and regions in Turkey. Over 60% of the refugees consist of women and children. In the TPCs, some facilities such as accommodation, food, health, education, and other humanitarian needs are provided by the Emergency Management Authority of Turkey. About 311,000 thousand children continue their education, and 100,000 of the adult refugees have been educated by the Ministry of Education of Turkey.
**Conclusion**: The coordination between international organizations and Turkey need to be enhanced to provide more effective facilities for refugees.

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### Analysis of 112 Emergency Medical Service Utilizations of Syrian Refugees Residing in Ankara, Turkey

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**Study/Objective**: This study aims to investigate 112 emergency medical service utilizations among Syrian refugees residing in Ankara.
**Background**: With the civil war in Syria, lots of Syrians left their country and migrated to neighboring, or more distant countries since March 2011. The number of Syrian refugees in Turkey was 2,747,946 in March 2016. While some of the Syrian refugees have been living in camps, 2,475,134 of them have been living in metropolis areas such as Ankara. There has been a parallel increase in the number of Syrian refugees and the number of Syrian refugees who benefit from health services, including prehospital emergency medical services.
**Methods**: In this descriptive, cross sectional study, data was obtained from the Department of 112 Emergency Health Services of Ankara Provincial Health Directorate. Records from January 1, 2013 to January 6, 2015 were analyzed.
**Results**: Utilization of 112 Emergency Medical Services among Syrian refugees has risen from the beginning of 2011 to the first five month of 2015. First five stations, responded to nearly half of (42%) the calls from Syrian refugees, based in Altındağ region, where Syrians densely live in Ankara. Prehospital emergency medical services were used mostly by people under 18 years old.
**Conclusion**: Findings suggest that staff in regions where the burden on the system has been increasing should be supported, and should be provided with abilities to overcome language barriers and cultural differences.

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### Surgical Needs of Internally Displaced Persons in West Darfur, Sudan

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**Study/Objective**: To quantify the burden of surgical disease in a population fleeing conflict.
**Background**: The burden of surgical disease in refugees and Internally Displaced Person (IDP) populations has not been well-defined and is difficult to quantify because of logistical obstacles. Populations fleeing conflict are highly mobile, limiting the effectiveness of traditional sampling methods. In this study, we used satellite imagery and GPS technology to conduct a population-based surgical needs assessment amongst IDPs in Kerenik, West Darfur, Sudan.
**Methods**: Satellite imagery was used to identify man-made structures. Ground teams were guided by GPS to randomly selected households following a computer algorithm. A novel, laptop-based, surgical needs survey was administered by a physician to household residents. One randomly selected individual per household was designated to answer demographic and medical history questions, pertaining to themselves and

first degree blood relatives. All residents of the household were offered a physical exam looking for surgical disease.
**Results**: A total of 780 individuals answered survey questions; 82% were IDPs. A history, since displacement of surgical conditions, was reported in 38% of respondents, and by 73% of respondents in at least one first degree blood relative. Surgical histories included trauma (gunshots, stabbings, assaults; 5% respondents; 27% relatives), burns (6% respondents; 14% relatives), and obstetrical problems (5% female respondents; 11% relatives). A total of 1,485 individuals agreed to physical exams. Untreated surgical disease was identified in 25% of participants.
**Conclusion**: This study combined unique sampling and survey techniques to perform a population-based assessment of the surgical burden of disease in a highly mobile, marginalized population. We identified significant recent histories of trauma and other surgical conditions, and on exam found a high burden of untreated surgical disease. Health officials and non-governmental agencies working with IDP and refugee populations should be cognizant of the high prevalence of surgically treatable conditions in these communities.
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## Impacts of the Interim Federal Health Program on Healthcare Access and Provision for Refugees and Refugee Claimants in Canada: A Stakeholder Analysis

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**Study/Objective**: This study examines the perceptions of key stakeholders regarding the impact of the Interim Federal Health Program (refugee health policy) reforms in 2014, on access and provision of healthcare for refugees and refugee claimants.
**Background**: The Federal Government funded the Interim Federal Health Program (IFHP) since 1957, ensuring comprehensive healthcare insurance for all refugees and refugee claimants seeking protection in Canada. Retrenchments to the IFHP in 2012 greatly reduced healthcare access for refugees and refugee claimants, generating concerns among healthcare stakeholders affected by the reforms. In 2014 a new IFH program temporarily reinstated access to some health services however, little was known about the reforms and its impact on stakeholders.
**Methods**: Data was collected using semi-structured key informant interviews with refugee health policy stakeholders (n = 23). Four stakeholder groups were identified: refugees and refugee claimants (n = 6), policy-makers and government officials (n = 5), civil society organizations (n = 6) and professionals and practitioners (n = 6). Using a stakeholder analysis, stakeholder positions and influences regarding the policy were mapped and a content analysis, using NVIVO 10, was employed to abstract themes associated with barriers and facilitators to access and provision of healthcare.
**Results**: The findings reveal that the majority of stakeholders expressed mixed and opposing views regarding the 2014 reforms, with varying levels of influence over the policy. Moreover, five facilitators to accessing health care were identified, and eighteen themes regarding barriers to health care access and provision were abstracted. Four common barrier themes were perceived among all stakeholder groups, including lack of communication and awareness among refugees and providers.
**Conclusion**: The study highlights that the IFHP reforms in 2014 have transferred refugee health responsibility to provincial authorities, resulting in bureaucratic strains, inefficiencies, overburdened administration and delayed healthcare seeking by refugees due to existing barriers. There are some benefits to the reforms, but lack of support and mixed opinions among the majority of stakeholders emphasized the need for policy reformulation with stakeholder engagement.
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## Reproductive, Maternal, Newborn and Child Health (RMNCH): Interventions and Delivery Modalities in Fragile Settings: A Review of Literature

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**Study/Objective**: The objective of this review was to systematically identify interventions and service-delivery modalities, that have measurably improved Reproductive, Maternal, Newborn or Child Health (RMNCH) in fragile settings during conflict or disaster response.
**Background**: Over 1.4 billion people live in fragile settings, making them particularly vulnerable to the effects of disasters and protracted conflicts. Sixty percent of preventable maternal deaths, 53% of deaths in children under-five, and 45% of neonatal deaths occur in fragile settings. Synthesized information regarding interventions and modalities used in fragile settings, and their measured outcomes, is significantly lacking.
**Methods**: A literature review was conducted systematically using academic databases PubMed, CINAHL, DoPHER, WoS, CDSR, Scopus, and Global Health up to July 8, 2015. Hand-searching was conducted, and grey literature was assessed. Inclusion criteria were studies: i) Including interventions/service-delivery modalities in RMNCH; ii) Target population included women of reproductive age, pregnant women, mothers, newborns, or children under-five; iii) In conflict/disaster response in fragile settings. All study designs eligible. Exclusion criteria were studies: i) Only including mental health; ii) Not including target population; iii) Not in fragile/post-disaster/post-conflict; iv) Without measured outcomes. Data extracted for setting, project, methods of delivery, results and study design.
**Results**: The search yielded 66 articles from 25 countries published between 1996-2015. Contexts included IDP/refugee camps, active conflicts, earthquakes, famine, tsunamis and other humanitarian crisis. Due to study variations, quantitative meta-analysis was not performed. Measurable improvements in health or access in fragile settings included skilled birth attendance, postnatal care, management of hemorrhage, use of modern contraceptives, HIV treatment, and more. Compelling

methods to ensure continuity-of-care during crises were identified.
**Conclusion**: This evidence will significantly inform the technical capabilities and research priorities of organizations delivering RMNCH programing in humanitarian crises; including delivery strategies that have ensured continuity-of-care during erupting crises.
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### Attacks on Health Care in Emergency Settings: What is the Extent of the Problem, Based on Open Source Data from 2014 to 2015?

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**Study/Objective**: The objective of the study was to document the extent and the nature of the problem of attacks on health care workers, health care facilities and patients by consolidating and analyzing the data available from open sources.
**Background**: Attacks on health care workers and health care in emergency settings are a general problem, depriving people from the health care services they badly need. General perception is that the frequency of attacks on health care workers is increasing.
**Methods**: Review of data from open sources on individual attacks on health care, that reportedly took place in countries with emergencies from January 2014 to December 2015.
**Results**: Over the two-year period, we found reports of 594 attacks on health care that resulted in 959 deaths and 1,561 injuries in 19 countries with emergencies. Sixty-three percent of the attacks were against health care facilities, and 26% were against health care workers. Sixty-two percent of the attacks were reported to have intentionally targeted health care. Most countries experienced a decrease in the number of attacks, with the notable exception of the Syrian Arab Republic.
**Conclusion**: Attacks on health care remains an important problem. The study highlights the need for standard definitions and classifications to enable a comparison of information from multiple sources, in order to better understand the full extent and nature of the problem. The lack of information on the impact of attacks on health service delivery and the health of affected populations, is a significant knowledge gap and should be a priority for information collection moving forward, if we want to make evidence based policy recommendations. The findings underscore the need for intensified action from a broad spectrum of actors, to ensure that health care is provided universally during emergencies to all those who need it, unhindered by any form of violence or obstruction.
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### Minimum Standards for Staff Health in Humanitarian Aid Organizations

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**Study/Objective**: To create Minimum Standards for aid workers regarding their occupational health.
**Background**: Annually, Non-Governmental Organizations (NGOs) deploy thousands of expatriates worldwide to assist with various disasters. There are no international guidelines on minimum standards on occupational health for humanitarian aid workers, to ensure consistent and accurate preparedness and support for the delegates. Consequently, there is a need to have global guidance on the medical clearance, personal medical kit, psychosocial support, first aid training, medical evacuation, insurance and post deployment return home.
**Methods**: Based on the Delphi technique, a literature review, interviews with delegates, and a workshop organized for several humanitarian aid organizations, a questionnaire was developed to form future minimum standards for occupational health for humanitarian aid workers worldwide.
**Results**: Ten themes were identified: Delegates should be well prepared for their deployments; have good support during their deployment; accompanying family members be included in the health policies; have a healthy and safe working environment and accommodation; psychosocial support be available and implemented; a medical evacuation plan which they know how to implement; good insurance coverage during and after their deployment; staff are well taken care of after deployment; duty of care is fulfilled and emergency recruitment is handled professionally.
**Conclusion**: To be effective in the aid work, staff should receive appropriate health briefings, equipment and support for their deployment to be sufficient in their role. Humanitarian aid organizations have an important task to fulfil in various disasters. With help of this global guidance they can fulfil their duty of care, and fulfil their obligation to protect and support their workers in the best possible way. In operations like the Ebola outbreak in West Africa, this was even more important to address to ensure health and safety of the humanitarian aid workers. The results of the research on Minimum Standards will be presented to the audience.
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### There's an App for THAT!

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**Study/Objective**: This session focuses on recognizing the utility of personal mobile technology as both a supplement to enhanced patient care, and access to healthcare for the humanitarian practitioner, within the framework of austere disaster/emergency medicine response.
**Background**: When considering the use of technology in clinical medical practice, a lot of factors must come into consideration: "What works for a particular individual or practice,

are applications clinically reliable/evidence based and professionally validated, and how does one select and become proficient in utilizing these types of tools?" These are a few of the key components to be addressed in this presentation. Currently little professional data exists regarding the use of technology applications, except for studies evaluating frequency of use. This lecture will seek to help the learner address these and other issues, in an effort to augment their ability to best render humanitarian aid.

**Methods**: A brief overview of technical terminology is provided along with a review of a variety of applications. Additionally, audience members will be formally surveyed as to their current use of mobile technology, as well as self-perceived knowledge gaps and practice deficits. Interactive discussion will provide additional opportunities for knowledge sharing and personal growth. Resources to guide application selection are provided for a variety of clinical settings and professional roles.

**Results**: By the end of this session, the learner will be able to: 1. Identify and analyze reliable personal mobile software (Applications or "apps") sources for use in clinical practice. 2. Demonstrate the use of applications in common clinical situations. 3. Develop a selection of applications useful to individual practice.

**Conclusion**: Mobile Medical Applications and devices such as smartphone based otoscopes, microscopes, Point Of Care Ultrasound, clinical references, etc. are an invaluable and underutilized resource in humanitarian disaster and emergency medicine. This session will provide members a forum to augment their austere medical practice through the use of readily accessible and robust technology.

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## In the Eye of Storm: A Haitian-Based Child Protection/ Social Service NGO Responds to Hurricane Matthew

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**Study/Objective**: To discuss Lessons Learned / Best Practices in both local disaster planning, as well as Disaster Response.

**Background**: When Hurricane Matthew hit Haiti, few were prepared personally, organizationally or as a nation. Due to lack of an integrated disaster response system, severely damaged infrastructure and many other factors, Post Disaster response was poorly coordinated with looting, cholera, food insecurity, flooding, failure to get aid to the point of need, etc.

**Methods**: Direct Observational Lessons Learned.

**Results**: Preplanning and prior staging of resources allowed our Non-Governmental Organization (NGO), Little Footprints, Big Steps to evacuate families ahead of Hurricane Matthew, as well as immediately provide food, shelter and medical aid in the hours, days and weeks after the hurricane. This was due in significant part, to the Staff/Board of Director experience with disaster management in general and hurricane response, Haiti in particular.

**Conclusion**:

- Failing to plan is planning to fail.
- Prior Planning Prevents Poor Performance.
- Many lessons learned in our organizational response to Hurricane Matthew are directly applicable to WADEM's target audiences.

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## Disease Diplomacy for Humanitarian Aid and Conflict Reduction

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**Study/Objective**: This paper adopts a disaster diplomacy framework to explore the overall disaster diplomacy conclusions for epidemics and pandemics, including vaccination programs; in effect, looking at "disease diplomacy."

**Background**: Disaster diplomacy examines how and why dealing with disasters, before and after a disaster manifests, does and does not reduce conflict and support peace. From numerous case studies around the world, the overall conclusion is that disaster-related activities (such as prevention, planning, risk reduction, response, and recovery) often have the potential to catalyse or influence peace initiatives in the short-term, but long-term impact and creating new diplomacy are almost absent. Meanwhile, many health diplomacy initiatives have long been used such as WHO's "Health as Bridge for Peace" program and ceasefires negotiated to implement child vaccination programs and to support disease eradication endeavors.

**Methods**: Case studies are examined qualitatively to seek explanatory and predictive conceptual models for success and failure of disease diplomacy. The focus is on infectious disease rather than on wider health diplomacy, or on other health issues, such as chronic conditions and lifestyles, in order to ensure that disaster diplomacy can be tested from a health perspective.

**Results**: No infectious disease related initiatives could be found which led to clear-cut disaster diplomacy successes. Nor were examples found aiming to use infectious disease for active disaster diplomacy, despite numerous calls to do so, such as through "global health as foreign policy" and "global health diplomacy." Yet, separating efforts to deal with infectious disease from diplomatic activities, especially in conflict zones in the context of humanitarian aid, might support these programs' achievements.

**Conclusion**: Infectious disease related initiatives confirm the experience from across disaster diplomacy case studies, that disaster-related activities sometimes catalyzes ongoing peace and conflict processes, but so far have not been shown to create new ones.

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## Preparing for Receiving International Assistance following a Disaster - MDA Case Study

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**Study/Objective**: The objective of this study was to identify the administrative constraints that might hinder international assistance coordinated by Magen David Adom (MDA) in case of a disaster affecting Israel
**Background**: Israel sits on the Africa–Syria rift, which may cause a serious earthquake affecting the region. The reference scenario, is an Earthquake (EQ) with the magnitude of 7.5 in the Jordan valley. The consequences of such an EQ will most probably require International Humanitarian Assistance. Magen David Adom, The Israeli National Society of the Red Cross movement, will be tasked to coordinate the international assistance from the Red Cross movement with the authorities.
**Methods**: In coordination with the Israeli National Emergency Management Agency (NEMA), and the International Federation of the Red Cross and Red Crescent (IFRC) disaster law program, MDA reviewed areas identified in previous international operations, as bottlenecks.
**Results**: The following areas have been identified:

- Visas and working permits. Permits to perform for licensed professions (mainly medical).
- Import permits and regulatory agencies permits for regulated products (medical supplies and machinery, drugs, communications)
- Insurance and liability
- Taxes waivers for goods, waivers from landing fees
- Need to identify national standards of services, as the base line for an emergency plan of action leading to an international emergency appeal

**Conclusion**: MDA has engaged in a series of discussions with the respective authorities, where some solutions have already been found; providing a B-4 visa to the international aid workers, discussing with the Ministry of Health (MoH) the possibility that a unit recognized as an EMT will be allowed (personnel, equipment, drugs and medical supplies). These discussion continue with NEMA. At the same time, MDA is training it's National Disaster Response Team to be able to provide an effective liaison to the arriving units and to the authorities.

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## MSF Experience with Testing Hybrid Model of Telemedicine During Humanitarian Intervention - Providing Distant Clinical Support in Madaoua, Niger

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**Study/Objective**: N/A.
**Background**: Medecins Sans Frontieres (MSF) aka Doctors Without Borders, Madaoua Project supports the paediatric services of a remote and insecure district hospital integrating Inpatient Therapeutic Feeding Center (ITFC). MSF is implementing a telemedicine pilot project tailored to ensure continuity of expert care in case foreign proficiency has to be withdrawn, and to increase the quality of care by providing distant clinical support and management, which includes a training component.
**Methods**: Telemedicine services composed of synchronous and asynchronous solutions were made available in the hospital. A video-conferencing platform was set-up with reference pediatricians group based in Barcelona and Dakar, combined with MSF asynchronous services. Cases that required second opinion were consulted over asynchronous platform, One complicated case was selected each week for case presentation followed by discussions in real-time. A term evaluation based on 5 months of qualitative data was done by MSF.
**Results**: There were 38 cases that were consulted via telemedicine, of which 25 were further discussed live during 19 synchronous sessions held weekly. Then, 42% (16) were pediatric, 42% (16) were ITFC and 16% (6) were neonatal cases. Ultimately, 24% recovered, 34% died, 5% referred to higher level, and 37% underwent further treatment. The highest ranked value of telemedicine consultation by users was 'facilitating patient management' regardless of patient outcome, ranging from 69% in patients that died, to 78% cured, to 88% that were referred/ongoing treatment. In addition, telemedicine consultation helped in establishing a diagnosis which would have been missed in 21% of total cases.
**Conclusion**: This hybrid model of telemedicine has potentials to be a powerful tool for providing distant clinical support for complicated cases in resource limited settings and/or in insecure context. Integrating synchronous component presents substantial technological challenges to deal with, and requires significant Human Resource commitments in mid to long term, but leverages out the benefits across all patient outcomes as well as to users for professional development.

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## Capacity Building of Pharmacists in Humanitarian Aid, Brazil

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**Study/Objective**: The aim of this research is to investigate the skill-specific comprehensive core competencies that humanitarian

pharmacist must demonstrate, working in emergency humanitarian interventions.

**Background**: In the last decades many influential international humanitarian organizations had strengthened and enlarged their capacity to deliver humanitarian aid, and have realized the need to employ more professionals in the field of humanitarian assistance. Pharmacists have crucial importance in health care related interventions of assuring the use of quality drugs, disease prevention and health promotion. The World Health Organization (WHO) recommends that pharmacists should be adequately represented in the staff of international health agencies. Appropriate competencies and skills of pharmacists working in international humanitarian aid are essential in successful implementation of health interventions.

**Methods**: A literature search was conducted to identify the main essential health services provided by humanitarian organizations and internationally accepted functional, technical and personal competencies required for pharmacists. Semi-structured interviews were conducted with expatriate pharmacists and expatriate medical coordinators, all of whom have worked in the fields of humanitarian aid missions. The interviews are recorded, transcribed and analyzed using a content analysis and discourse analysis methodology.

**Results**: Six participants were interviewed, three pharmacists and three medical coordinators. The interviewees had worked in (overall) 32 humanitarian missions. The main functions of the pharmacists were focused on stock management and supply of medicinal products. However, pharmacists in humanitarian fields do not perform many functions related to the provision of effective Medication Therapy Management (MTM). Interviewees highlighted that the personal competences related to working under pressure, adaptability and flexibility, cultural sensitivity and teamwork skills are essential for the humanitarian aid pharmacist.

**Conclusion**: This study highlights the critical competencies required for humanitarian aid pharmacists. Moreover, identifies the absence of these professionals in key activities related to MTM, which may lead to health related risks.

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## Changing Hearts and Minds, using Virtual Reality to Improve Empathy towards Refugees

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**Study/Objective**: Xenophobia is growing ever more present globally, in response to the influx of refugees from various conflicts. Families that have made the harrowing journey from their war torn nations have been met, not with open arms, but border fences and hostile populations. The best way to improve these conditions is to create more empathy from the host country populations towards the refugees.

**Background**: Studies using virtual reality have been performed before, and have shown that they have the ability to change a person's emotions toward an act. For example, the use of virtual reality was able to make people more empathetic to cows, and the viewers actually reduced their meat consumption after the VR session.

**Methods**: With the use of a 3D recording camera, a person will document their journey from the streets of a city gripped by violence, such as Aleppo, and follow them as they exit the country and make the perilous journey on an overcrowded boat into Europe. From there, the filming will continue and include their experiences in migrant camps, along with the living conditions and hostilities they faced daily from the native populations. From the footage, a short 20-30 minute video will be compiled and shown via VR to volunteers to determine if they have any change after the viewing. Follow-up with volunteers could last several months to determine if any lasting effects occur.

**Results**: This is only a proposal, but the hope is that the results would show an increased empathy for refugees and assist in reducing the xenophobia currently gripping host countries.

**Conclusion**: Changing the minds of the populous will take time, but with the use of VR, perhaps leaders could be swayed to change their policies to be more refugee friendly. If this study works, the field of humanitarian relief could be altered forever.

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## Mobile Health in Complex Emergencies: Preliminary Results from a Workshop, Lebanon, March 2017

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**Study/Objective**: The objective of this workshop is to identify the essential components of establishing, managing, and sustaining mobile health services at the community level, within conflict context based on experiences in the Middle East and North Africa (MENA) region.

**Background**: The MENA region from Syria, Palestine to Libya is characterized by instability, conflict, and growing humanitarian needs. Humanitarian interventions are increasingly taking place in complex and protracted crisis that severely affect healthcare systems. The mobile health services are flexible, adaptable to the local context and needs, and critical in this environment where primary health care is not available or accessible. In order to adapt to the complex environment in their countries, the Red Cross Red Crescent Movement societies in the MENA region has been widely deploying mobile health teams to provide essential primary health care in remote and hard to reach areas to most vulnerable populations.

**Methods**: The Canadian Red Cross with other partners will conduct a workshop in Lebanon in March 2017, involving key implementers and researchers in the mobile health field. We've drafted and shared a structured survey with main stakeholders to collect vital data regarding their mobile health experiences. Moreover, technical documents will be drafted using existing mobile health guidelines to be discussed and approved during the workshop. Evidence-based medical practice, case studies, and experts' opinions will be combined to reach consensus about the effective models of delivery, packages of services, best practices, and key challenges and solutions of mobile health services.

**Results**: The synthesized preliminary results of the workshop will be presented, highlighting the essential components,

standard operating procedures, and recommendations to overcome the common challenges within conflict contexts.
**Conclusion**: The outcome document will be used as a reference guide to build on existing knowledge in mobile health service delivery in complex emergencies.
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### Prevention and Risk Management from Nature to Society: How can Medicine Help Reduce the Refugee Crisis in Mexico?

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**Study/Objective**: To sensitize Mexican doctors on preventing immigrant disease complications.
**Background**: Mexico serves as a halfway point for immigrants seeking safety and a better life. Many of these refugees carry severe diseases that complicate matters. These complications could be prevented by proper and timely treatment. Currently, there are no programs targeted at immigrant health. Doctors should be sensitized to the current situation and the need to prevent health complications.
**Methods**: Retrospective, observational, longitudinal study of refugee patients found in Mexico City; 200 refugee patients (ages 11 to 55) found in immigrant homes and hotels working with the Responde A.C. Foundation were included.
1. Three different sites were selected, where there was a higher density of patients.
2. Specialized and experienced doctors enrolled the patients through a weekly triage.
3. A clinical file was created for each patient containing a full medical history and background on the patient. 4. Patients were given a weekly follow-up for 2 months, during these follow-ups they were asked about their recovery progress. A clinical consult was given to monitor their progress.
**Results**: We found that there is a constant need for general and specialized medical care among refugees in Mexico. Providing timely and appropriate care showed improvement in the patients perceived quality of life. The 130 patients showed good progress, 20 patients developed complications, and 50 patients were lost during follow-up. At the present time, the statistical analysis will conclude by the end of 2016.
**Conclusion**: There is an immigrant crisis in Mexico, and health-care providers should be aware of this problem and action should be taken to prevent this crisis from continuing to grow. This study shows the importance of timely and accurate medical care, and the impact it could have in preventing complications and improving the quality of life of refugees in Mexico.
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### The Educational Challenge in 2017: Providing Emergency Care to Migrants and Vulnerable People

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**Study/Objective**: The aim of the study was to explore and describe problems and difficulties in situations with migrants in emergency care in order to plan for an appropriate and effective teaching program for emergency care providers.
**Background**: In 2016, there were many posed threats to emergency medicine practitioners all over Europe. Terrorism, climate changes, and seasonal diseases could be sufficient to challenge emergency medical systems; they add to the hardships facing the thousands of migrants who continue to cross into Europe with the never-ending conflict in Syria and Iraq. In those settings, emergency medicine must play its key role of being the last resort for people with no primary health care and no alternative.
**Methods**: An explorative study was carried out using a sample of 67 emergency care providers, 15 physicians, 52 registered nurses, 46 women, and 21 men experienced in emergency care. They documented their experiences of problematic situations.
**Results**: The health care professionals' experiences of problematic situations with migrants in emergency care were described as: (1) language barriers; (2) reliance on authorities; (3) different behavior; (4) contact with relatives; (5) complicating logistic factors; (6) gender roles; (7) patient's earlier experiences of violence; (8) use of natural remedies; and (9) lack of knowledge on specific health care problems of migrants.
**Conclusion**: Results showed the main problem was related to communication difficulties, including language barriers and cultural dissimilarities. Another key factor is the lack of knowledge on specific health care problems of migrants. In order to mitigate the problems, the use of adequate interpreters is a theoretical chance, whereas using language-free communication tools (cartoons and vignettes) could be a financially effective alternative. Training programs for emergency care providers must include sessions to improve knowledge about the care of migrants from different parts of the world. The importance of searching for the unique individual perspective is stressed.
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### Evidence: Aid Special Collection for the Health of Refugees and Asylum Seekers

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**Study/Objective**: To build collections of health care evidence, to provide those addressing the health of refugees with some guidance, collections divided between Evidence Aid and Cochrane.
**Background**: In 2015, over one million people arrived in Europe by sea, mostly originating from Syria. In the same year, 3,771 people went missing or died attempting to reach safety in Europe. In 2016, people continue to make the hazardous journey across the sea, and at the beginning of February, 67,072 people made it across, while 357 were reported dead or missing.
**Methods**: Both collections focus on some of the most relevant medical conditions, as perceived by experts involved, either in

guideline development or on the frontline, directly addressing the health care needs of refugees and asylum seekers. In the first instance, the work-group addressed five priority conditions.

**Results**: The collection "*Health of Refugees and Asylum Seekers in Europe*" was published on December 2, 2016, hosting curated resources from the Cochrane Library and other research outputs, categorized into guidelines; systematic reviews; articles; and other information.

**Conclusion**: Since publication, the refugee health collection, found on the website *EvidenceAid.org*, has received almost 600 page views, ranking it third amongst most viewed pages after the homepage and the resources tab for that period. On average, users have been spending 2.30 minutes on the page, suggesting the content is commanding attention. We will continue to encourage an evidence-based response to this crisis, and will report on usage of both collections at the conference.

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## Ethics and Palliative Care During International Humanitarian Action

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**Study/Objective**: This is a critical interpretive synthesis of the ethical and practical limitations inherent to the provision of palliative care by humanitarian organizations during public health emergencies. Developed in dialogue with the SPHERE Project, the Palliative Care in Complex Humanitarian Emergencies network, and the Children's Palliative Care Network, and was situated within a broader qualitative study on the place of and need for palliative care in humanitarian crises. Its findings can be adapted to inform guidelines for aid agencies for the provision of palliative care.

**Background**: Standards of care in crisis settings emphasize that patients who are dying should be treated with respect and properly attended to. However, in humanitarian crisis where demands for care outweigh resources, efforts are typically directed to those most likely to survive. The need for humanitarian agencies to provide palliative care was recently highlighted in the Ebola crisis, it is still unclear if, and how 'end-of-life' care is approached in context. Aid workers need to be equipped with the ability to initiate palliative treatment as a worthy intervention, even in times of crisis and scarcity.

**Methods**: Literature was captured using standardized, key and mesh term searches through academic databases, including MEDLINE, EMBASE, CINAHL, Web of Science, as well as grey literature databases (ReliefWeb, IGO).

**Results**: Findings described here include: (1) the interaction of humanitarian principles with triage priorities in disasters; (2) the politics and ethics of healthcare exclusion; (3) 3-case studies exemplifying the need for increased guidance and preparation for palliative care needs in humanitarian emergencies.

**Conclusion**: This Research for Health in Humanitarian Crises (R2HC)-funded analysis will help elucidate the realities of palliative care needs in humanitarian practice, and inform the development of guidelines and training to better prepare humanitarian healthcare teams for palliative and end-of-life needs in the field.

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## Epidemiological Humanitarian Aid: Data for Evidenced Based Decision Making in Disaster and Conflict Medicine

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**Study/Objective**: Qualitative and quantitative assessment of disaster and Ukraine ATO/Contact Line to report the incidence and prevalence of communicable and noncommunicable disease (NCD) (to include trauma) to better serve policy and decision makers on humanitarian aid packages. A thorough assessment tool for civil and military medical needs, gaps, and reporting that feed into all disaster services to enable evidenced-based decision making.

**Background**: Currently, many barriers and challenges remain for donors, humanitarian actors, and governmental institutions to appropriately allocate resources due to the lack of sound data and epidemiological principles. Systems and standards for disaster preparedness, prehospital medicine, evacuation chain management, and noncommunicable disease are lacking and require evidenced-based decision making at a policy level.

**Methods**: A thorough, quantitative, and qualitative descriptive analysis and updated stakeholder mapping to describe the methods for carrying out emergency operations, the process for rendering mutual aid, the emergency services of governmental agencies requiring interoperability, analyze how resources are mobilized, how the public and other agencies will be informed, and the process to ensure continuity of government and core functions, such as rule of law, during an emergency or disaster and all other medical services. This must include a data-driven epidemiological core focus based on data, applicable to any manmade or natural disaster, and be sustainable in nature. This must be testable, reproducible, and well-versed across agencies. Medical support elements and security assets may create a clear picture that will enhance support for both Ukraine MoD, Ukraine MoH, and other NATO-associated partners.

**Results**: Assessment Reports and data tools able to sustainably highlight disaster preparedness, evacuation chain management,

gaps, and key recommendations supporting NATO's fundamental security tasks.
**Conclusion**: Recommendations for humanitarian and governmental actors with focus on efficiency and interagency coordination, based on detailed epidemiological information, can decrease morbidity and mortality for the conflict in Ukraine.
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### When Electronic Health Records and Humanitarian Aid Meet: Technology in a Rural Setting

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**Study/Objective**: We aim to discuss how a simple implementation of a basic electronic health records system has helped to improve efficiency and patient safety for humanitarian aid within a rural setting.
**Background**: Humanitarian aid involves the challenge of delivering health care within a resource-limited setting, often dealing with cultural and language barriers. To bridge the cultural and language gap, and to keep proper medical records of patients served within a rural setting, we designed a low-cost electronic health records system with accessible components.
**Methods**: To help create a sustainable method for a humanitarian aid effort in Cambodia to keep track of patients' medical records, we created a simple user-friendly program interface which allows entry of basic medical information, including location of consult, consultation notes, past medical history, and medications prescribed for multiple patients. To accurately match patients with their medical records and proper patient identification, we employed the use of a simple biometric system. We used a dual authentication method, comprising of a simple off-the-shelf fingerprint scanner with a digital camera for photograph taking for facial recognition.
**Results**: There was positive feedback on the performance of the electronic health record system and its biometric functionality. The system was able to function effectively and cope with the high flow of patients at clinics. The system also led to more efficient medical record keeping and retrieval, with a decrease in manual paperwork. We envision the system to be further improved with time to increase functionality and to remain as a viable low-cost alternative to efficient medical record keeping and retrieval for humanitarian aid in the rural setting. (If selected for presentation, pictures of the EHR and it's implementation would be provided).
**Conclusion**: Utilization of basic and cost effective technology for electronic health records and biometric recognition of patients is possible and helps the provision of medical humanitarian aid in a low-cost setting.
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### The Impact of Social Media Platforms on the Engagement of Stakeholders in the Context of the Provision of Humanitarian Data

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**Study/Objective**: In 2011, Evidence Aid began using multiple social media platforms to disseminate information and engage stakeholders. In 2014, a project was undertaken by Evidence Aid to assess the use of Twitter, after gaining a considerable following of 940 accounts worldwide since joining 28 months previously. The objective of this study was to further understand the impact of the use of social media platforms on the engagement of stakeholders in the provision of humanitarian data.
**Background**: Evidence Aid provides timely and accessible evidence on interventions that might be considered in the context of natural disasters and other major health care emergencies. Our mission is to inspire and enable those guiding the humanitarian sector to apply an evidence-based approach, and the vision being that those in need receive humanitarian aid in the most timely, effective, and appropriate way possible.
**Methods**: Analytical tools within each of the social media platforms, as well as Evidence Aid's website, were used to assess the effectiveness of Evidence Aid's online communications in terms of the engagement of stakeholders between 2015 and 2016.
**Results**: Between August 2015 and August 2016, the traffic to Evidence Aid's website has increased as follows: the average session duration for each user is up by 27% showing users are spending more time on the site, access to the website by Spanish language users increased by 123% due to the addition and promotion of translated summaries, and referrals to the website from social media sources increased by 33%. Referrals from Facebook increased by 43%, LinkedIn by 57%, and Twitter by 9%, suggesting our social media campaigns are driving traffic to the site.
**Conclusion**: Social media platforms, when used appropriately, can be effective tools in the engagement of stakeholders in the context of the provision of humanitarian data and engagement of influencers in the sector.
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### What is the Interest of the International Health Emergency Responders in Organizational Improvement?

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**Study/Objective**: To clarify the interest of the international health emergency responders in organizational improvement.
**Background**: Although humanitarian actors are expected to learn and improve from experience and reflection, little has been reported about the interest of the emergency responders in organizational improvement.
**Methods**: A questionnaire was sent to the members of an International Emergency Medical Team (Humanitarian

Medical Assistance, a Japanese non-profit organization) who was involved in the deployment for Typhoon Haiyan (2013), Cyclone Pam (2015), and Nepal Earthquake (2015) responses.

**Results**: A cumulative total of 77 out of 100 members answered the questionnaire. A total of 491 responses were obtained. Of those, 169 (34%) were obtained from the members who experienced international deployment once, 322 (66%) were from members more than once. Their interest distributed in [1] Organizational management: 62 (13%), [2] Operational management: 292 (59%), [3] Clinical activity: 84 (17%), and [4] Logistical activity: 53 (11%). The most interested subcategory was Information management: 97 (20%). Fundraising, Accounting management, Safety management, Complaint management, Infection Prevention/Control, and Clinical waste management were the subcategories interested, but only from the members who experienced international deployment more than once.

**Conclusion**: International health emergency responders had the interest in organizational improvement, mostly in operational management, especially in information management. Their focus of interest may change with experience.

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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## Opportunities and Roles of EMTs in Accelerating Disaster Recovery: A Canadian Red Cross Approach

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**Study/Objective**: This field case study highlights how Emergency Medical Teams (EMTs) have bridged the gap between the emergency response and early recovery, of a health-system affected by a Sudden Onset Disaster (SOD), by supporting continuity-of-care and capacity building, using the experience and methodology of the Canadian Red Cross (CRC).
**Background**: Following a SOD, many EMTs leave the affected country at the two-week mark. This can lead to significant gaps in the continuity of health service delivery, resulting in heightened public health risks within a fragile health-system. The CRC has been deploying Emergency Field Hospitals (EFHs) in response to disasters since 1996. Recent external evaluations of CRC deployments (type 1 or 2) deployed to the Philippines, Nepal and Ecuador, have validated the success of the approach of CRC. CRC has handed over the EFH in the Philippines, Nepal and Ecuador.
**Methods**: CRC partners with the Red Cross of the affected country when deploying an EMT. Contrary to many EMTs, these deployments typically range from 1-4 months, and are followed by additional programming. CRC's handover process includes training and donation of medical equipment to a local partner. A desk review, analysis of operational data, and expert interviews have identified the vital role of EMTs in recovery and health-system strengthening, by staying longer than two weeks, delivering more than clinical services, employing a comprehensive handover, and embedding services within the health-system.
**Results**: The Ministry of Health in the Philippines, Nepal and Ecuador were able to ensure service-delivery, despite the departure of CRC and health-systems that were not fully rehabilitated. Additionally, the Philippine Red Cross has deployed its own newly-acquired EFH, to more than 5 operations. Similar results can be seen in Nepal and Ecuador.
**Conclusion**: Evidence will inform organizations deploying EMTs methods to improve continuity-of-care, and the critical role of EMTs in accelerating disaster-recovery.

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## Improving an Emergency Medical Team's Capacity to Management of Diabetic Complications, Post Sudden Onset Disaster

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**Study/Objective**: Review the development of an integrated clinical service for the management of surgical diabetic complications, post-Sudden Onset Disaster (SOD) by an Australian Emergency Medical Team (EMT).
**Background**: Asia is the site of a rapidly emerging diabetes epidemic. The management of diabetes after a Sudden Onset Disaster (SOD) is complicated by a lack of monitoring and therapy for diabetes and reduced access to basic wound care. Furthermore, many persons in low- and middle-income countries with diabetes remain as a baseline undertreated. In 2013, and Australian Medical Assistance Team (AusMAT) deployed a Type 2 EMT to Tacloban in response to Typhoon Haiyan. Thirty-two percent of the surgical workload was diabetic limb infections and sepsis, as a result of relatively minor injury. Many dilemmas were encountered, not limited to difficulty with timing of wound closure, an absence of pharmaceuticals for discharge, limited inpatient expertise with diabetic management, and concerns about the usage of diabetic medications post-discharge in a food scarce environment.
**Methods**: This paper reviews the experience of the AusMAT EMT 2 in Tacloban and chronicles the improvements in clinical pathways, pharmaceuticals, nursing, and rehabilitation staffing and engagement with the host nation's Ministry of Health.
**Results**: Since 2013, the AusMAT EMT has added the following aspects to its service:

Increased number of and range of diabetic medications;
Increase laboratory capacity to diagnose and treat the complications of diabetes;
A focus on integrating internal medicine expertise in the team;
Including nurses with diabetic management and education expertise; and
Clinical practice guidelines for surgical management of diabetic foot wounds.

**Conclusion**: The experience of the AusMAT Type 2 EMT in Tacloban with serious diabetic foot complications from minor injuries has led to a considerable reconfiguration of the clinical service provided in response to a SOD.

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## WHO' Minimum Technical Standards and Recommendations for Rehabilitation, for Emergency Medical Teams' Guidance: Development and Use

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**Study/Objective**: To disseminate the development and use to date, of the WHO 'Minimum Technical Standards and Recommendations for Rehabilitation for Emergency Medical Teams' guidance document (e-publication expected December 2016).
**Background**: The World Health Organization (WHO) Emergency Medical Team (EMT) initiative, supports populations severely impacted by large-scale catastrophic disasters by ensuring a rapid, professional, coordinated medical response by national and international teams. Physical rehabilitation has become increasingly recognized as an essential health component of the medical response in disasters, due to the humanitarian imperative to limit long-term disability, and optimize functional outcomes in persons sustaining severe traumatic injuries (and infectious disease outbreak sequelae). The WHO 'Minimum Technical Standards and Recommendations for Rehabilitation for Emergency Medical Teams' was developed to provide guidance for integrating rehabilitation capacity into EMTs, and hence the global humanitarian medical response.
**Methods**: Guidance document development was a highly consultative process hosted by WHO involving global experts from the rehabilitation field, including operational rehabilitation from International Non-Governmental Organizations (INGOs), international professional rehabilitation societies, and individuals.
**Results**: The WHO 'Minimum Technical Standards and Recommendations for Rehabilitation for Emergency Medical Teams' guidance document draft, is available on the WHO EMT Initiative extranet, with the official e-publication anticipated in December 2016. The minimal technical standards for rehabilitation have been incorporated into the verification process undergone by EMTs, to qualify for global classification. It is expected that use of the minimum standards and recommendations will result in expanded, quicker access of patients to rehabilitation services (and equipment) in disasters, as well as improved referrals between EMTs and local health facilities for ongoing rehabilitation service provision - translating to increased near-term functional outcomes and reduced long-term disability for affected persons.
**Conclusion**: In conclusion, the WHO 'Minimum Technical Standards and Recommendations for Rehabilitation for Emergency Medical Teams' guidance document establishes minimum standards for rehabilitation to increase the rehabilitation capacity of EMTs in disasters (and outbreaks).

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## International Emergency Medical Teams in the Russian Federation

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**Study/Objective**: To show the tools and tasks of Emergency medical teams in the Russian Federation.
**Background**: International experience of a national Mobile Field Hospital in the Russian Federation (RF) is very large (Columbia, Turkey, Iran, China, Afghanistan, Chile, etc). The Task of this presentation is not to show the procedures of WHO in step-by-step certification of International Emergency Medical Teams, but rather how this processing was created in the Russian Federation.
**Methods**: Procedure analysis.
**Results**: 1. In Civil Law Code there is a special legislative article, supported by some part of the state budget, for humanitarians, free of charge assistance delivery for the injured in emergencies anywhere. 2. Medical emergency relief in all aspects is never connected to policy, politics, confession, economical status of patient, etc. Protocols and Standards are the same to everyone injured independently upon his social position. 3. Every central hospital or specialized clinic has bed reserves (5%) if any emergency occurs. 4. All the system of Emergency Medical Care in RF has its satellite network, and taking it into account, could connect all the medical facilities and register of specialists into one competent and powerful telemedicine framework. 5. The system has mobile field hospitals, portable modern equipment, and staff prepared who are regularly educated and trained. 6. The system is strictly organized, centralized vertically, and is under the management of the RF Health Ministry, 7. The system is strictly territorially organized and has more than 80 territorial and regional units (centers). In such a way, all Russian Disaster Medicine Centers 'Zaschita' (Protection) have become one of the first in the great number of medical facilities amidst many WHO member-countries who satisfies the requirements of WHO procedures of certification.
**Conclusion**: Tasks of the internal emergency medical teams of RF, Disaster Medicine Centre 'Zaschita', as a collaborating WHO disaster medicine center, are presented and discussed.

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## Learning from Canadian Red Cross International Health Team Deployments: Understanding Individual and Institutional Competencies that would be Beneficial to a Canadian Domestic Response

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**Study/Objective**: To determine the types of individual/institutional competencies/skills that are obtained from working with the Canadian Red Cross (CRC) International

Emergency Response Unit (ERU) that can be applied to a domestic context in Canada.
**Background**: The Canadian Red Cross has extensive experience working in international settings, both in disaster and development. The ERU of the CRC is a health emergency unit that can respond to international humanitarian disasters, either in the form of basic primary care health services or as a field hospital. Much institutional and individual knowledge and skills have been obtained over years of working in these contexts. We hypothesize that there is a large amount of knowledge and skills that have been learned, that could easily be applied to the Canadian domestic context, but this has never formally been studied.
**Methods**: Qualitative methodology: Key informant and semi-structured in-depth interviews. Aim for a diversity of perspectives and in-depth accounts. Sampling and recruitment: Purposive/snowball sampling strategies. Participants will include a diversity of professional backgrounds, ERU HCPs (nurses, physicians, mental health, surgeons, anesthetists), ERU team/deputy leaders, logisticians, technicians, security managers, and other CRC managers/directors involved in the deployment of health ERU. Data collection: Experienced research assistants will conduct the interviews by Skype, telephone, or in person. Interviews will be audio-recorded (with consent) and are expected to last 30-45 minutes. All interviews will be transcribed. Demographic information: age range, gender, number of years working in humanitarian settings, role collected.
**Results**: Analysis: Three team members will independently code the interviews based on a pre-developed code sheet. Key overarching themes developed. Results: Will be discussed in terms of themes/lessons learned. Discussion will include next steps for integrating this knowledge at the domestic level.
**Conclusion**: Hypothesis: Individual and institutional skills/knowledge/capacities that are acquired through international ERU deployment have application in the Canadian domestic realm.

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## Psychological Fitness for Deployment: Personality as a Predictor of Performance

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**Study/Objective**: To predict peer-evaluated performance of deployed AusMAT members from personality and psychological well-being.
**Background**: Disaster response personnel are typically selected on the basis of professional training and qualifications. These criteria contribute to the 'can do' component of performance. The 'will do' component incorporating performance quality and interpersonal effectiveness is generally assessed subjectively. Australian Medical Assistance Team (AusMAT) examined the role of the Five-Factor Model (FFM) personality factors and psychological wellbeing in predicting performance of medical and logistics personnel as measured by peer evaluation.
**Methods**: During the annual Tour de Timor event in 2016, twenty-three AUSMAT personnel completed the NEO Personality Inventory – 3 (Costa & McCrae, 2010) and the MH30 Mental Health Screen (Response Psychological Services, 2008). Performance criteria were obtained through peer evaluations submitted during deployment, via the online PES50 Peer Evaluation Schedule (Response Psychological Services, 2010). Anonymous data was used to explore the relationship between personality factors and peer-evaluated performance.
**Results**: Low scores on the personality facet Tender-mindedness and high scores on the facet Order were valid predictors of peer-evaluated performance. Order predicted almost 90% of the variance in the performance criterion, while tender-mindedness predicted almost 50%. Many other directional relationships were observed between both personality and mental well-being with the performance criterion.
**Conclusion**: AusMAT personnel who demonstrated a realistic, rational and in some ways very clinical approach were rated more favorably by their peers across multiple criteria of deployment performance. AusMAT Logisticians who maintain flexibility while adhering to standards and process more so than their peers are rated very favorably. Establishing a performance baseline measure using peer evaluation enabled improved self-other awareness during the deployment, and provided participants with detailed feedback for self-development. The proportion of variance explained, suggests significant potential for the use of personality measures in AusMAT selection.

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## Emergency Medical Services during Mass Casualty Incidents (MCIs) - Challenges and Proposed Policies

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**Study/Objective**: To identify consensus-based policies that could be adopted by world-wide Emergency Medical Services' (EMS) to manage mass-casualty incidents (MCIs).
**Background**: Medical management in MCIs is often characterized by challenges, such as lack of available resources, insufficient cooperation between first responders, inability to protect personnel, etc. As such challenges are common to EMS services world-wide, there is a need to identify policies applicable to the varied entities.
**Methods**: Twenty-one challenges concerning EMS' operation during MCIs were identified. Potential policies to effectively address challenges were disseminated to 38 experts from ten countries. Two cycles of a modified e-Delphi process were conducted; participants were requested to agree/disagree to endorse the policies based on a five-point Likert scale. Policies endorsed by ≥80% of participants were adopted for EMS use during MCIs. Policies that did not achieve consensus were reviewed to identify differences according to experts' country of origin.
**Results**: Seventy-six percent (16/21) of proposed policies were endorsed in the first e-Delphi cycle. Four were endorsed by

100% of respondents including: ensure all ambulance services maintain readiness for MCIs; conduct joint training and exercise programs; adopt a common model for managing MCIs; and recognize the authority of only one on-site EMS commander. One policy that was proposed was that the senior EMS officer arriving on-site should not necessarily take over command and was endorsed by 92% in the 2nd e-Delphi cycle. Variability among experts according to origin country was noted concerning: (1) assign ambulances to off-duty EMS staff; and (2) dispatch two BLS and two ALS ambulances as an automatic MCI response.

**Conclusion**: Clear policies shared by all EMSs are needed to ensure effective management and maximal life-saving capacity in MCIs. The study presents consensus-based solutions to varied challenges common to EMS worldwide. Additional studies are needed to further develop policies into measurable and comparable international standards.

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## Evaluation of the Situation of Trainings Provided by Çanakkale 112 Ambulance Services

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**Study/Objective**: The purpose of this study is to evaluate the present situation as of November 1, 2016, in regard to in-service training provided by the Training Unit of Çanakkale 112 Emergency Medical Services (ÇEMS).

**Background**: It is important to constantly update and improve personnel training in Emergency Medical Services. The following trainings are provided to personnel in pre-hospital health services: Basic Module Training (BMT), Trauma and Resuscitation Training (TRT), Advanced Life Support Training (ALST), Child Advanced Life Support Training (CALST) and Training for Ambulance Driving Techniques (TADT).

**Methods**: The study is a descriptive epidemiological study. The data was obtained from the records by Training Unit of Chief of Staff of Çanakkale 112 Ambulance Service.

**Results**: A total of 395 personnel are employed in ÇEMS. Of those, 57,5% (n = 227) are Emergency Medical Technicians (EMTs); 20,0% (n = 79) are Emergency Medical Technicians (Paramedics). In all, 89,8% of all of the personnel (n = 307) received the BMT; 90,1% (n = 308) received the TRT; 71,6% (n = 245) received the CALST; 61,1% (n = 209) received the ALST. Only 37,0% of them received the TATD. 97% of EMTs (n = 220) received the BMT; 99,0% of them (n = 224) received the TRT; 78,0% of them (n = 177) received the CALST; 70,0% (n = 160) received the ALST; 32,0% (n = 72) received the TATD. Further, 86.0% of paramedics (n = 68) received the BMT; 87.0% of them (n = 69) received the TRT; 67,0% of them (n = 53) received the CALST; 53,0% (n = 42) received the ALST; and, 23,0% (n = 18) received the TATD. 25,0% of doctors received the BMT; 12,0% of them (n = 2) received the TRT; 38,0% (n = 6) received the CALST and 12,0% (n = 2) received the ALST.

**Conclusion**: It was concluded that since the BMT and TRT were performed in the city of Çanakkale, the participation of EMS personnel was high; on the other hand, since the ALST and CALST were performed in the city of Bursa, the participation percentage of EMS personnel was lower.

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## Changes in Quality of Prehospital Care and Time Delays in Acute Stroke in Tallinn, Estonia from 2005 to 2016

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**Study/Objective**: The aim of the study was to analyze changes in quality and time delays in prehospital stroke management, and their influence on Door-to-Needle Time (DNT).

**Background**: Interval between stroke onset and thrombolysis determine the efficacy. Guidelines for stroke management were introduced in 2008 in Tallinn Emergency Medical Services (TEMS). Since 2014, the requirement of pre-arrival information by phone call of a possible thrombolysis patient to the West Tallinn Central Hospital (WTCH)-SS neurologist is in the TEMS guidelines. Since 2014, thrombolysis starts on Computed Tomography table (CT) at WTCH-SS.

**Methods**: Data of all consecutive thrombolysed stroke patients were recorded prospectively since January 1, 2005 to November 1, 2016 at WTCH-SS. Ambulance records of thrombolysed and non-thrombolysed stroke patients managed by TEMS were retrospectively analysed since 2009. Analysis was conducted for three periods: 2005-2009, 2009- 2011, and 1/1-1/11/2016.

**Results**: TEMS records were analyzed for 3666 stroke, including 243 thrombosed, patients during selected periods. Changes are depicted in the table. The exact time of onset was recorded on 38.9% (2009-20011) and on 62.4% (2016) of TEMS records. TEMS response time with ECG performed or ECG monitoring was 26.8 and 24.8 minutes, respectively versus 18.2 minutes without ECG. The pre-arrival information of possible thrombolysis to WTCH-SS was recorded in 28.7%. With pre-arrival information mean DNT was 25.8 versus 50.3 minutes without prior call.

**Conclusion**: TEMS adherence to guidelines has improved, but ECG is performed. DNT times have improved at WTCH-SS. The factors for improved DNT were related to pre-arrival information of possible thrombolysis patients by TEMS and start of thrombolysis in CT.

| | 2005-2009 | 2010-2011 | 2016 | 2009-2011 | 2016 |
|---|---|---|---|---|---|
| | Thrombolysed | | | All stroke | |
| Dispach high priority | 66.2 | 88.9 | 87 | 61.9 | 72.7 |
| Mean response time (minutes) | 9 | 6.9 | 6.6 | 9.4 | 8.1 |
| Recorded blood sugar (%) | NA | 66.7 | 93.1 | 25.9 | 52.1 |
| ECG/ monitoring done (%) | NA | 54.2 | 49.5 | 43.6 | 31.5 |
| DNT (minutes) | 75.7 | 55.4 | 28 | | |

**Table 1**. Changes in door to needle times at WTCH-SS (West-Tallinn Central Hospital). Since 2014 thrombolysis started in computed tomography (CT) room and pre-arrival information is provided by TEMS (Tallinn Emergency Services).

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## Resuscitation Team and Code Blue Practicing in Çanakkale State Hospital, Turkey

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**Study/Objective**: This study has two research objectives. The first aim is to evaluate the quality of resuscitation team and code blue practicing. The second is to determine which factors affect the code blue process.
**Background**: Code Blue Teams (CBTs) have crucial roles in every hospital or health care center in the world. With this important role, CBT must be well trained to save more lives. To train this team properly, hospitals and other health organizations have some responsibilities. If they do their responsibilities, and provide some conveniences to CBTs, the team can practice more and be trained well.
**Methods**: The authors conducted a retrospective data review of code blue frequency in three months (June 1- September 1, 2016). To carry out this study, permission was obtained from the hospital authority, then code blue forms reviewed. The personal information of the patients is not used in this paper.
**Results**: CBT has 40 code blue calls from different locations in the hospital. Of those calls, 20% (f = 8) are from the angiography unit, 35% (f = 14) from clinics, 30% (f = 12) from patient's rooms, 5% (f = 2) from cafe for syncope, and 10% (f = 4) from intensive care units. There was 45% (f = 18) of patients who were resuscitated by giving CPR and saved their life. There was 2.5% (f = 1) patients could not be saved in the angiography unit and 52.5% (f = 21) patients were given only first aid.
**Conclusion**: The arrival time to the patients is between in 20-120 seconds. Code blue forms need to be standardized. Having practiced regularly will be helpful for CBTs. Timing is very important and could affect the code blue quality. People who activate the CBT in hospitals must be educated about first aid and code blue process.

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## Quick Assessment of Intra Abdominal Pressure in an Emergency: An Option for Better Decision Making in Cases of Blunt Trauma Abdomen

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**Study/Objective**: The study was designed with an objective to measure intra abdominal pressure using intra vesicular pressure monitoring, in conditions predisposing to abdominal compartment syndrome in surgical trauma patients.
**Background**: Intra-Abdominal Hypertension (IAH) is defined as a sustained or repeated pathologic elevation of Intra-Abdominal Pressure (IAP), of greater than 12 mm Hg. Serial monitoring of IAP warrants early initiative for conservative treatment of IAH before dangerous levels of IAH develops.
**Methods**: This study comprised of 30 patients, who were above the age of 10 years, and presented with acute abdomen with suspected intra abdominal hypertension. IAP was measured at 0 hr, 8 hr, and 16 hours. Data included demographics, main diagnosis on admission, APP (MAP-IAP), APACHE II score; ICU stay, hospital stay, complication and mortality.
**Results**: Total data of 30 patients was taken and IAH (IAP $\geq$ 12-20 mmHg) was observed in 18 (60%) of cases and ACS (IAP $\geq$ 20 mmHg) was noted only in 3 (10%). There was male preponderance 2.33:1 and raised IAH in 61.9% of males. Majority (46.7%) of patients were admitted with perforation peritonitis with significant abdominal distention (96.7%). The mean IAP at the time of study was $14.73 \pm 2.83$ ($P = 0.92$) in IAH group and was $19 \pm 2.98$ ($P = 0.74$) in ACS group whereas the mean APP was $53.60 \pm 11.01$ ($P = 0.92$) in IAH group and $39 \pm 11.43$ ($P = 0.97$) in ACS group. Mean Acute physiology score was $19.4 \pm 6.4$ while majority (47.6%) observed high APACHE II score (>20). Mean APACHE score in ACS group ($27.3 \pm 10$) was higher with higher mortality rate $58.3 \pm 31.94$ as compared to IAH group ($20.4 \pm 6.04$, mean mortality $34.78 \pm 18.25$). Medical therapy (isotonic crystalloids in 100%) and surgical therapy (midline laparotomy 86.7%) was offered in majority.
**Conclusion**: Raised IAP leading to IAH and ACS, is a hidden threat to the surgical abdomen. For early prompt diagnosis and prediction of mortality, IAP and APP monitoring are effective.

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## Patient Isolation Units, Performance-Avoidance: A Patient with Heat Stress Risk during Temporary Isolation and Transportation by the EMS Biohazard Team

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**Study/Objective**: To perform trial exercises, study, and technical evaluation of the Patient Isolation Units (PIU), for biosafety of the emergency medical care staff during transportation of a suspected patient with a high contagious disease and microclimate conditions in the PIUs' chambers.
**Background**: Deployment of a PIU for temporary isolation and transportation of an infected patient requires high-level biosafety measures, to avoid uncontrolled release of infectious material and protect medical care staff. Different design features and performance in a variety of biosafety ventilation systems of PIUs, initiated concerns regarding comfort, safety, and microclimate conditions for the patients during transportation operations, including uncontrolled ingress of the disinfection liquids into the PIU chamber during disinfection treatment.
**Methods**: Microclimate conditions and physiology status in the PIU's chambers were evaluated with the volunteers having purposely elevated core body temperature for +38, 5 °C and placed in a PIU. Volunteer´s rectal, skin temperature, and heart rate were recorded during negative/positive pressure ventilation regime of a PIU, including microclimate parameters such as external/internal temperature, humidity, airflow, air pressure, air exchange rate, and $CO_2$ concentration.
**Results**: It was concluded that desirable nominal AER inside of an isolation chamber should be in the range of 35-50 times/hour, compared to a majority of commercially available PIUs with the insufficient AERs of 10-15 time/hour.
**Conclusion**: Trial exercises with practical handling of the mock patients during their temporary isolation and transportation in the PIUs by the EMS Biohazard Teams demonstrated the need of cooperation between the first responders (EMS, fire service, police, and health care) to improve joint standard operational procedures. Potential heat stress risk of a patient isolated in a PIU is significantly influenced by the performance of biosafety ventilation systems. High air exchange rate in PIUs' chambers is essential to control a patient's comfort and cooling effect.
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## Emergency Medical Team Working Group for Minimum Data Set

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**Study/Objective**: To enhance flow of standardized information between Emergency Medical Teams (EMTs), Emergency Medical Teams Coordination Cell (EMTCC), and the Ministry of Health (MOH).
**Background**: During a disaster, EMTs' assistance arrives with lots of goodwill, but may not be compatible with the needs or the situation. Every EMT has its own data collection and report system. The variety of each data gathering system creates difficulties in the process and analysis of information for by the EMTCC and MOH. There is a gap in the reporting due to lack of pre-existing standardized template. Lack of a standardized reporting system creates difficulties for EMTCC and MOH to collect data for future research to improve the disaster response. Japan International Cooperation Agency (JICA), Israel's Agency for International Development Cooperation (MASHAV), and the World Health Organization (WHO) set a Working Group (WG) to define the Minimum Data Set (MDS) for disaster report.
**Methods**: A preliminary meeting with JICA and MASHAV set the concept and introduced it to the WHO. With the WHO's approval, a secretariat of a MDS WG was established and made a literature review. Thirteen international organizations joined the MDS WG. Summary of the first WG and MDS internet survey was taken with the response of 29 countries' EMTs. The outcome was presented to the second WG in order to define the strategy and the items for the MDS, taking into consideration the patient's record and the EMTCC and MOH needs statistics.
**Results**: Based on the survey, MDS WG determined the items should be included in the reports and will be finalized by the WHO and the WHO's recommendation to use as MDS reporting by EMTs.
**Conclusion**: Using standardized MDS can help with data collection in disaster in order to provide better medical care and to develop research for future learning and better disaster response.
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## The Robot Physician's (RP-7) Management and Care in Unstable ICU Oncology Patients

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**Study/Objective**: An assessment and treatment of Intensive Care Unit (ICU) Oncology patients is important for surgeons and intensivists. The use of Robot Physician's (RP - 7), ICU management, and care of ICU Oncology patients.
**Background**: The timely assessment and treatment of ICU Oncology patients is important. We hypothesized the use of Robot Physician's (RP-7) ICU to improve management and care in unstable ICU Oncology patients.
**Methods**: This is a study using the effectiveness of RP. RP is used to make multi-disciplinary ICU rounds in the ICU and for Emergency cases. Data from several aspects of the RP interaction, including the latency of the response, the problem being treated, the intervention that was ordered, and the type of information gathered using the RP, were documented. The effect of RP on ICU length of stay and cost was assessed.
**Results**: The use of RP was associated with a reduction in latency of the attending physician face-to-face response for routine and urgent pages compared to conventional care (RP: 10.2 [SD = 3.3] minutes vs conventional: 220 [SD = 80] minutes). The response latencies to Oncology Emergency (8.0 [SD = 2.8] vs 150 [SD = 55] minutes) and for Respiratory Failure (12 [SD = 04] vs 110 [SD = 45] minutes) were reduced ($P < .001$), as was the LOS for patients with AML (5 days) and ARDS (10 days). There was an increase in ICU occupancy by 20% compared with the pre-robot era, and there was an ICU cost savings of KD2.2 million attributable to the use of RP.

**Conclusion**: The use of RP-enabled, rapid, face-to-face ICU Intensivist - physician response to unstable ICU Oncology patients resulted in decreased ICU cost and LOS.

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## Training on EMT, CLS, CMAST and DMALS for the Lebanese Armed Forces

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**Study/Objective**: These exclusive training workshops allows trainees to deal with disaster in conformity with the national and international standards, optimizing emergency management in an unpredictable framework, putting in place an Emergency Contingency Plan and efficiently implementing it and assessing, triaging and responding efficiently to various context of emergencies.
**Background**: The presence of landmines from years of conflict continues to cause threat and dictates the need for effective actions. Post-war countries face particular challenges, especially in the Middle East, where the political situation remains dynamic. With the Syrian crisis, the need for training armed forces on disaster preparedness, combat/demining medics to ensure quick reaction time along with proper and efficient skills became crucial.
**Methods**: The training provided exclusive courses in Emergency Medicine Techniques (EMT), Combat Lifesaver (CLS), Combat Medic Advanced Skills Training (CMAST), Demining Medic Advanced Life Support (DMALS). It followed international standards and included theoretical parts where basic material was delivered mainly in phase I, complimented by hands-on and cases studies, scenarios and simulation workshops. In phase II, theoretical part consisted of only 30% of the training. Practical field drills with live scenarios including terrorist attack and bombing resulting in casualties took place. Hence, student evaluation was performed during practical field performance.
**Results**: Phase I: 13 trainees completed the EMT; 16 the CLS; 11 the CMAST and 12 the DMALS. They improved by 55% in average Phase II: 12 trainees completed the EMT; 15 the CLS; 9 the CMAST and 12 the DMALS. They succeed an oral exam based on a check list.
**Conclusion**: After completion of phases I and II, Phase III will follow to adjust and improve organizational limitations/obstacles and refine the system. The first 2 phases allowed team fields to acquire necessary theoretical (I) and practical skills (II). These phases should be complemented by elaborating policies and procedures to be validated by the regulatory authorities.

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## Creation of a Novel Educational Liaison Position for the Emergency Medicine Residency Training Program at Addis Ababa University: A Model for Maturing Bi-institutional Educational Partnerships

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**Study/Objective**: To describe the creation of a novel curriculum liaison position within the Toronto Addis Ababa Academic Collaboration in Emergency Medicine (TAAAC-EM) bi-institutional partnership.
**Background**: The Toronto Addis Ababa Academic Collaboration in Emergency Medicine (TAAAC-EM) helped develop, and has been implementing, the Addis Ababa University postgraduate EM training program curriculum since 2010. With graduates now working as EM faculty, a novel Educational Liaison (EL) position was created in 2015 with a two-fold purpose: (1) To improve bi-institutional coordination and quality of teaching activities, and (2) To provide AAU EM graduates with professional development opportunities in educational leadership.
**Methods**: The EL reviewed the TAAAC-EM curriculum documents and conducted a focus group needs assessment of current PGY1-3 learners (n = 28). Monthly Skype meetings were held with the TAAAC–EM Curriculum Director and Coordinator to review the year's schedule of teaching trips, evaluate the contents, organize and merge teaching activities from both institutions, and improve the resident evaluation process.
**Results**: Identified areas for curriculum improvements included: adherence to scheduled resident seminars, improved communication between partnering teachers, and a desire for increased practical skill workshops. Twelve monthly Skype meetings were successfully conducted to coordinate implementation of the above activities. The one-year experience of the EL position has been overwhelmingly positive. Key benefits to the AAU EM residency program include increased communication between partnering faculty, increased AAU faculty professional development and improved delivery, and coordination and quality of TAAAC-EM resident teaching activities.
**Conclusion**: Creation of this in-country EL faculty position improved coordination of postgraduate EM educational activities at AAU, and is a replicable model for mentoring recent EM graduates in leadership positions within maturing bi-institutional educational partnerships in Africa.

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## Undergraduate Emergency Medicine Program in Tanzania, "A Model for Resource Limited Setting"

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**Study/Objective**: The main objective is to describe the model and hence increase awareness, and assist medical educators and medical schools to develop undergraduate emergency medicine programs in a resource limited setting.
**Background**: Exposing medical students to the basics of emergency medicine will potentially improve the quality of emergency care in our hospitals. Also it promotes, maintains and integrates the emergency medicine education system in Tanzania.

**Methods**: Field case descriptive design.
**Results**: We conducted a five week clinical rotation; using bedsides, simulations and small group discussion guided by formative assessment results. Our primary goal is to impact hands-on skills. Students are scheduled to clinical shifts and attached to a one-on-one with resident/registrars to work with, during which required them to complete a logbook for procedures and skills. At the end of the rotation the student undergoes summative assessment and fills out a post rotation survey for feedback. In 2015/16 all students "agreed" or "strongly agreed" that they gained knowledge that will help them practice medicine in whatever field of medicine they choose to enter", and 91% of students "strongly agreed" that "All medical students in Tanzania should have an Emergency Medicine rotation" experience.
**Conclusion**: The undergraduate emergency medicine program has been successfully implemented at Muhimbili University of Health and Allied Sciences. The experience gained can be applied to other medical schools to facilitate the dissemination of principles and essentials of emergency care.
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## Perceptions of Trainees toward Leadership, and Change Managment Training, at Tikur Anbessa Specialized Hospital, Department of Emergency Medicine, April 2015

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**Study/Objective**: To assess perceptions of the physician residents on receiving training in leadership, change management, and process improvement.
**Background**: Leadership is the ability to influence and motivate people. Physicians are leading health care teams and require greater attention to leadership skills as important skills. Leadership skills, change management, and process improvement skills are ranked high as important administrative skills in Emergency Medicine.
**Methods**: There were four hours of interactive presentations: leadership skills, change management, management systems, process improvement, and core values. Two hours were devoted to application, in which skills learned had to be used. A Survey using a 5-point likert scale was distributed at the end of the course, which asked learners to evaluate the instructor and teaching method. Additional areas assessed were the teachings on general leadership, problem solving, change management, management systems, and application exercises.
**Results**: A total of 30 trainees attended, and 21 completed the course.
**Conclusion**: Trainees were enthusiastic with learning leadership skills, felt their knowledge was improved, they will use it in their job, and will recommend this kind of training to others. It represents a clear need in training.

Average scores for training categories.

| Areas | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| General leadership | 3.95 | 4.35 | 4.45 | 4.7 |
| Problem solving | 4.35 | 4.35 | 4.35 | 4.3 |
| Change management | 4.2 | 4.45 | 4.6 | 4.25 |
| Management systems | 4.1 | 4.1 | 4.5 | 4.65 |
| Application exercise | 4.5 | 4.55 | 4.5 | 4.25 |

**Table 1**. Average Scores by Training Categories.

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## Medical Simulation as an Educational Tool: The Bridge Between the What-To and How-To

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**Study/Objective**: To introduce and evaluate simulation-based curriculum for final year medical students in managing acutely ill patients at the University of Cape Coast School of Medical Sciences (UCC-SMS), Ghana.
**Background**: Medical simulation is a relatively new concept for training and evaluation of physicians in healthcare. Many medical schools have adapted simulation into undergraduate curricula. It allows for enacting practical approaches to patient care in a non-threatening environment with a various range of tools. It allows for reduction in errors, confidence, competence and team-building, in a teacher-enabled environment. Medical education in Ghana is yet to maximize this teaching modality. Medical school graduates have difficulty transitioning, bridging theory and practice in managing acutely ill patients, leaving room for errors. Hence the need for the introduction of simulation prior to practice.
**Methods**: Simulations will be piloted at UCC-SMS as part of the 4-week Accident and Emergency Module rotations, with purposively designed scenarios. The school has a clinical skills laboratory which will be used for these sessions. All final year medical students in the academic year will be included. Sim-instructors will evaluate students at the end of the selected scenario sessions and will not form part of academic scores. Students will also be asked to evaluate the sessions. Participation will be optional.
**Results**: We expect an improvement in the application of basic sciences and clinical knowledge; an emphasis on systematic approach to the initial assessment of critically ill patients ie.: ABC approach; confidence in carrying out critical life-saving procedures; teamwork and communication. We also expect to identify gaps and lapses associated with the adoption of this teaching modality for improvement.
**Conclusion**: Incorporating simulation into undergraduate medical education curricula, will better equip students with critical skills in the management of emergencies on becoming interns. This therefore, will necessitate the need for training

more simulation-based medical educators, and also equipping standard simulation facilities in Ghana.

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### Paramedic Disaster Health Management Competencies: A Scoping Review

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**Study/Objective**: This scoping review aims to identify, categorize and explore the existing range of paramedic disaster health management competencies that have been developed internationally. The objective of the study is to assist EMS agencies to develop core competencies specific to their own environments, in order to standardize teaching in the area of paramedic disaster health management response.
**Background**: Paramedics play an essential role in all phases of disaster health management. Previous research has identified potential gaps in content and challenges to the sustainability of knowledge, acquired through occasional disaster response training by paramedics. For paramedics to respond competently, they must be equipped with the necessary skills to provide comprehensive care to the populations affected by disasters. Despite this, the literature shows that education and training for disaster response is variable, and that an evidence based study specifically designed to outline sets of core competencies for Australian paramedics has never been undertaken.
**Methods**: A systematic scoping review will be conducted using the Joanna Briggs Institute (JBI) methodology. The review will use information from four databases: PubMed, MEDLINE, ScienceDirect, and Scopus. Keywords, inclusion and exclusion criteria will be identified as strategies to use in this review.
**Results**: will be extracted, mapped, and categorized from appropriate studies. The identified core competencies will be sorted into common domains such as communication, operations, planning, logistics, incident command systems and ethics. A descriptive analysis of the results will then be undertaken.
**Conclusion**: Further research is needed to develop core competencies specific to Australian paramedics, in order to standardize teaching in the area of disaster health management response. This study will assist agencies from all jurisdictions in evaluating or creating disaster curricula, that adequately prepares and maintains paramedics for an effective all hazards disaster response.

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### National Standards for Higher Education Programs in Disaster Management in Australia

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**Study/Objective**: The aim of this project was to develop a framework for higher education programs in emergency and disaster management for Australia.
**Background**: The development of such standards is of considerable value to Australia as it may contribute to national policy cohesion and also to capability development. The Generic Emergency and Disaster Management Standards define the scope and the domain in order to assist higher education institutions to develop programs that provide a relatively consistent and sound intellectual basis for the expertise required.
**Methods**: The Generic Emergency and Disaster Management Standards were developed through a mixed qualitative research approach involving a systematic literature review, mapping of current course content, focus groups of experts and consultation with industry representatives.
**Results**: The standards consist of three main domains. The knowledge domain included governance and policy frameworks, theoretical and conceptual basis for practice, and contemporary disaster management, skills and application. The skills domain included leadership, communication, and collaboration. Finally professional practice together with critical thinking is considered the means by which the knowledge and skills are applied.
**Conclusion**: These standards are intended to provide a consistent and sound intellectual basis to assist higher education institutions to develop disaster and emergency management courses. While the focus is necessarily on the Australian context, it is recognized that University programs in Australia provide education to international students, and the methods used in developing these standards draw considerably from international sources, and thus they are likely to be of broader applicability. Additional mechanisms for the monitoring and ongoing development of these standards are required.

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### The Evaluation of the Trauma and Resuscitation Course in Çanakkale 112 Emergency Medical Services, Turkey

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**Study/Objective**: The aim of this study is to evaluate the Trauma and Resuscitation Course (TRC) for nurses, technicians, and paramedics, carried out by Çanakkale Emergency Medical Services (ÇEMS) between January 1, 2014 to December 31, 2014.
**Background**: The TRC in Turkey has been carried out by the Association of National Trauma and Emergency Surgery

since 1997. The target group of the TRC consists of doctors and health care professionals. The primary aim of the TRC is to provide a standard training and enhance the quality of service. The certificates, which is valid for five years, have been given to the professionals who have succeeded in the theoretical and practical exams.

**Methods**: The authors have conducted an epidemiologic-descriptive method in this study. In the scope of the study, 90 professionals were called for four different courses, and 82 of them attended the theoretical and practical training. The gathered data were evaluated by making frequency distributions.

**Results**: In all, 63.4% (f = 52) of the participants consisted of women and 73.1% (f = 60) are high school graduates. The practice skills of the participants were classified under the eight titles. Respectively mean score of them; the Mean Score (MS) of providing advanced airway (intubation) is 18.9/20; MS of establishing vascular access and intraosseous attempt is 9.9/10; MS of stabilizing the neck and vertebra is 19.8/20; MS of the centric extraction device (CED) is 9.9/10; MS of the traction splint is 9.7/10; MS of the vacuum stretcher is 9.3/10; normal stretcher is 9.5/10, and combination stretcher is 9.8/10. The general mean score of the theoretical exam is 83.6, practicing mean score is 96.9, and the general success average is 90.2.

**Conclusion**: The TRC scores of the CEMS personnel have been found to be quite high.

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## No Cost Solutions to Performance-Based Disaster Medical Education

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**Study/Objective**: High-quality clinical disaster medicine requires medical teams working in chaotic environments. Many disaster education providers fail to adequately assess disaster performance during training, often concerned with the cost and complexity of such assessments. We created a competency-based, 5-hour Emergency Preparedness Training (EPT) curriculum with low-fidelity training tools and easy to reproduce skill assessments to improve trainee knowledge, confidence, and disaster medicine skills.

**Background**: High-quality clinical disaster medicine requires medical teams working in chaotic environments. Many disaster education providers fail to adequately assess disaster performance during training, often concerned with the cost and complexity of such assessments.

**Methods**: Diverse groups of medical university students, health care professionals, and community members were enrolled between 2011 and 2014. The course consisted of an online questionnaire, didactic lectures, small group exercises, and two live, multi-patient, mass-casualty incident (MCI) scenarios.

**Results**: All 708 participants completed the course. They were trained over three years, including 49.9% physicians, 31.9% medical students, 7.2% nurses, and 11% various other health care professionals. All 100% of the participants completed the pretest and 71.9% completed the posttest, with average correct answers increasing from 39% to 60%. Trainees met 73% and 96% of performance objectives during small group exercises and 68.5% and 61.1% during the two MCI scenarios. Both overall knowledge and confidence with clinical disasters improved from 33/100 to 74/100 (overall knowledge), and 33/100 to 77/100 (overall confidence). 91.5% of trainees highly recommended the course. Average cost of training was less than US $100 per course.

**Conclusion**: Simple EPT design elements can improve trainee knowledge, confidence, and disaster medicine skills at a very low cost. This unique EPT curriculum may help educators with limited resources implement performance-based medical team training effectively and efficiently.

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## Legal Accountability of International Emergency Medical Teams In Disasters

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**Study/Objective**: This research maps and explores existing legal systems that, within a disaster context, may be applied to hold International Emergency Medical Teams accountable for medical errors.

**Background**: International Emergency Medical Teams (IEMT) provide clinical care to populations affected by disasters. However, while well intended, their work may result in harm to a patient. To date the medical legal accountability of IEMTs has not been systematically assessed.

**Methods**: This study is a narrative literature review. An initial search in Google and other search engines was performed. Legal documents, guidelines and grey literature referring to legal accountability of IEMTs were selected. Results were organized in two categories: international legal system and national legal system.

**Results**: IEMTs are deployed by different relief agencies, including governmental or non-governmental organizations, which are subjects to separate legal systems, for instance, of their own countries or international laws. No international laws related to disasters provide for mechanisms of IEMT's legal accountability. However, there are non-disaster international legal systems applicable to certain types of relief agencies deploying IEMTs - for instance, regional human rights systems. No database provides for a list of national legislations relevant to IEMTs, nevertheless the research confirmed that national disaster or non-disaster laws could be applied. There is no record of any legal case against an IETM decided in favor of a patient.

**Conclusion**:

- There is no specific legal system designed for enforcing legal accountability of IEMTs.

- Due to differences in legal status of IEMTs' providers and national laws, similar events may end up with a different legal outcome.
- Patients may be devoid of mechanisms to seek redress, due to lack of relevant legal system applicable to their case, or when the applicable legal system provides for exemptions from accountability by means of judicial immunities or Good Samaritan laws.
- Ensuring medical liability insurance for IEMTs should be considered.

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## Developing AUSMAT's Rehabilitation Capacity: Applying the Technical Standards to Practice

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**Study/Objective**: The objective of this case study is to describe the process undertaken by the Australian Medical Assistance Team (AUSMAT) in developing its rehabilitation capability, and applying the World Health Organization Classification and Minimum Standards for Emergency Medical Teams to practice.
**Background**: The Australian Medical Assistance Team is Australia's health emergency and medical response facility. In October 2016, AUSMAT achieved classification as a World Health Organization Type-2 Emergency Medical Team and field hospital. This achievement was the culmination of many months of preparation, by people from a wide range of areas of expertise, and served as the impetus for AUSMAT to address the need for rehabilitation within its broader capabilities.
**Methods**: Development of AUSMAT's rehabilitation capability required a process of rationalizing the minimum standards against AUSMAT's core business.
**Results**: AUSMAT's rehabilitation capability is closely integrated with its core clinical activities. AUSMAT rehabilitation professionals will work within a transdisciplinary model of practice between Occupational Therapy and Physiotherapy. The primary goals of the rehabilitation capability is to reduce secondary injury, achieve optimal outcomes post injury, improve patient flow through the field hospital and identify appropriate transfer and referral pathways. In accordance with typical AUSMAT tasking, the focus of the rehabilitation capability is on the acute phases post injury. Rehabilitation currently remains a largely untested capability for AUSMAT, however through the process of addressing the standards for rehabilitation in a Type-2 EMT, AUSMAT is now in a position to deploy rehabilitation professionals alongside medical, nursing, logistical and other team members.
**Conclusion**: AUSMAT has developed its rehabilitation capability, and has demonstrated to the WHO, core and technical standards for a Type-2 EMT and field hospital. As such, AUSMAT represents an example of operationalization of the minimum standards for clinical practice.

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## Perceptions and Reflections of Emergency Medicine Graduates, Regarding the Toronto Addis Ababa Academic Collaboration in Emergency Medicine (TAAAC-EM) Curriculum: A Qualitative Evaluation Study

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**Study/Objective**: This study is a qualitative curriculum evaluation of the Toronto Addis Ababa Academic Collaboration in Emergency Medicine postgraduate training program, in Emergency Medicine at Addis Ababa University (AAU), Ethiopia.
**Background**: In 2010, the first-ever Emergency Medicine postgraduate training program in Ethiopia was launched at Addis Ababa University. Toronto Addis Ababa Academic Collaboration in Emergency Medicine (TAAAC-EM) designed and implemented a curriculum to support the Addis Ababa University (AAU) EM program. To date, three cohorts of EM specialists (n = 15) have graduated from the three-year program. After six years of implementation, we undertook a qualitative evaluation of the TAAAC-EM curriculum.
**Methods**: Data collection took place in 2016 in Ethiopia via in-person graduate interviews (n = 12). Participants were interviewed by a trained research assistant, who used a semi-structured interview guide. Standard interview, transcription, and analysis protocols were utilized. Qualitative software (QSR-NVIVO 9) was used for thematic grouping and analysis.
**Results**: Graduates of AAU's EM residency training program reported very positive experiences with the curriculum overall. All graduates recognized the importance of TAAAC-EM's emphasis on bedside teaching to their learning, a unique component of the TAAAC-EM model compared to the baseline teaching milieu at AAU. In addition, several themes emerged when graduates were asked about areas of program improvement, including: (1) shifting didactic clinical epidemiology teaching to the senior residency years (PGY2-3), to coincide with completion of a required residency research project; (2) increasing simulation and procedural teaching sessions; and (3) adding formal certification courses such as ATLS and ACLS.
**Conclusion**: Interviewing graduates of AAU's EM residency training program proved to be an important avenue for determining areas of curriculum improvement for future trainees. It also provided critical input to TAAAC-EM strategic planning discussions, as the partnership considers expanding its scope beyond Addis Ababa.

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## Hospital Workload for Weapon-Wounded Females Treated by the International Committee of the Red Cross - More Work Needed than for Males

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**Study/Objective**: To assess whether there is a difference in hospital workload for treating weapon-wounded females compared to males.
**Background**: Civilians constitute 33-51% of victims in armed conflict. Several reports on civilian injuries exist but few are focusing on injuries afflicting females. We analyzed routinely collected data on weapon-related injuries from the International Committee of the Red Cross (ICRC) hospital in northwestern Pakistan, in order to define injury-patterns and type of surgical treatment for admitted females.
**Methods**: A total of 3,028 patient-files (376 adult females) from consecutively admitted patients to the ICRC-hospital in Peshawar, from February 2009 to May 2012 constitutes the study. Information regarding injury-mechanism, time since injury, vital parameters at admission, type of injury, treatment and basic outcome were extracted from the files, and prospectively registered and retrospectively analyzed. Comparisons between gender and age-groups were done by cross-table analyzes or non-parametric tests when appropriate.
**Results**: Females were younger than males (20 vs 25 years, $p < 0.001$), arrived sooner after injury (24 vs 48 hours, $p < 0.001$) and were victims of bombs and missiles more frequently (64% vs 57%, $p < 0.001$). Vital parameters such as systolic blood-pressure (110 vs 112 mmHg, $p < 0.001$) and pulse-rate (100 vs 90, $p < 0.001$) were more affected at admission. Females were subjected to surgery (83% vs 77%, $p < 0.05$) and given blood transfusions more often (19 vs 14%, $p < 0.01$). No differences in amputations or inhospital mortality were noticed.
**Conclusion**: Females treated at the ICRC-hospital in northwestern Pakistan are markedly affected by indiscriminate weapons such as bombs and missiles. Their consumption of surgery is greater than indicated by their numbers, which might have an impact on planning for staffing, and premises in similar contexts.

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## War Surgical Treatment of Comminute Fractures Requires more Resources than Isolated Life Threatening Wounds

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**Study/Objective**: To assess whether war wound severity corresponds to consumption of resources in a limited resource setting.
**Background**: The International Committee of the Red Cross (ICRC) has developed a Wound Classification system (RCWC) for assessing war wound severity. The RCWC score is based on wound size, tissue involved, existence of fracture and if there is threat to limb and/or life. Whether or not the RCWC score corresponds to consumption of resources has not previously been studied.
**Methods**: Data from 1,573 patients was analyzed from a prospectively created database containing information from patients treated at ICRC's hospital for war wounded in Peshawar, Pakistan, between 2009-2012. High resource consumption was defined as ≥3 operations, amputation, ≥3 blood transfusions or ≥15 days of hospital stay. The relationship between RCWC and high resource consumption was assessed with logistic regression analysis.
**Results**: Age (median) was 24 years (0,5-84). Patients were 87% male, and 18% were <16 years. 55% were treated within 24 hrs of injury. The main causes of injury were blast/fragment (56%) and gunshot (37%). Only 32% had soft tissue injury, 43% had a fracture and 25% had wounds threatening limb and/or life. Treatment of extensive soft tissue injury required more resources than simple fractures (odds ratio 12,11, 95% CI: 5,50-26,68 vs. 2,35, 95% CI:1,61-3,43). Comminute fractures consumed more resources (OR 8,44, 95% CI: 5,93-12,00), than isolated life threatening wounds (OR 3,70, 95% CI: 2,42-5,65). There was 15% of the patients with life threatening wounds, and 5% of all patients died during treatment.
**Conclusion**: Treatment of comminute fractures required, somewhat unexpectedly, more resources than isolated life threatening wounds. A potential relationship between certain RCWC groups and high resource consumption could be seen. However, this requires further analysis to establish.

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## Medical Formations of EMERCOM of Russia and their Experience in Providing Emergency Medical Assistance to Emergency-Affected in Russia and Foreign Countries

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**Study/Objective**: Ministry of Russian Federation for Civil Defense, Emergencies and Elimination of Consequences of Natural Disasters (EMERCOM) of Russia includes medical formations for providing Emergency Medical Services (EMS). At mass casualties disasters EMS is provided directly in the disaster zone, or in specialized medical institutions using Airmobile Hospital (AH) or air medical evacuation correspondingly. The objective is to assess and analyze the efficiency of the formations at emergencies and verify sufficiency of their personnel and material-technical supply.

**Background**: AH was organized in March 1995 as a part of Central Airmobile Search-Rescue Team "Tsentrospas", and it has 2 deployment variants. Also created was a system of air medical evacuations including aviation, air medical teams, specialized equipment (intensive care module, telemedicine, transport extracorporeal membrane oxygenation and special setups). Nikiforov Russian Center of Emergency and Radiation Medicine (Saint-Petersburg) is a multi-disciplinary medical-diagnostic, research-education institution within EMERCOM of Russia aimed at providing EMS at the prehospital stage.
**Methods**: Review the analytical method that was used for this study.
**Results**: AH can be delivered to emergency areas in air-landing and air-assaulting variants; it can provide EMS in autonomous mode in cases of a difficult access area and harsh climate. World Health Organization (WHO), International Certification Committee classified AH EMERCOM of Russia as FMT type 2 on May19, 2016. For emergency medical response, EMERCOM has developed and is using an innovative means of personnel delivery and medical evacuation (mobile multifunctional medical-diagnostic unit, amphibious air-cushion craft with removable medical and fire-fighting modules, specialized resuscitation ambulance). Over the last 10 years AH provided EMS in Russia and other foreign countries (Serbia, Afghanistan, Iran, Sri-Lanka, Indonesia, Pakistan, China, Haiti and Chile) including therapy and pediatric care (over 9,000 people), traumatology (over 7,000 people), and surgeries under general anesthesia (over 600).
**Conclusion**: Both AH deployment variants has shown high efficiency depending on the situation. All possible forms of AH delivery to deployment areas were used. All specialized organic and non-organic formations of EMERCOM of Russia provided efficient EMS at the prehospital stage.

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## A Consultation-based Study about Core Competencies of Emergency Medical Rescue Strength of the People's Armed Police

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**Study/Objective**: To establish an evaluation system regarding the capability of emergency medical rescue strength of the People's Armed Police (PAP).
**Background**: Over the past 30 years, various disasters happened in a significantly increasing frequency and intensity, and the tendency will continue in the future. In order to respond effectively to disasters and reduce damage, every country in the world has reinforced the research and practice of emergency medical rescue. As the leading strength to cope with emergency accidents, Chinese People's Armed Police (PAP) participated in emergency rescue many times to cope with earthquake debris flow, floods, and other disasters. In response, emergency medical rescue detachments were established one-by-one in PAP. Lacking in consistent capability evaluation standards, the capability of each detachment varies, which greatly influences the global construction pace of emergency rescue forces from PAP.
**Methods**: In view of the capability and quality of emergency medical rescue strength, the Delphi method was used. All experts from the discipline of emergency management, health service, preventive medicine, clinical medicine, and rescue medicine received the consultation. All experts were qualified Associate Professors or Professors. The consultation involved such items as: appropriateness of indicators setting, comprehensiveness, and overall weight distribution of indicators. After two rounds of consultations, an evaluation system of capability indexes and their corresponding weights were determined.
**Results**: Through consultations, the evaluation system of capability indexes was formulated including seven first-grade indexes, 16 second-grades, and 42 third-grades. This involves organization and command, emergency maneuvers, injury treatment, medicine support, sorting, medical evacuation, quarantine protection, defense, and survival. Through analysis, it was found that the weight distribution of each index was rational and consistent with practical work.
**Conclusion**: The establishment of the evaluation system of capability indexes has provided an objective criteria and scientific basis for the construction of emergency medical rescue strength of PAP.

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## Upgrading the Treatment of Pediatric Trauma in Israel

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**Study/Objective**: Advertising expert committee recommendations for program improvement and upgrading of child care trauma cases treated in Israeli hospitals in cases of moderate and severe injuries.
**Background**: Israel established the national trauma care system in the 1990's. It included a trauma unit at hospitals, the combination of paramedics and intensive care ambulances, the Magen David Adom (MDA EMS), established the National Trauma Registry, constructed and reorganized the emergency medicine departments, Advanced Trauma Life Support (ATLS) courses for doctors, technological improvements significantly in intensive care units, reducing response times and more. These and others led to a reduction in mortality of the severely wounded and those in critical condition. However, children's injuries are still the leading cause of significant mortality and morbidity of children older than 1-year. Therefore, pediatric trauma is a serious problem of public health and a perceived social and economic burden. Moreover, it causes premature death, disabilities, impaired quality of life, and a burden on society and the victims' families.
**Methods**: In Israel, most trauma therapists who are mostly general surgeons have not had enough experience with children. On the other hand, pediatricians have knowledge and experience in child care but not in trauma. This causes the existing gaps in child care, in both a prehospital compound and a hospital.

**Results**: The committee's recommendations relate to the initial treatment of pediatric trauma, including stabilization and transfer phase and the first "golden hour." Recommendations for treatment in hospitals according to their levels include: National centers (Level 1 Trauma center), regional centers (Level 2 Trauma center), recommendations for trauma staffing (personnel), recommendations for upgrading equipment and infrastructure, training programs and refreshing knowledge and skills, and the development a PATLS course (Pediatric Advanced Trauma Life Support).
**Conclusion**: Writing a summary report, which was accepted by the Ministry of Health and by the National Committee for Trauma and Emergency Medicine, as a national work program for improving and upgrading child care trauma cases.
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## Operating Room Management During Mass Casualties: A New Checklist

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**Study/Objective**: The American Society of Anesthesiology has released a new checklist for management of the operating theater during mass-casualty events.
**Background**: No prior system existed for operative management.
**Methods**: Expert opinion from prominent trauma and disaster anesthesiologists.
**Results**: Refer to facility's Operations Manual; open up the appropriate annex.

Activate a call-in tree; assign an individual to activate, and use clerical personnel or automatic paging system, if available.
Assess status of Operating Rooms (ORs); determine staffing of OR's 0-2, 2-12, and 12-24 hours. Hold elective cases.
Alert current ORs; finish current surgical procedures as soon as possible, and prepare to receive trauma.
Assign staff; set up for trauma and emergency cases.
Anesthesia Coordinator should become OR Medical Director; work with OR Nursing Manager to facilitate communication, and coordination of staff and facilities.
Report OR status to the Hospital Command Center (HCC); enter telephone, email address of HCC.
Ensure adequate supplies; coordinate with anesthesia technicians' supply personnel, to ensure adequate supplies of fluids, medications, disposables, and other items.
Contact PACU; accelerate the transfer of patients to floors or ICU's, in preparation for a high volume of cases.
Anesthesiologist should act as liaison in Emergency Department (ED); send an experienced practitioner to the ED, to act as a liaison (your eyes & ears), and keep communications open to the Anesthesia Coordinator.
Consider assembly of Stat Teams; use the combination of anesthesia, surgical, nursing, respiratory personnel to triage, as needed.
HAZMET/WMD event; review special personal protective procedures, such as DECON, and isolation techniques. Consider if part of the OR, or hallways, should be considered "hot," or should have ventilation altered. Good resources include the CHEMM/REMM websites.
Coordinate with blood bank; verify blood availability.

Coordinate with other patient care areas: ICU's, OB, Peds, etc., to ensure continuity of care for new and existing patients.
**Conclusion**: This guidance provides a structured, task-based approach.
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## Are Surgical Skills Under-Emphasized in Literature on Medical Response to Disasters? A Brief Review and Critical Analysis of the Literature with Emphasis on Low Resourced Populations

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**Study/Objective**: The literature on the medical response to disasters appears to underemphasize the importance of surgical skills, especially in Low- and Middle-Income Countries (LMIC).
**Background**: While emphasizing the important issues of medical aid, control of infections, or water and food security it is also recognized that the acute phase of disaster requires immediate or almost immediate surgery, for life and limb threatening surgical pathology. It is our hypothesis that the literature on surgery in first medical response to disasters is sparse, especially in vulnerable, low-resourced populations.
**Methods**: A PubMed advanced search using a standard Boolean search strategy was employed: "(disaster OR disaster response) AND (medical aid OR medical response OR humanitarian aid) AND (surgery OR surgical skills OR surgical procedure) AND (developing country OR austere environment OR low resource environment OR third world)". Subsets of this search strategy generated articles for review. Other search engines were examined using a similar search strategy.
**Results**: A Pubmed search strategy including "(disaster OR disaster response) AND (medical aid OR medical response OR humanitarian aid)" yielded 4,470 articles. If "(surgery OR surgical skills OR surgical procedure)" was added to this same search strategy then 519 articles (11.6% of total) are identified. If "(developing country OR austere environment OR low resource environment OR third world)" are then added, then 21 articles (0.5% of total) are identified. Of these 21 articles identified only 4 (0.1% of total) address the needs or issues of local surgical assets in LMIC, the remainder instead emphasizing surgical capacity of foreign medical teams in LMIC.
**Conclusion**: Our hypothesis is confirmed with only 11.6% of total articles on the medical response to disasters discussing surgical issues to any degree, despite significant surgical trauma seen in disasters, especially earthquakes. Only 0.5% of total

articles discuss disaster-related surgical care in developing countries, with few discussing improving local country surgical assets. Most papers instead discuss the impact of foreign surgical teams, which are also clearly needed. Reasons for these overall findings are discussed. Opportunities to investigate the significant gap in surgical preparedness to disasters should be addressed. Research on improving local surgical assets in LMIC, in particular to address the acute phase of disasters, may be beneficial.

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## Assessment of Advanced Life Support Training in Emergency Medical Personnel : a National Report of Thailand

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**Study/Objective**: To survey the number of Emergency Medical Service (EMS) personnel certified in Advanced Life Support (ALS) in Thailand.
**Background**: In Thailand, Emergency Medicine specialty has been established for only 17 years. In-depth knowledge of emergency medicine training in ALS and knowledge gap between each kind of personnel had never been studied.
**Methods**: Research was done in the form of survey research using a questionnaire. The surveys were allocated by postal mail to emergency rooms in 13 health districts throughout Thailand. The target group was emergency medical personnel who practiced in EMS of Thailand: Emergency Physicians (EP), General Physicians (GP), Paramedics, Emergency Nurse Practitioners (ENP), and Registered Nurses (RN). A self-administered questionnaire consisting of personal and professional profiles, certificated status in ALS, and 50-questions of procedural competency assessment was used.
**Results**: According to 1,155 respondents (80% response rate), the percentages of personnel who passed each of the ALS courses is as follows: Advanced Cardiac Life Support (ACLS) 81.56%; Advanced Trauma Life Support (ATLS) 62.77%; Pediatric ALS (PALS) 45.45%; Prehospital Trauma Life Support (PHTLS) 15.84%; Advanced Disaster Life Support (ADLS) 8.23%; WINFOCUS Ultrasound ALS (WINFOCUS) 6.15%; Advanced Hazmat Life Support (AHLS) 4.85%; and others 1.9%, respectively. There were 11.60% that had never been trained in ALS (Figure 1). The average competency score was 34.02/50 (SD = 8.81). EP had a significantly higher mean competency score than GP ($P < .01$). ENP had a significantly higher mean score compared with RN ($P < .01$); there was no significant difference between ENP and Paramedics ($P = .06$). Other factors that significantly associated with competency score were gender, hospital type, and work experience. Most of the participants (92%) desired additional training in ALS.
**Conclusion**: Emergency medical personnel in Thailand should be supported to train in ALS in order to comprehend standard emergency medical practice throughout the country.

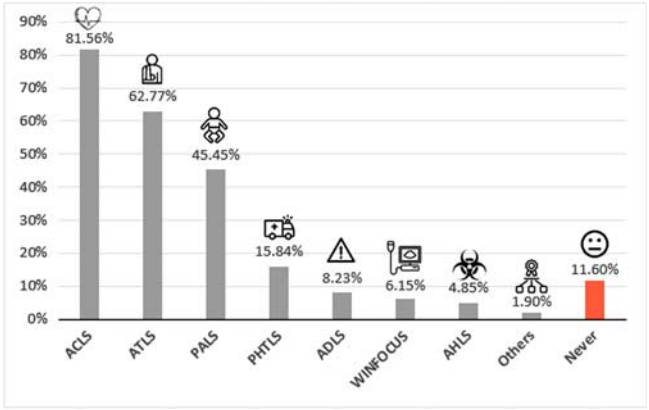


**Figure 1.** Percentages of emergency medical personnel who passed each of advanced life support courses.
ACLS, ATLS, PALS, PHTLS, ADLS, WINFOCUS, AHLS, HAZMAT life support, Never passed any advanced life support courses

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## Senior Nursing Students Working as an American Red Cross Volunteer: Virtual Case Workers

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**Study/Objective**: The American Red Cross (ARC) Kentucky Region, and the University of Louisville (UL) School of Nursing, have facilitated a student clinical experience in disaster preparedness. Fall 2016, a pilot project developed from the Red Cross calls for virtual volunteers to assist with disaster relief services to natural disasters. In response, UL- 4th semester Community Practicum Leadership Practicum students were trained as volunteer virtual caseworkers for the ARC Disaster Services Disaster Action Team.
**Background**: The American Red Cross is mandated to provide assistance to victims of single- and multi-family fires, in addition to other disasters. Nurses assist caseworkers to provide support to clients, to assist with immediate response, and recovery needs by addressing health needs. Involvement of pre-licensure nursing students as caseworkers allows them to utilize their community leadership education to facilitate clients' recovery.
**Methods**: The 4th semester Community Health baccalaureate nursing students were trained and responded as American Red Cross virtual caseworkers; as part of a disaster response action team, they served individuals and families affected by home fires in the Kentucky and Southern Indiana region. The group received required training through online modules and in-person orientation to prepare for the role.
**Results**: The results showed that the nursing students and American Red Cross staff required additional education. The current on-boarding processes needed improvement, and case

workloads needed adjusting to accommodate student schedules. Overall, the students received valuable lessons on disaster relief concepts.

**Conclusion**: Relief organizations, like the American Red Cross, offer nursing students opportunities to help communities in need throughout the country. Busy class schedules and clinicals present scheduling difficulties for students and agencies. Alternative learning experiences, such as virtual environments (call center representatives and casework), can help to meet the objective of the American Red Cross, while providing a unique clinical experience to senior nursing students.

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## Evaluation of Certain Behaviors in Regard to Disaster Preparedness of Students in Hüseyin Cahit Korkmaz Medical Vocational High School

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**Study/Objective**: The purpose of this study is to evaluate the behaviors of disaster preparedness of students at the educational year of 2014-2015 in Hüseyin Cahit Korkmaz Medical Vocational High School in Aksaray.

**Background**: The first 72 hours after disasters are critical. Personal preparedness is necessary during silent periods of emergencies and disasters in order to survive during these critical hours. Personal preparedness of health personnel is especially important, since they may have important roles after the disaster.

**Methods**: This is a descriptive epidemiological study. A survey including 24 questions was developed for the study. A Frequency and Chi square analysis was conducted for the data in SPSS 18 software.

**Results**: The age of the participants varied between 13-18. The average age of the participants is 15.9 (SD = 1.1) years. Of that, 71.7% of the participants (n = 225) were female and 41.4% of them (n = 130) were a student in the Department of Nursing; 33.4% of them were at second grade. 31.5% of the participants (n = 99) stated that they experienced an emergency, and 23.9% (n = 75) of them reported that they experienced a disaster. 32.2% of the participants (n = 101) stated that they had received education on emergencies and disasters, 20.1% of those who had received education (n = 63) reported that they most received education on first aid; 8.3% of them (n = 26) stated that they had received education on fire safety. Finally, 74.5% of the participants (n = 234) reflected that they would like to receive education on disasters.

**Conclusion**: It is clear that the students at medical vocational high school, who will have important roles in the provision of health care services in future disasters, should receive further relevant education. The majority of the students who participated in the study were aware of this situation.

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## IFRC Humanitarian Health Competency Matrix

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**Study/Objective**: To develop, refine, apply, and evaluate a comprehensive competency framework of knowledge, skills, and behaviors required of humanitarian health responders.

**Background**: A more effective approach was needed to prepare potential delegates in public health and promotion principles, and more active and responsive community engagement through evidence-based training methods. Red Cross and Red Crescent teams agreed that all necessary health-team tasks and activities that may be needed to respond to any disaster be identified and categorized according to specialty and levels of expertise on a competency matrix. These competencies attempt to identify and quantify the knowledge, skills, and behaviors required in a response by Red Cross and Red Crescent health delegates, and improve humanitarian health response.

**Methods**: In 2013, emergency health representatives from IFRC and eight partner National Societies identified and mapped core and supporting competencies at three tiers of competency into critical strands of content. The competency matrix continues to be refined during and after each emergency health deployment by contributing and host National Societies; the most recent testing and refinement was in September 2016 in Norway.

**Results**: The system of mapping Humanitarian Health competencies effectively quantifies critical content to better prepare training programs, and to evaluate the performance of the trainees in a response. The emergency health competency matrix allows for better identification and classification of what Red Cross and Red Crescent teams do, across roles in each phase of a response. When there is an ineffective response by Red Cross and Red Crescent - deployed teams, IFRC, and NSs can use the matrix to identify gaps in implementation, capacities, and resources.

**Conclusion**: Red Cross and Red Crescent's Humanitarian Health competency matrix provides a system for Red Cross and Red Crescent teams to identify and apply critical knowledge, skills, and behaviors required in an emergency health response, and to more effectively train and evaluate humanitarian health responders.

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## Evaluation of Applicability and Feasibility of the Standardized Direct Observation Tool (SDOT) in Qatar Emergency Medicine Residency Program

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**Study/Objective**: The purpose of this study was to evaluate the applicability and feasibility of the SDOT in the setting of an Emergency Medicine Residency Program.

**Background**: The EM residency program in Qatar is based in one of the busiest emergency departments in the world, with an annual attendance of nearly half a million patients. The residents and faculty in this program come from varying international trainings. The EM residency program adopted the Standardized Direct Observation Tool towards the Workplace Based Assessment (WBA) of emergency medicine residents, in an effort to meet the international accreditation standards of the Accreditation Council for Graduate Medical Education - International (ACGMEI).

**Methods**: A cross-sectional questionnaire consisting of 20 questions was used to gather the opinions of the survey participants on various aspects of the utilization of SDOT within the EM residency program. Specifically, they were asked for information focusing on the clinical setting, time taken, the length of the SDOT form, clarity of language, perceived usefulness, and its efficacy in assessing the six ACGMEI competencies. The results were plotted using SPSS to derive trends and patterns.

**Results**: A total of 73 participants consisting of 33 residents and 40 faculty took part in the survey. 90% was undertaken in the resuscitation and high dependency areas. Although, English was not the first language for 82.2% of the respondents, the language and clarity were deemed acceptable. The busy nature of the clinical workplace, lack of time and the length of the form were often cited as potential mitigating factors to the implementation of the SDOT. The majority of participants felt it was a useful tool for assessing the six ACGMEI competencies.

**Conclusion**: The SDOT retained much of its proposed usefulness and showed widespread acceptability within the clinical workplace of a busy, international EM residency program.

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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

### Community Disaster Risk Reduction using Indigenous Knowledge, Integrating with Climate Smart Interventions in Coastal Andhra Pradesh

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**Study/Objective**: Using indigenous techniques to reduce the dependency on outside resources.
**Background**: Andhra Pradesh (AP) is a state that has suffered the most from the adverse effects of severe cyclones, floods, and drought. It is estimated that about 90% of AP's total territory are vulnerable to tropical storms, floods, and related hazards, while the coastal belt is even more vulnerable to natural disasters, and the state's population is compounded by the recurrent impact of disasters.
**Methods**: Vulnerability Analysis, Situational Analysis, Participatory Vulnerability Capacities Assessment, Hazard Hunt Capacity building.
**Results**: The project is a model to all the vulnerable communities; capacities of vulnerable communities are increased and confident of combating the disaster situations. Innovative elements and results: Horizontal trainings by trained taskforce members in other vulnerable villages are conducted on their own initiation. Cost Effectiveness: There is no need to purchase anything from outside to implement this initiative at vulnerable villages. Workshop with the Education Department officials: Workshops with the department and regular one-on-one meetings have been organized. Lessons Learned: Flexibility and patience in order to survive and grow the structures, admit to mistakes, and correct them.
**Conclusion: CHALLENGES**: Initially, there was no response from the government as well as from the local communities. How to improve similar initiatives in the future? A similar intervention can be implemented in other villages overcoming the above mentioned challenges, involving the trained children and task force groups of this project. Replication: This intervention can be replicated in any part of the world, at a vulnerable village or school based on the type of disaster - but same methodology can be adopted for any type of disaster. This can be replicated to any context either for Tsunami or Cyclone prone, floods or flash floods, fire accident zone, or in a peacetime.

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### Risk Factors of an Earthquake Hospitalized Patient Death in the Wenchuan Earthquake Victim Database

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**Study/Objective**: This paper is aimed at identifying the contributing factors of mortality and providing a clinical reference for the management of those injured in earthquakes.
**Background**: Few epidemiological studies have been conducted on the determinants of the mortality of patients hospitalized after an earthquake. The West China Hospital Earthquake Database includes earthquake injury cases who were treated in Sichuan Hospitals in the Wenchuan Earthquake, the Luahan Earthquake, and the Yushu Earthquake.
**Methods**: A hospital-based, case-control study was conducted. Records from West China Hospital Earthquake Database included all deaths (n = 36) due to earthquake injuries. Controls were the quake survivors from the same hospital. A conditional logistic regression was performed to assess the Odds Ratio (OR) of variables used in the study. A chi-squared test for trend was performed to reveal the possible relations between risk factor (variable) number and case fatality.
**Results**: People with a severe Traumatic Brain Injury (TBI) had the greatest risk of death (adjusted OR = 63.3). Multisystem Organ Failure (MSOF) and infection significantly increased the risk of earthquake-related death (adjusted OR = 87.8 and 11.2).
**Conclusion**: Based on the West China Hospital Earthquake Database, Severe Traumatic Brain Injury, Multisystem Organ Failure, and infection are the significant determinants of earthquake-related inpatient death.

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### Physical Rehabilitation in the Context of Natural Disasters: A Case Study in Nova Friburgo, Rio de Janeiro, Brazil

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**Study/Objective**: To identify and analyze the needs of physical rehabilitation, and the health care seeking behavior related to recovery and preservation of physical capacities of people affected by disaster
**Background**: Disasters may cause physical injury and generate incapacities and deficiencies as consequences. In January 2011, the major disaster registered in Brazil occurred in the Mountain Region of Rio de Janeiro. Rains caused floods and landslides, killing approximately a thousand people.

**Methods**: A case study was performed in one of the most affected municipalities- Nova Friburgo. Data related to types of medical complaints in local emergency services, one week before and after the disaster was collected. Victims, health professionals and public health managers were interviewed. The requirements for physical rehabilitation and the responsiveness of health services in the disaster's recovery period were explored. Simple frequency measures were applied for quantitative data and the content of interviews was analyzed.
**Results**: Twelve affected people were interviewed, nine women (average 47 years old) and three men (average 43 years old). Only one women had private health care insurance. Seven women and three men had jobs before the disaster, 40% of them were able to keep working after the disaster. The proportion of traumatic complaints in the emergency municipal service tripled in the week after the disaster. However, there was no increase in the demand for rehabilitation services in the municipality. Possible explanations arise from the analysis of interviews: lack of knowledge about physical rehabilitation possibilities, lack of confidence concerning the public health services, prioritization of other activities related to life maintenance (eg. overcome losses and family care) and misconception of patient complaints by health professionals, hampering the continuity of care.
**Conclusion**: The demand for rehabilitation was suppressed after the disaster, being of utmost importance to actively seek the victims out.
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## Disaster Complexity: South Pacific Origins of the Blizzard of 2016

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**Study/Objective**: Apply complexity science to a disaster case study.
**Background**: The Blizzard of 2016 produced blizzard conditions and heavy snowfall throughout the Mid-Atlantic and Northeast United States during January 22–24, 2016. This Category 4 ("crippling") nor'easter created significant human impact due to its passage over densely-populated coastal "megalopolises", extending from Washington D.C. to Boston.
**Methods**: A multidisciplinary team was assembled to review this storm from a complexity sciences vantage. The blizzard was distinguished by its dynamic, "globally-networked" risk landscape, a hallmark of complexity. Investigators explored how factors related to climate change, including record-setting global temperatures and a powerful El Niño, ultimately contributed to the season's strongest winter storm.
**Results**: The Blizzard of 2016 was a natural hydrometeorological disaster; combining elements of winter storm, nor'easter, blizzard, and coastal flood; that disrupted transportation and infrastructure for millions. With snow depths exceeding 3 feet in some areas, the blizzard covered an estimated 434 thousand square miles and impacted more than 100 million people. The antecedent climate events that led to the blizzard included an explosive, thunderstorm-generating interaction between the east-to-west migrating Madden-Julian Oscillation (MJO), emerging from the Indian Ocean, as it encountered peak ocean temperatures associated with an extremely strong 2015/2016 El Niño Southern Oscillation (ENSO). This took place in the tropical Pacific Ocean, just north of American Samoa, in the vicinity of the equator where it intersects with the International Date Line. This destabilizing MJO-ENSO interaction affected the jet stream and set in motion a cascade of atmospheric effects, that ultimately influenced the development of a powerful blizzard several weeks later and 7,000 miles (11,000 km) away.
**Conclusion**: From a disaster complexity point of view, the Blizzard of 2016 reveals the intricate interconnections among weather systems worldwide, and illustrates how natural and anthropogenic (eg. climate change) phenomena interact to produce far-ranging consequences.
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## A Framework for Analyzing Performance Under Pressure in Diverse Healthcare Settings in Ecuador

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**Study/Objective**: To better understand the performance of health workers under pressure.
**Background**: This paper addresses a challenging landscape for health care professionals, and endeavours to analyze the healthcare system at a national level, and how it has adapted to the many challenges of both internal and external conditions. I have undertaken complex and extensive research to identify the factors that influence the responses of health professionals in diverse and changing scenarios, so as to examine their performance under extreme crisis situations.
**Methods**: Forty-five detailed interviews with key professionals (doctors, nurses, paramedics) were undertaken in diverse locations in Ecuador. Participants described high pressure scenarios including: natural disasters, emergency departments, large and small facilities, intensive care and operating theaters. Grounded theory was used to develop models to better understand performance under pressure.
**Results**: An 'emic' approach was used to understand 'pressure': namely, participants described scenarios where they personally experienced 'pressure'. Broad interacting classes of factors contributing to 'pressure' were identified. Using dramaturgical analysis, we developed a 'performative matrix' that helped deepen our understanding of performance under pressure as a dynamic, collectively-determined social phenomenon shaped by (1) facilities and systems (staging, props); (2) teams and personnel (roles, actors), and (3) case complexity (plots, storylines). Explanatory frameworks to emerge included dramaturgical, processual and evolutionary models.
**Conclusion**: Rather than capturing a static view of individuals and outcomes, performance is modeled as a complex unfolding collective drama. Using dramaturgical, processual and evolutionary

models, we are better able to conceptualize performance under pressure and to propose pathways for evaluating and optimizing performance in dynamic and complex scenarios.

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## Arctic Disaster Risk Reduction and Response: Community-Based Approaches in the Face of Wicked Problems and Cascading Disasters

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**Study/Objective**: To examine community-based Disaster Risk Reduction and Response (DRRR) approaches to wicked problems (Rittel and Webber 1973) and cascading disasters (Little 2012; Pescaroli 2015) in the Arctic; and to understand how these approaches do or do not change in correlation with the degree/type of the wicked problem and related circumstances, such as the degree of interconnectedness of critical infrastructure.
**Background**: Communities across the Arctic have been subjects to climate stressors, impacts and other natural-hazard induced or man-made crises and disasters. These range from violent ocean and winter storms, landslides, floods, erosion, earthquakes, tsunamis, nuclear, maritime and aviation incidents, etc. In some cases, the response is governmentally aided, such as in the case of planned relocations of entire communities to other, safer locations (see Alaska or Norway). However, when facing disasters of a more complex nature - ie. cascading disasters, wicked problems, interconnected infrastructures across functional and national boundaries - emergency and disaster response institutions have often been slow to adapt and react. Consequently, many communities across the Arctic feel left to their own devices in dealing with DRRR.
**Methods**: Following an extensive literature review of the theoretical framework, this qualitative study examines and analyses case study data from around the Arctic, to shed light on community-based approaches to vulnerability and risk reduction and response to cascading disasters and wicked problems.
**Results**: Initial results indicate valuable insights into a novel topic, and shows the challenges and barriers faced by communities when responding to these complex events. We recognize adoption of innovative, self-help approaches such as the use of Para diplomacy and knowledge transfer with other communities around the Arctic who face similar challenges.
**Conclusion**: Final conclusions including, diplomatic implications, future research directions and where possible, policy recommendations, will be presented at the WADEM Toronto conference in April 2017.

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## Doctor-Heli Fleet Operations During the 2016 Kumamoto Earthquake in Japan

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6. Japan Aerospace Exploration Agency, Tsukuba/Japan
7. Weathernews Inc., Chiba/Japan

**Study/Objective**: This study described and analyzed the operations of the Doctor-Heli (DH) fleet, comprising of 14 DHs and a headquarters in Kumamoto prefecture.
**Background**: The "physician-on-board" helicopter system, called Doctor-Heli (DH) in Japan, is crucial in the event of a widespread disaster. During the 2011 Great East Japan Earthquake, the DH fleet carried out effective operations during a real disaster for the first time in Japan. After the earthquake, a new command and control system of the DH fleet, and headquarters at the prefectural government level, were instituted. In April 2016, the Kumamoto region of Kyushu Island, southern Japan, was hit by a major earthquake.
**Methods**: An air medical transport record of Kumamoto earthquake has been analyzed.
**Results**: In total, the 14 DHs transported 75 patients in the first five days (April 16-20, 2016). Most of the patients were transported to neighboring prefectures that were not damaged by the earthquake. The headquarters of the DH fleet in Kumamoto Prefecture, requested assistance from other organizations to use their helicopters for medical transportation. Thereafter, five helicopters from the Japan Self-Defense Forces, eight from Fire departments, and one from the Coast Guard were used for medical transportation. Of the 89 transported patients in total, 30 (34%) sustained traumatic injuries due to the earthquake, and three (3%) suffered pulmonary embolism while asleep in vehicles at the disaster site. Furthermore, dynamic satellite monitoring, which was developed after the 2011 Great East Japan Earthquake, was used for all DHs, as well as helicopters from the fire departments, and was effective for information sharing, efficient operations, and safety.
**Conclusion**: The command and control of the DH fleet, the headquarters at the prefectural government level, and dynamic monitoring developed after the 2011 Great East Japan Earthquake were usefully employed. More efficient coordination of the DH fleet, and cooperation with other organizations, are ongoing challenges.

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## The Experience of the Ecuadorian Red Cross in the Joint Deployment of an Emergency Medical Unit Post, April 2016 Earthquake

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**Study/Objective**: To study the lessons learned from the joint deployment.
**Background**: On April 16th 2016, at 6:58 pm. an earthquake of 7.8 Richter scale, hit west of Ecuador. As a result 673 people died, 4,859 injured, 8,000 displaced, 51 health care facilities damaged, and 593,000 persons had reduced access to health care services. The Canadian Red Cross together with the Ecuadorian Red Cross deployed (on April 20th) Emergency Medical units to support the affected population. The units were deployed in Jama and El Matal, and later moved to Pedernales, where they stayed until September 30th when the services were taken over by the Ministry of Health (MoH).
**Methods**: Data was collected from the unit's statistics, as well as from the operation's debriefing.
**Results**: A total of 46,356 patients have been treated in the fixed facilities and the mobile clinic. There were 31,821 (68.6%) patients for internal medicine, 3,039 patients with GOB (mass or lump) needs (6.5 %), and Odontology needs became an issue with 3,137 (6.7 %).
**Conclusion**: Successful joint deployment of an International and National team. Hand-over of the EMU from the Canadian RC to the Ecuadorian RC serves as crucial local capacity building for the ERC for future disasters. The Ecuadorian Red Cross High Technological Institute, the biggest training school for paramedics in the country, served as a major resource in the response (initial and long term) allowing the deployment of more than 2,000 persons to the affected areas. This earthquake has been the only large scale disaster the country has faced in 10 years. The response capacities have been increased significantly post disaster.
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doi:10.1017/S1049023X17003181

## 2013 Colorado Floods, Boulder's Emergency Animal Air Rescues; A Military and Animal Control Collaboration

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**Study/Objective**: I. Introduction of the 2013 Colorado Floods II. Preparedness for potential county-wide emergency events III. The response; Emergency Operations Center (EOC), ground rescue, and animal sheltering IV. Helicopter Evacuations; collaboration between military and animal control V. Lessons Learned and concluding remarks reinforcing the necessity and value of collaboration
**Background**: In September 2013 the State of Colorado suffered a major flood event affecting 17 counties. Boulder County was the most devastated county in terms of lives lost, homes destroyed, and families displaced. The Colorado National Guard and the Army were requested for assistance with human evacuations from the ground as well as the air. When the Military responded to evacuate flood victims and were faced the challenge of air-evacuating pets, their compassion for the evacuees led them to the decision to air evacuate pets as well, setting the precedent for this emergency. The Boulder Police Animal Control Unit responded to manage and supervise the staging area for incoming rescued evacuees and their animals. Officers had key roles during this event; training military personnel on animal handling and equipment, handling a variety of animals to ensure the safety of emergency responders, evacuees, and animals; evaluation for veterinary treatment; and provided care for the animals. The use of resources, improvisation, and collaboration during this event lead to the successful evacuation of over 1,500 evacuees and their pets.
**Methods**: Provided in Background.
**Results**: The 2013 Colorado Floods led to the second largest helicopter rescue for humans to date, and the largest helicopter evacuation of animals. This disaster tested both the ability and capability of aerial evacuations for varied species of animals. In the midst of disaster, the US military and animal control collaborated to successfully evacuate over 1,500 people and their pets (estimated 800-1200 animals).
**Conclusion**: To provide audience with capabilities, suggestions, and practical application for aerial evacuations of animals during disasters.
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## Monitoring the Well-being of AusMAT Members Deployed to Fiji following Tropical Cyclone (TC) Winston

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**Study/Objective**: To monitor the well-being of Australian Medical Assistance Team (AusMAT) members deployed to Fiji following Tropical Cyclone (TC) Winston.
**Background**: The AusMAT response to TC Winston resulted in small teams across a variety of locations. Due to the limited day to day visibility and communication with individual team members, oversight of team welfare was likely to be challenging.
**Methods**: An anonymous electronic survey, the AusMAT well-being questionnaire[1], was completed by team members following each work shift during deployment. The questionnaire assessed perceptions of physical workload, weather conditions, body temperature, symptoms of heat stress, access to food and fluids, fatigue and sleep factors. Responses were compiled by the National Critical Care and Trauma Response Center, ensuring anonymity of responses. A brief report consisting of two paragraphs, overall trends and recommended actions, was compiled for the mission lead on a daily basis.
**Results**: An example of the overall trends summary from day 3 is provided.

- ~35% of the team reported hot working conditions.
- ~50% of the team reported feeling moderately to severely hot during shift.
- ~15% of the team reported severe to extreme fatigue post shift.
- ~30% of the team aren't able to get out of the warm/hot conditions during their down time.
- ~40% of the team reported warm sleeping conditions but overall sleep data is acceptable.

**Conclusion**: The daily team leader report was considered critical to understanding how each team member was responding to the environment during the TC Winston response. It prompted strategies to manage heat and hydration prior to the manifestation of serious symptoms. Such information also contributed to our knowledge of the AusMAT member workloads, assisting to prepare teams for future deployments. [1] Brearley M, Ruskie S. Development of a Disaster Nurse Well-being Instrument. Prehospital and Disaster Medicine 30(1): s116

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## Canada Task Force 2 Medical Team Deployment to the Fort McMurray Wildfire

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**Study/Objective**: To provide a review of the Canada Task Force 2 (CAN-TF2) medical team deployment to the 2016 Fort McMurray wildfire (FMMW).
**Background**: The FMMW displaced over 80,000 citizens and destroyed over 1,600 structures, making it the most economically devastating natural disaster in Canadian history, with a cost of over 9 billion CDN (6,834 billion US). CAN-TF2, an all-hazards disaster response team, was deployed to this disaster. Since its inception in 2002, the team has deployed in Alberta during the Slave Lake wildfires (2011), and the Calgary/High River floods (2013). The medical unit of CAN-FT2 engaged in its first active deployment during the FMMW. This team was designed to provide medical care for CAN-FT2 members and was comprised of paramedics, nurses, and physicians. During this event the teams scope was expanded, as it developed the only medical facility in the FMM vicinity.
**Methods**: A narrative review of the FMMW deployment that focused on lessons learned from the medical team standpoint, along with descriptive epidemiology of the patient encounters.
**Results**: Themes discussed included: (1) the development of a field hospital to support those beyond the CAN-FT2 team, which encompassed first-responders and critical infrastructure employees; (2) undertaking chronic disease management; (3) the fostering of relationships with other provincial agencies that allowed access to medical transport and critical medical supplies; (4) the integration of a critical incident stress-management team that addressed the mental health needs of first-responders; (5) the monitoring of public health markers and advocacy for actions within the incident command structure, that ensured the safety of the first-responders and self-deployed volunteers; (6) the transition from a CAN-TF2 field hospital back to a government facility run by the local medical community in FMM.
**Conclusion**: The medical team capacity within CAN-FT2 continues to evolve, and the FMMW deployment has highlighted a number of strengths and areas requiring further development.

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## Fit for Duty? The Case for Disaster Responder Fitness Standards

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**Study/Objective**: To mitigate the risk of disaster responders suffering heat illness through physical fitness standards.
**Background**: Recent Australian Medical Assistance Team (AusMAT) deployments have encountered challenging environmental conditions, heightening the risk of heat stress impacting responders. Two intrinsic factors increasing the risk of heat related illness are inadequate heat acclimatisation and lower levels of physical fitness. Pre-deployment heat acclimatization guidelines have been developed for disaster responders [1], yet commensurate standards are not available for fitness. Furthermore, the physiological impost of responding to disasters in hot and humid conditions are poorly characterized, limiting the development of evidence based standards.
**Methods**: A literature review of emergency responder fitness standards was conducted. Assessment of disaster responders was undertaken according to Brearley et al. (2013)[2] during construction of an EMT2 facility in hot and humid conditions to determine physiological and perceptual responses.
**Results**: Fitness standards are common among law enforcement and civilian protection agencies, generally incorporating running to volitional exhaustion. There were no reports of fitness standards for medical disaster responders in the peer-reviewed literature. Establishing an EMT2 facility in hot and humid conditions resulted in prolonged elevation of heart rate, core temperature, and physiological strain accompanied by body temperature perceptions of warm to very hot.
**Conclusion**: Based upon the physiological responses of disaster responders establishing an EMT2 facility in hot and humid conditions, assessment of disaster responder fitness is warranted. Reflecting the lower physical demands compared to law enforcement and civilian protection agencies, and age range of potential disaster responders, submaximal fitness tests should be prioritized.

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## Earthquake in Amatrice (Italy), August 24, 2016: The Role of the Medical Teams of the National Alpine Rescue Corp (CNSAS)

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**Study/Objective**: The Mountain and Speleological Alpine Rescue Corp (CNSAS) is a voluntary corps diffused in all of Italy, expert in hostile environment rescue missions. The study is a report of the first medical teams deployed in Amatrice.

**Background**: After the first shocks of the earthquake in Amatrice and Accumuli (August 24, 2016), the national Civil Protection activated the national disaster response and rescue teams of CNSAS and reached the affected areas under a national coordination. Expert teams on hostile and confined environments were recruited, search dogs and medical teams were recruited as well.
**Methods**: The immediate response (because of the deep diffusion of the Alpine Corp resources in this area) was realized by local and regional teams. A second wave of rescue teams arrived a few hours later. The teams were deployed in Amatrice, Accumoli, and 38 small villages in the province of Rieti. A helipad in Amatrice was used for Medevac operations. The farthest areas and villages were reached only with military helicopters support. Two main scenarios were faced:
1) inside the "red area": supporting the rescue operation missions together with firefighters and police;
2) out of the "red area": checking people with minor injuries and vulnerable categories. All the data was transmitted to the Crisis Unit in Amatrice and to the Command Control Chain of Civil protection.
**Results**: The experience showed the importance of:

- stockpiles and technological support;
- information and training on disaster medicine and basic procedures (triage and tracking tools);
- knowledge on tactical approach and tactical medicine;
- knowledge of the Command and Control Chain and of the Civil Protection disaster response.

**Conclusion**: The medical teams of the CNSAS are an essential resource to support, search and rescue missions after earthquakes. Their own role can be precious in the check and monitoring of the health needs of the people affected, inside the Civil Protection disaster response.

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## Lessons from the French Society of Disaster Medicine, Stratadviser Ltd and the West African Health Organization Collaborative Group during the 2014-2016 Ebola Outbreak

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**Study/Objective**: Ex-post evaluation of Relevance, Efficiency, Effectiveness, Impact, and Sustainability of recommendations elicited by the collaborative group during this period.
**Background**: Unlike more common epidemics in the three affected countries, such as malaria (over 2,650,000 cases/year) or tuberculosis (close to 32,000 cases/year), the Ebola outbreak (around 24,000 cases/2 years) paradoxically undermined the conditions of cohesion, integrity, security, functioning, and existence of health systems and beyond the economies of the Economic Community of West African States (ECOWAS). Therefore, the collaborative group disaster medicine experts analyzed socio-economic and historical insights, and epidemiological data and field practice observations to come up with specific recommendations on the design of Humanitarian, Health, and Economic Corridors (H2EC). This is intended to limit the spread of a virus that contaminates and disseminates progressively thanks to population movements, while promoting the movement of this population.
**Methods**: Due to the international nature of potential applications of the H2EC concept and design, the collaborative group followed the methodology for Center of Excellence (CoE) project evaluation, used by the European Commission, namely the Logical Framework Approach (LFA).
**ResultsConclusion**: The positive post-evaluation of the economic corridors design teaches broad lessons applicable to other disaster medicine situations.

| To date | |
|---|---|
| Relevance and quality of design: | Comprehensive, regarding geographical environment, socioeconomic constraints, population natural behavior, and public health requirements. |
| Efficiency of implementation: | Scaled to local/regional scarce health care workers/assets resources. |
| Effectiveness: | Actually limit population displacement while allowing nearly normal socioeconomic activity. |
| Impact prospects: | Positively bear upon population resilience. |
| Potential sustainability: | Could be easily reactivated, but will still require external support to some extent. |

**Table 1**. Assessment of Humanitarian, Health and Economic Corridors according to the Logical Framework Approach.

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## Emerging Issues of Withdrawing the DMAT Headquarters, Kumamoto Earthquakes of 2016

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**Study/Objective**: Clarify the issues of withdrawing the Disaster Medical Assistance Team (DMAT) headquarters.
**Background**: It is essential that DMATs have to hand over management to the right organizations at the right time. That is why DMATs Headquarters must be withdrawn smoothly. Kumamoto earthquakes 2016 in Japan, DMATs were dispatched on April 14 to the stricken area and concluded activities by April 23. Our team had orders to manage the biggest local headquarters and to close it down. However, withdrawing was so tough on the front line due to newly emerging issues; there has been little experience in withdrawing the big headquarters.
**Methods**: Five emerging issues were extracted as follows: (1) Confusion on determination how and when the DMATs hand over management to other organizations. (2) Difficulties on choice of DMATs staying behind until the very end. (3) Impediment by the remaining equipment that DMATs

brought in. (4) Lack of coordination with the chief administrator. And (5) Troublesome tasks to dispose waste and litter that DMATs produced. We have considered and resolved these emerging issues.
**Results**: During a large-scale disaster, the agency that presides over various organizations discussion of policies is required. Handover of duties should be determined by such an agency. The point of time of ending the activities should be defined at an earlier time. If existing DMATs are exhausted, headquarters has to request the government to send reinforcements. Equipment that DMATs did not use, and the waste and litter that DMAT made, should be carried back, basically because it is awkward to handle the unwanted material in the stricken area. In addition, they may cause unnecessary confusion. Over-dependence on the Internet consumed time to directly communicate with, and hindered opportunities to, understand the strategy of chief administrator.
**Conclusion**: There are some important points for DMATs to take into consideration when the headquarters is closed.
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## The 2013 Santiago de Compostela Train Crash: High-Speed Derailment, Medical Trauma, and Psychological Aftermath

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**Study/Objective**: Present a disaster complexity case study from multiple complementary perspectives.
**Background**: The July 24, 2013 high-speed train derailment outside Santiago de Compostela Spain was the second deadliest in Spanish history. All 13 cars derailed and 100% of the train's 224 occupants were either killed (80) or injured (144). The crash analysis focused sequentially on identifying the hazard dynamics in the Santiago de Compostela train crash, linking these train crash hazards to the medical trauma sustained, and translating Potentially Traumatizing Exposures (PTEs) into patterns of psychological distress and disorder.
**Methods**: An analysis of the derailment was conducted drawing upon an interdisciplinary team of experts in mechanical engineering (international authority on train wrecks), disaster psychology (internationally renowned Spanish psychologist who provided consultation and care on-scene), medical crash trauma, biomechanics, disaster health, and public health. Each expert contributed a discipline-specific account of the crash. A synthesis of key components of the event was developed by blending direct on-scene response experience, with in-depth review of investigative reports, news stories, and websites of Spanish agencies involved in disaster response and railway safety. Analysis included the construction of a hazard profile and a matrix of psychological stressors in relation to intensity and severity of exposure, informed by the Population Exposure Model.
**Results**: For this non-intentional, human-generated, technological/transportation disaster, distinguishing features included: human causation of a preventable event, excessive velocity, absence of safety engineering to slow the speeding train, extreme wreckage, 36% fatality rate among train occupants, life-changing severity of medical trauma for injured survivors, psychological impact on rescue personnel, and extensive exposure of the Spanish population to prolonged graphic media coverage.
**Conclusion**: The Santiago de Compostela train derailment was notable as a human-caused preventable event that precipitated exceptional damage, death, and injury, leading to significant psychological trauma and demonstrating that psychological consequences are exacerbated when human causation is implicated.
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## Incendie dans un bar. Particularités de prise en charge de victimes multiples en arrêt cardiaque (AC) sur intoxication aux fumées d'incendie.

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**Study/Objective**: La prise en charge de victimes multiples en AC sur une intoxication aux fumées d'incendie expose les équipes préhospitalières à des difficultés logistiques et organisationnelles. Dans la nuit du 6 août 2016, 14 jeunes ont trouvé la mort dans l'incendie d'un bar situé à Rouen (France) par intoxication aux fumées d'incendie suite à la combustion de matériaux d'isolation phonique.
**Background**: La prise en charge des victimes, dans ce contexte, necessity diascopies aux manoeuvres de réanimation cardiaque habituelles l'administration précoce d'hydroxocabalamine afin de lever l'inhibition de la cytochrome oxydase mitochondriale par les dérivés cyanés.
**Methods**: Une équipe médicale du SAMU composée d'un médecin, d'une infirmière et d'un ambulancier et des équipes de pompiers ont été immédiatement envoyées sur les lieux dés le premier appel par les témoins. Dès leur arrivée, ils ont pris en charge 5 victimes légèrement intoxiquées et brulées et une autre en AC, avec la notion d'une quinzaine de victimes bloquées dans la cave de l'établissement.
**Results**: Dés la notion de victimes multiples, le plan blanc du Centre Hospitalier Universitaire (CHU) a été déclenché. Trois victimes en AC et une victime inconsciente en état de choc ont été pris en charge par la première équipe avec rapidement des difficultés d'abords des voies aériennes (oedèmes) et vasculaires nécessitant l'utilisation de mandrins d'Eischman et de dispositifs intraosseux pour l'injection d'hydoxocabalamine. La répartition des taches était primordiale entre les intervenants. La victime inconsciente a été évacuée sans délai et non médicalisée vers le CHU. Elle est décédée un mois après. Les équipes médicales de renfort ont pris en charge 2 autres victimes. Les 8 autres victimes ont été déclarées décédées. Toutes les victimes sorties du lieu de l'incendie en AC sont finalement décédées.
**Conclusion**: La prise en charge de victimes multiples d'intoxication aux fumées d'incendie nécessite de disposer rapidement d'hydroxocabalamine et de dispositifs d'abord intraosseux.
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## A Mass Casualty Experience: Carbon Monoxide Poisoning in a Group of Restaurant Workers

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**Study/Objective**: To investigate the treatment of CO poisoning using oxygen.
**Background**: Acute carbon monoxide poisoning is a common cause of accidental poisoning. The incident described here occurred in a restaurant in Singapore, where a group of workers were exposed to CO due to a malfunctioning ventilation system. Thirty patients were sent to our ED as our hospital has the only burn unit in Singapore, as well as being the closest in proximity to the incident site.
**Methods**: All patients involved in the incident were charted upon arrival and seen by a team of Emergency Department doctors, including three medical officers and two toxicologists. Once the diagnosis of the index case was confirmed with an elevated carboxyhemoglobin, he was initiated on 100% oxygen using a Non-breather Mask (NRM). Subsequent cases were also initiated on NRM once there is confirmed history of being in the affected area of the restaurant, and patients complained of symptoms of headache, giddiness, breathlessness, or chest tightness. All cases were screened with the following investigations - Chest X Ray, full blood count, renal panel, troponin T, carboxyhemoglobin, venous/arterial blood gas, and lactate levels.
**Results**: Two patients were admitted to inpatient and 17 to our observation unit. All cases displayed down trending of carboxyhemoglobin levels with oxygen. Three cases with raised Troponin had initial complaints of chest tightness that resolved with oxygen therapy. All patients were discharged and none required HBOT.
**Conclusion**: Carbon monoxide poisoning is readily treatable once the diagnosis is clinched through a thorough history taking, physical examination, and appropriate investigations. Importantly, a concomitant cyanide poisoning should be excluded, as the treatment is different. A mass-casualty situation can also happen in such instances, so a protocol should either be activated or drawn up immediately upon identification of the first few cases. Hyperbaric oxygen treatment is a consideration in severe cases.

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## Disaster Preparedness and Social Media: Experience from an Earthquake in Hawassa 2016

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**Study/Objective**: To create awareness for the community in the region of an earthquake. To disseminate preparedness information during an earthquake.
**Background**: Hawassa is found within the rift valley system, known to be the most vulnerable area in the country for volcanic activity including earthquakes. It is known that an earthquake with a magnitude of 5.2 Richter scale was registered in Yergalem, Hosana, and Werabe in Southern Ethiopia regional state a year ago. This year in January 24-25, a successive earthquake of 4.1 and 4.3 Richter scale respectively hit Hawassa, the capital of Southern Ethiopia regional state, 275 km (170 miles) south of Addis Ababa. The shock, which was also felt in Halaba and Shashemene areas, registered at approximately 9:35 pm local time, according to Dr. Atalay Ayele, earthquake science expert from the Addis Ababa University. According to regional authorities, the shock didn't bring significant injuries to people. The shock caused no serious damage to buildings except cracks in some buildings.
**Methods**: A total number of 100 people were reached through social media (Facebook) and a brief precaution and preparedness diagram was sent individually, as well as being posted to social media groups addressing health care. Each of the 100 social media contacts were instructed to disseminate precautionary measures to as many people as they could. Health care professionals and contacts of social media were addressed with particular emphasis.
**Results**: All of the 100 people responded, their thoughts in the following table:
**Conclusion**: In disaster situations, particularly in earthquakes, adequate disaster preparedness will benefit in preventing more serious injuries. Public media education, as well as social media, is very important in minimizing risk.

**Average Likert Score of Respondents**

| Content Areas | Average Score |
|---|---|
| General knowledge before for precautions. | 2.9 |
| General knowledge after for precautions. | 4.9 |
| Willingness for disseminating precautions. | 4.8 |
| Their peer response for precautions. | 4.9 |

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## "It Takes a Village": Integration of Emergency Management in Public Health Responses

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**Study/Objective**: During recent public health response coordination activities in New York City (ie. Ebola Virus (2014), Legionnaires' Disease (2015) and Zika (2016), the NYC Emergency Management (NYCEM) saw an "all hands" approach, where public health and medical partners worked closely with other Emergency Support Function (ESFs). These efforts included public information, community outreach, waste management in non-clinical settings, social services support in quarantine scenarios, surge staffing licensed workers, alongside worker health and safety guidance for various tiers of exposure/risk levels. This

case study presentation seeks to propose alternative methods for public health emergency response in emergency management, through lessons learned and the development of the Emergency Operation Center (EOC) planning tools.
**Background**: Public health incidents pose a challenge for emergency management agencies because they do not follow the same "stand up" and "stand down" style of natural disasters or catastrophic incidents. Typically, public health incidents begin with more ambiguity than emergency managers usually encounter in other types of naturally occurring or manmade incidents. These incidents require technical, regulatory and scientific expertise that involves various non-health stakeholders for general consequence management.
**Methods**: NYC is currently developing a draft of Public Health Response protocols and tools that integrate SMEs from non-health, Medical and/or Human Services agencies based on preparedness and response activities, hot washes, and After-Action Reports. With the goal of connecting expertise of particular ESFs and task forces, such as waste management in non-clinical settings, public information, community engagement, and consequence management, this presentation will allow focus group members/conference attendees to think through select public health incidents (based on NYC's case studies), that require significant non-public health and medical stakeholders.
**Results**: Research/field testing is still in progress but preliminary information may be available by Spring 2017.
**Conclusion**: More research/field testing is needed to formally integrate public health emergency management into the current ESF mechanisms used in local emergency management agency EOCs.
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## Maternity Care Model during a Natural Disaster or Humanitarian Emergency Setting in Rural Pakistan

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**Study/Objective**: To propose a maternity care model for natural disaster or humanitarian setting in rural Pakistan, by using its existing Health Human Resource (HRH).
**Background**: Pakistan has been severely affected by a number of natural disasters, as well as humanitarian emergencies in the last decade. There are more than 100,000 health workers (including community and facility based midwives) in rural Pakistan which are local, trained, and most of them possess a good relationship with their community. There is a need to establish effective strategies, to utilize their services as frontline maternity care workers during emergency and conflict situations.
**Methods**: A mixed methods study was conducted in flood-affected villages of Sindh, which included 60 interviews (15 from women, 25 from Community Health workers, and 20 from key informants) and a survey with 669 women about their preferences of maternity care providers.
**Results**: In the absence of obstetric facilities in relief camps and a functional referral system, 91.2% women gave birth in temporary shelters with the help of a traditional birth attendant (Dai) with no clean physical space available to birth. Community health workers were not involved in disaster related activities. A clean delivery kit, dignity kit, and contraception were not available at relief camps.
**Conclusion**: The existing health workers are recommended to be engaged at different stages of a natural disaster (preparedness, early warning, and response). The capacity building of health workers and district health officials on emergency management is highly recommended. District health authorities should collaborate with Humanitarian Health Cluster at pre-disaster time to optimal utilization of logistic, financial and human resources. A well equipped "birthing station" and "women friendly spaces" are recommended in each camp. Referral systems should be strengthened whereby all laboring women with complications, can be timely transferred (transportation provided) to the nearest rural health facility where they will be assisted by the Emergency Obstetric Care (EMoC) trained staff.
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## The Social Impact of Terrorism on Civilian Populations - Lessons Learned from Decades of Terrorism in Israel and Abroad

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**Study/Objective**: This study considers the socio-psychological implications of terrorism, which are sometimes neglected in preparedness plans.
**Background**: One of the main concerns for public safety, shared by many countries, is the fear of terrorism; yet, far fewer lives are lost yearly due to terrorism as opposed to other forms of trauma, such as traffic accidents. Why does terrorism receive so much attention and incite such intense apprehension? Perhaps, terrorism "packs a different punch," one that goes far beyond the number of injuries and fatalities. Terrorism's main goal is to disrupt ordinary life, fostering fear and helplessness in the population.
**Methods**: Using Israeli experiences as a case study, this study briefly reviews four points of connection between terrorism and its psychological and social legacies: the sociopolitical aspects of terrorism, the unexpected nature of terrorism, normalization of terrorism and public resilience, and social aspects of medical care for terror-related injuries.
**Results**: The Israeli experience suggests preparedness plans should include planning for the socio-psychological effects of terrorism, on targeted populations, and may, in certain contexts, use Israeli approaches as a model.
**Conclusion**: Experience gained in Israel and elsewhere can set the stage for an appropriate response plan, striving not only for preparedness but also resilience. Efforts should be made to advance local capabilities, response plans, and resilience by

drawing on the experience of others in coping with the terror threat.

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### Crocodile Human Encounter Patterns in Sri Lanka

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**Study/Objective**: Aim of this study is to identify what species of crocodile's attacks humans, their pattern when they attacked, where they attacked, what parts of the human body they prefer to grab most, why do they attack humans, and how crocodile human encounters are minimized so both species can live peacefully.

**Background**: Crocodilians represent one of the oldest constant animal lineages on the planet, in no small part due to their formidable array of predatory adaptations. As both human and crocodilian populations expand, they increasingly encroach on each other's' territories, bringing morbidity and mortality to both populations. Sri Lanka has two species of crocodiles – the Mugger Crocodile (Crocodylus palustris or "crocodile of the marsh") mainly found in freshwater tanks, and the Saltwater Crocodile (Crocodiles porosus or estuarine crocodile) which prefers estuaries and lagoon habitats. Research found both were responsible for attacking humans.

**Methods**: The reported cases of crocodile attacks from year 2010 to year 2015 were reviewed. During the 5 year period 150 attacks were reported and 51 were fatal. The aim was to identify the attacks by two different species of crocodiles that live in Sri Lanka. We studied timeframe, location, causes, and how they attacked humans.

**Results**: The popular belief is only salt water crocodiles are man eaters, and muggers are less aggressive. But our research shows that fatal attacks are done by both groups. The saltwater croc attacked and killed 27 people, and the muggers killed 49 humans, not much difference. The usual attack sites for both groups are either in shallow water or close proximity to croc infested water. This amounts to nearly 60% of attacks (90 incidents), of which 116 (77%) victims were males. They were attacked during bathing, washing clothes, swimming, collecting grass in marshy lands and playing in the water. Females were attacked while bathing, washing clothes and utensils. There were three rare cases where people were ambushed by saltwater crocodiles in a marshy area when they regularly collect firewood. Ninety-five percent of the victims were dragged to the water by both groups of crocs. Most of the incidents limbs were attacked; there were reports of attacking to the head and torso by both groups of crocodiles. Most of the victims (>92%) were aware that the water sources are infested with crocodiles, but did not care enough to think of the impending danger. We found that some people were attacked non-fatal, by salt water crocs when they approached a croc nest, the attacks launched to defend the nest. An interesting observation that emerged from the accounts on crocodile attack victims and witnesses, was that it appeared that the animals had observed people engaged in water-based activity, like bathing and washing clothes, over a period of time before the attack. This would imply that at least some attacks, were not the result of a casual encounter with potential prey, but the culmination of a hunt at a spot where prey was known to gather. Hunting the reptile for meat or for skin made them endangered species. It has been observed that reptiles were poisoned after attacking humans, in some parts of the island. The climatic change is also an important factor as temperature decides the gender of the siblings. Reducing the croc land due to encroachment by humans, sand mining and destruction of mangroves, made reptiles attack humans as well as loitering in the land areas searching for food.

**Conclusion**: In this review, we examined the features of crocodilians that contribute to explaining their evolutionary success, as well as the potential hazard they pose to humans. Only by understanding reptiles' capabilities and respecting its right to live, it is possible to mitigate the potential threat to life and limb of humans.

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### Perceptions on Medical Clowns in the Israeli Field Hospital after the Nepal Earthquake

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**Study/Objective**: Following the 2014 disastrous earthquake in Nepal, the Israeli Field Hospital (IFH) was deployed to Kathmandu to assist and treat the thousands wounded. Five Israeli Medical Clown (MCs) volunteers arrived with the IFH. The impact of a MCs in a disaster zone has yet to be described or considered at all. The objective of this study was to assess the effect of the MC presence on the work of a field hospital in a disaster zone.

**Background**: The use of MCs for alleviating pain and distress has been well documented. There is evidence showing the effect of a MC on the well-being of patients, especially regarding painful and distressful procedures. There is no known description of MCs in a disaster zone.

**Methods**: An online survey was sent to all available members of the IFH (medical and technical) with questions regarding their perception of the MC impact on the IFH staff

**Results**: The survey was a Likert based questionnaire (grading the impact from 1 = very little to 5 = very high). Of 92 available members, 75 completed the survey (81%). The participants were of an average age of 40.5 years old, and 75% were male. The participants were from every part of the IFH (medical and technical) and included enlisted, reserve and volunteer participants. There were 67.2% of the participants found a very positive impact on the staff, with 48.3% finding a very high impact of clowning on staff performance. Staff with previous exposure to MCs were more likely be impressed by MC.

**Conclusion**: MCs in a disaster zone impact both the staff and their performance. Their presence when possible can have a positive impact on both staff and patients and should be made possible when available.

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### Developing a Multi-layered Bleeding Control Program in Your Community

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**Study/Objective**: The goal of this session is to provide participants with an overview of a bleeding control program design and implementation. The session will cover the core elements of a bleeding control program, including equipment selection, bleeding control kit placement, bleeding control training programs, and public access.
**Background**: Severe bleeding remains a major cause of death amongst trauma patients worldwide. Beyond the disturbing trend of complex and highly coordinated terrorist attacks, an opportunity exists to enhance society's readiness and resiliency from all types of traumatic mechanisms of injury, both intentional and unintentional. Attaining early control of severe bleeding as close to the point of injury has been established as a known strategy to improve survival on the battlefield. The expansion of these concepts to the law enforcement and prehospital Emergency Medical Services community is already occurring. Expert consensus groups from both government and academia advocate that bleeding control equipment and training should also be made available in the civilian population.
**Methods**: Howard County (Maryland, USA) has created one of the first county-wide, multi-layered bleeding control initiatives in the North America. This program includes enhanced capabilities for first responders (police, fire, and EMS) as well as elements directed toward the civilians through a public access bleeding control program. The design, implementation, and lessons learned associated with this multi-tiered program will be presented.
**Results**: First responders have received training and equipment to provide bleeding control and other life-saving interventions. Public access bleeding control kits have placed in every public school. Additional kits are being placed with AEDs and in other high risk locations. School health personnel have been trained in bleeding control. Free bleeding control classes are available through a community outreach program.
**Conclusion**: Bleeding control programs represent an easily implementable, all-hazards medical countermeasure to help increase resiliency and minimize mortality from severe bleeding.

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### Active Shooter Incidents - What are we Doing to Prepare?

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**Study/Objective**: New York University (NYU) Langone's Active Shooter Program has been designed so that staff know what to do if such an incident occurs. This presentation walks participants through their Active Shooter Plan. Next, the presenter explains how to develop an effective Active Shooter tabletop exercise for hospital leadership across three modules. Lastly, this presentation focuses on the Training Program for all staff.
**Background**: Knowing what to do during an active shooter incident increases the odds of saving your life, our patients, visitors and others. The recent terrorist attacks in San Bernardino, Paris, and Belgium reminds us to be vigilant, and to be ready anywhere, anytime. Hospitals are soft targets. We all know how important it is to have a plan, being able to warn those at imminent risk, and to train our staff, faculty and students on what they can do to ensure the least loss of life possible, while making every reasonable attempt to continue caring for patients.
**Methods**: Attendees will learn how to develop a Plan that provides guidance regarding the expected response actions. This presentation will describe how to utilize emergency communications tools for communicating with staff during and following an incident, the support to law enforcement that may be required to provide, and the provisions for establishing a Crisis Support Center to aid recovery services for staff, faculty, students, patients, visitors and their families. This presentation will then illustrate how to conduct an executive-level Active Shooter tabletop exercise.
**Results**: This Tabletop Exercise (TTX) will be based upon NYU Langone's December 2015 exercise with around 50 executives and senior managers from across the enterprise, using a hypothetical active shooter scenario. The series of questions for each module put forth to the leadership to deliberate and resolve will be discussed.
**Conclusion**: NYU Langone developed a "Run, Hide, Fight" video to train all staff. The video will be shown.

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### MDA Experience Dealing with Penetrating Injuries in Terrorist Incidents

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**Study/Objective**: This study is aimed at reviewing the cases caused by stubbing and shooting (penetrating trauma). The patients were triaged by the Magen David Adom (MDA) team on the scene as suffering from substantial injuries or more serious injuries (patients declared Dead on Scene were excluded).
**Background**: Since September 2015, Magen David Adom in Israel - MDA (the National public EMS provider in Israel) have treated 526 victims from deliberate attacks. Among them, 56 suffered substantial injuries.
**Methods**: The study analysis is the response to 21 patients suffering from penetrating trauma injuries (stabbing and shooting) in those incidents (triaged on scene as suffering from substantial injuries), analyzing the response, on scene and evacuation time.
**Results**: In 43% of the cases, the on scene time was longer than 10 minutes, and transportation time in 71% of the cases was longer than 10 min (in 28%, 21-30 minutes).

**Conclusion**: The results call for a comprehensive understanding of the scene: the teams are working in a scene that has not been secured, with possible presence of additional perpetrators. Personnel has to work using Personal Protective Equipment (PPE) due to that risk. Dealing with an injured perpetrator requires security checks, authorization of the security authorities on the scene, and moral dilemmas. Transportation times might be prolonged. This creates a unique environment that calls for specific on-scene protocols, as well as training of the personnel (staff and volunteers) to be able to successfully perform their tasks in this hostile environment. On-scene procedures, as well as unique procedures developed (eg, police escort to overcome traffic), and revised treatment protocols as result of lessons learned from incidents will be presented.

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## Clinical Care for Sexual Assault Survivors (CCSAS): the Use of a Multimedia Training Tool.

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**Study/Objective**: Evaluate a multimedia training tool used to train Health Care Providers (HCPs) as key actors in improving the delivery of quality Clinical Care for Sexual Assault Survivors (CCSAS).

**Background**: Sexual assault rises as a global public health issue, in conflict-affected populations, where SGBV becomes a strategy of war. Training HCPs has been prioritized by humanitarian actors globally to improve the quality CCSAS. Few studies have evaluated the effectiveness of such training.

**Methods**: Four ToTs days were provided to relevant community HCPs working in a conflict area in Jordan, Turkey, Syria, and Lebanon. The CCSAS multi-media tool developed by the IRC was used as a unified training tool aiming to improve clinical care. The recruitment process included a general call for application, entailing a detailed syllabus for the training course whereby individuals expressed their interest in attending and submitted their resume to ensure that their qualifications were in-line with the pre-set selection criteria for the training.

**Results**: Six ToTs took place; in Jordan, two groups of 25 have improved by 142% and 57.6% on average at post-test in knowledge and attitudes to care for survivors. The third ToT in Turkey, 13 participants have improved by 47% on average and nine participants have improved by 82.6% on average. In Lebanon, 19 participants have improved by 62.5% on average. In Syria, 18 participants have improved by 46.2% on average. Key barriers to quality care identified included poor or lack of access to services, lack of privacy and confidentiality, and lack of essential resources and treatment including PEP, as well as an unclear referral mechanism. Action plans were developed by participants to address these barriers and follow-up to the evaluating progress was planned.

**Conclusion**: The CCSAS multi-media training tool showed an initial positive impact and has demonstrated effectiveness in promoting compassion and competence among trained HCPs and improving quality of care in humanitarian settings.

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## Paris Terrorist Attack on November 13, 2015 - Applying Wartime In-hospital Triage and Damage Control Strategies

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**Study/Objective**: The Paris terrorist attack of November 13th 2015 caused 130 deaths and 351 injured.

**Background**: Our work aims to show how in-hospital triage and damage control strategies, acquired during the recent conflicts in Afghanistan and Sahel, enable a rational and appropriate management of the patients.

**Methods**: We retrospectively reviewed the cohort of 17 patients treated at the Percy Military Teaching Hospital on the nights of November 13-14, 2015.

**Results**: The mean age was 39 ± 8 years. Eight patients (47%) had a thoracic injury (mean AIS = 3[1-6]), 5 (29%) an upper limb injury (mean AIS = 2[1-3]), 4 (24%) an abdominal injury (mean AIS = 3[2-4]), 3 (18%) a face injury (AIS 2 = medium [1-3]), 3 (18%) a lower limb injury (AIS = 1), 2 (12%) a spine injury (AIS = 5) and 1 (6%) a brain injury (AIS = 5). There was no patient identity error. Two patients (12%) were categorized immediate with extreme mention (T1E) (ISS 19 and 29), 6 (35%) immediate (T1) (average ISS = 24 [13-41]), 4 (24%) delayed (T2) (average ISS = 6 [1-16]) and 5 (29%) minimal (T3) (average ISS = 1 [1-3]). Four patients (24%) had a damage control procedure with a mean surgical time of 68 min (43-84). All patients were treated according to the deadlines imposed by their categorization. One patient died of multiple organ failure in the aftermath of a resuscitation thoracotomy. All patient records were reviewed and three were analyzed as perfectible, without consequences for the patients involved.

**Conclusion**: The current context exposes us to the threat of new possible terrorist attacks and requires that the medical community get prepared to manage multiple war casualties. The familiarization to the modern principles of war surgery seems mandatory to face this type of situation.

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## Lessons of Military Anesthesiologists after Terror Attacks in Paris. Comparison with Battlefield Experience.

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**Study/Objective**: Objective of this study is to report the management by a military hospital of an influx of civilian casualties due to terror attacks.
**Background**: During the night of November 13, 2015, Percy army teaching hospital received 17 wounded in two convoys.
**Methods**: Retrospective, descriptive study
**Results**: Except one, all patients (8 AU and 9 RU) had GSW and nearly half of the patients had thoracic injuries (no body armor) in contrast to recent military series. Triage of GSW was easier than injuries by explosion. The hospital was away from sites of the attacks with a delay of two hours before the arrival of the first patient. Five trauma bays for AU were prepared with for each 1 anesthesiologist, 1 nurse, 1 anesthetist nurse. Eight patients were hospitalized in ICU. A binomial surgeon-anesthetist was in charge of triage which is the rule in French army. Before arrival of first casualties, bracelets with a temporary identity were generated to avoid any mistake of identity. During the first hours; 32 PRBC, 32 lyophilized plasmas and 3 platelet concentrates were transfused without incident. The use of the universal lyophilized plasma specific to the French army facilitated immediate transfusion. Prior to the arrival of the first patient, it was decided that only damage control procedures would be authorized regardless of the clinical condition (collective indications of damage control). The goal of this decision was to optimize the use of operating theaters. This decision was motivated by the risk of second attacks and experience of managing a large number of wounded with a limited operating theaters number during deployments. Operating theaters like the rest of the hospital were never saturated. As in times of war, the transmission of information between the different levels of care was difficult.
**Conclusion**: Military skills are useful in managing an influx of casualties.

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## Pray for the Best, Prepare for the Worst: Cholera Treatment Ward Preparation of Novice Haitian Healthcare Staff

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**Study/Objective**: To describe the preparing of Haitian Healthcare staff for triaging and management of cholera patients.
**Background**: Haiti has endemic cholera. This is exacerbated by our (yearly) rainy season. In 2016, this was further worsened by Hurricane Matthew, allowing massive contamination of water supplies in southern Haiti. This resulted in a much greater need for Haitian healthcare workers with no previous exposure to this patient population, to be able to effectively recognize, treat and contain potential cholera patients.
**Methods**: Observational discussion and lessons learned from setting up a Cholera Treatment Ward in Southern Haiti, post Hurricane Matthew.
**Results**: Haitian Healthcare workers with no prior experience or capacity for treating cholera developed an effective knowledge base, skillset, and Cholera Treatment Ward (CTW), thereby proactively heightening local disaster management capabilities.
**Conclusion**: Many of our lessons learned are applicable to a wide variety of disasters, infectious diseases, capacity building situations and would be of interest to WADEM members' attendees.

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## Does Planning and Preparation Help in Disaster Risk Management? A Nepal Experience

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**Study/Objective**: To review the response mechanism and the preparation before the Nepal earthquake, for effective preparation and response.
**Background**: Nepal which lies between two large countries of China and India and is prone to natural disasters including earthquakes, floods, landslides and severe weather events. Bureau for Crisis Prevention and Recovery (BCPR) ranks Nepal as the 11th most at risk country in the world in terms of relative vulnerability to earthquake. The (last year) earthquake in Nepal had caused nearly 9,000 deaths compared to the expected 100,000 deaths, and this is due to the timing of the event. The earthquake occurred on Saturday, so all the schools and offices were on holiday, that is the one important reason for the lower number of casualties; and the other is the preparedness of the Ministry of Health and the hospitals. The first factor was not in our hands to modify but the second one was. Two factors, one was that the government had taken the lead of all the disaster preparedness by various International Non-Governmental Organizations (INGOs) through the cluster system. The Second is the training in disaster preparedness by the course called Hospital Preparedness for Emergencies developed by US Aid.
**Methods**: Hospital Preparedness for Emergencies (HOPE), Primary Trauma Care (PTC), Emergency protocols were conducted and the Health Emergency Operation Center (HEOC) was prepared before the earthquake which helped in saving many lives. The HUB hospital system was implemented by Ministry of Health to coordinate better among the hospitals.
**Results**: All of this preparedness may not have worked completely, but the review organized by WHO and Ministry of Health, Nepal after the disaster showed that these training protocols and HEOC had really helped to treat patients systematically.

**Conclusion**: Stakeholders should undergo disaster risk management training, and work closely with the Ministry of Health to save as many lives as possible.

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## Thrombolysis of Acute Massive Bilateral Pulmonary Embolism: A Success Story in a Ghanaian Emergency Department

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**Study/Objective**: To report on the first successful management of a patient with acute massive bilateral Pulmonary Embolism, at the Komfo Anokye Teaching Hospital Emergency Department (KATH ED), Kumasi, Ghana.

**Background**: Pulmonary Embolism (PE) is an acute silent killer in developing countries, and is primarily a diagnosis of clinical suspicion. There are limitations in its diagnosis and interventions, increasing the mortality tendencies. Acute massive bilateral PE carries an exceptionally high mortality rate even with interventions.

**Methods**: We sought to describe the management of the first successful thrombolysis of a patient with acute massive bilateral PE who presented to our ED at KATH, because there is paucity of literature on successful ED management of such cases in Ghana.

**Results**: A 23 year-old woman, 2-months pregnant, $G4P0^{+2}$, admitted with sudden onset of breathlessness, chest pain and a history of hemoptysis one week earlier. No significant past medical history. BP was unrecordable, tachycardia, saturating <90% on oxygen, with deteriorating mental status. She was intubated and started on IVFs and subsequently, dobutamine. Bedside ultrasound revealed a dilated Right ventricle, full IVC and a gestational sac. No evidence of DVT. ECG showed sinus tachycardia, extreme left-axis-deviation, S-wave in lead I; Q-wave and T-wave inversion in lead III. Wells Score was 5.5. Normal chest X-ray and chest CT-Angiography showed acute bilateral massive PE. Thrombolysis was used with Streptokinase via central line after obtaining a clotting profile. She spontaneously aborted and the evacuation of the uterus was done. CPR was done following an episode of cardiac arrest, and Return of Spontaneous Circulation (ROSC) was achieved. She was admitted to the ICU, extubated and discharged home on warfarin on Day 12. She currently attends her review sessions and was given counsel for preconception care.

**Conclusion**: High-risk emergencies can be managed in low resource settings. There is, however, the need for available and affordable diagnostic resources, medications and logistics to promptly identify and appropriately manage such cases.

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## Association Between Water Security, Disaster Risk Perception and Preparedness Behavior of a Rural Ethnic Minority Village in Chongqing, China: A Pilot Study

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**Study/Objective**: To explore the relationship between water security, disaster risk and preparedness among an ethnic minority rural community in China.

**Background**: Increased rainfall variability and water-related disasters can be expected due to climate change. Among the resource-poor in China, these water-related disasters will increasingly affect people's water security. There is a need to understand their current water security and disaster risk, to recommend long-term water management and disaster preparedness options.

**Methods**: A cross-sectional, cluster sample survey was conducted in February 2015, in Xingguang Village, southeastern Chongqing, China. The target population was 520 households of 9 sub-villages. The survey included indicators on water security (time to fetch, water sufficiency, supply stability, water storage, and price), disaster risk (perception of living in high-risk area and ability to protect from future disasters) and preparedness (disaster bag). Descriptive and analytic epidemiological analysis was conducted using SPSS. Ethics approval was obtained from Chinese University of Hong Kong.

**Results**: Among 52 household representatives who completed the survey, 76.9% thought climate change impacted health, and water was their main health risk concern (36.5%), 63.5% have insufficient water on a normal basis, and 84.6% rely on rainwater as their main water source. Only 32.7% perceived to be living in a high-risk area, of which climate-related disasters such as storms (44.4%) and droughts (38.9%) were most frequent. Of all water security indicators, insufficient water was significantly associated with the perception of living in a high-risk area ($p = 0.017$). No evidence was found between water security indicators and the ability to protect from future disasters. No evidence was found between disaster risk perception and preparedness.

**Conclusion**: Long-term water management should address water sufficiency. Interestingly, the ability to protect from future disasters is not related to water security indicators. Disaster preparedness education and further research is recommended.

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## A Lethal Lapse: Envenomation and Ebola, Critical Gaps in Aid Worker Preparation

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**Study/Objective**: Assessment of Critical Gaps in Aid Worker Preparation during the 2014 Ebola Outbreak.
**Background**: During the author's time as a clinician and clinical instructor during the recent Ebola emergency response, two mambas were found in Ebola Treatment Units (ETUs). In addition to the ETU setting, the very nature of addressing Ebola necessitates fieldwork in jungle conditions. Each of the three main countries affected by Ebola have a significant number of venomous reptiles, as well as other potential plant and animal sources of toxin exposures. The author worked independently for six weeks with Liberian Ministry of Health (MoH) and the World Health Organization (WHO) as a Facilitator for Ebola Phase III "Hot" Training.
Additionally, he assisted in the preparation and opening of a 50 bed Ebola Treatment Unit (ETU), where he was also responsible for providing clinical care, comprehensive education and training, and oversaw field operations of three ambulances and associated personnel. At no point did any of the formal pre-deployment training address the potential for envenomation from the local flora and fauna. I believe this is a critical lack that should be addressed in future responses.
**Methods**: Comprehensive review of CDC, WHO, US Military, and aid organization Ebola training materials. Informal verbal surveys conducting as an instructor during the final phase of Ebola hot zone training.
**Results**: Despite the potential of a lethal envenomation, no pre-deployment coursework included material addressing this possibility. Furthermore, informal surveys of hundreds of Ebola emergency response workers representing dozens of aid agencies revealed that not one organization had prepared for an envenomation incident.
**Conclusion**: Despite the fieldwork that is inherent in an Ebola emergency response, there were no plans in place regarding antivenin or medical evacuation from the field. The entire focus was on preventing exposure to Ebola. This is analogous to a "distracting mechanism of injury" in Emergency Medicine and Trauma, in which tunnel vision impairs a comprehensive survey.
**Conclusions**: When there is a probability of encountering envenomation during fieldwork, especially potentially lethal envenomation, pre-deployment training should include both a comprehensive risk assessment; as well as appropriate contingency plans. Failing to plan is planning to fail.
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## The Fatal Fruit: A Cautionary Tale in Situational Awareness

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**Study/Objective**: Emphasize Need for Medical Mission teams to familiarize themselves with local flora/ fauna and potential intoxications/ envenomations.
**Background**: A four-year-old girl presented to our Haitian hospital with profound hypoglycemia and a six-hour history of seizures. Initially, aside from addressing the hypoglycemia and administering benzodiazepines, the staff was unable to provide definitive diagnosis or treatment. Subsequent in depth interviews with the parents via translators allowed the staff to determine that ingestion of unripe ackee fruit (*Blighia sapida*) was the probable cause of the child's symptoms.
**Methods**: Case Study and review of physiology, biochemistry, and management of ackee fruit toxicity.
**Results**: Increased readiness on the part of healthcare providers to recognize and treat Ackee Fruit Toxicity, as well as increased situational awareness regarding potential exposures outside their cultural norms.
**Conclusion**: Discussion: The inability to obtain a complete history and physical (as is often the case in toxic ingestions), as well as a lack of familiarity with local toxic plants potentially led to a delay in definitive treatment. This is particularly problematic when medical staff is deploying to unfamiliar regions. Conclusions: Medical Mission workers should educate themselves as to local specific toxins that they may lack familiarity with. Delays in diagnosis results in delays in comprehensive care, with potential subsequent increases in morbidity and mortality.
Failing to Plan is Planning to Fail.
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## When a Little Human is Bitten Twice by a Large Venomous Snake: The Providers Disagree with the Original Consultant Recommendation

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**Study/Objective**: This is a case of a severely envenomed child by not one, but two bites from a confirmed large adult Florida coral snake (Micrurus fulvous), that exhibited with immediate systemic manifestations. Initial consultation from a wilderness medicine and emergency medicine specialist, suggested one treatment, but consultation with a toxicology service asking certain questions gave conflicting recommendations to treatment. Bringing in other experienced consultants and advocating for the patient, led to the change of recommendation by the initial consultant; and finally treatment, though delayed initially, of the patient with the appropriate antivenom.
**Background**: Literature is scant at best on how often even medical professionals / attending physicians might disagree with consulting specialists. However, it is important for any medical professional at any level, to be able to advocate for what might be best for the patient, as well as to educate the patient or their caretakers. This, of course, can be done civilly and professionally, although this is a skillset seldom taught. Elapid snake envenoming, specifically coral snake envenoming, requires important education to determine if and how much antivenom, the only true cure for venom, might be needed. Many online resources are incorrect or incomplete with regards to the proper treatment of snakebites, and possibly even harmful.
**Methods**: This is a case of a double envenoming of a young child by a Florida coral snake, leading to severe systemic effects

that for various reasons had a significant delay in treatment with antivenom. This case will be used to highlight important aspects to snake envenomation and recommendations on dealing with consultants.
**Results**: In the end, our young patient was ultimately discharged from the Intensive Care Unit (ICU) with significantly improved central and peripheral nervous system symptoms.
**Conclusion**: Conflicting treatments and patient advocacy need to be carefully balanced, and even disagreements can be handled professionally.
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## Using the Epidemic Curve to Inform Social and Behavior Change at Scale During Epidemic Response.

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**Study/Objective**: The International Federation of the Red Cross and Red Crescent (IFRC) presents a model for Social Behavior Change in emergency contexts that supports local actors in low resources settings, and engage with communities and utilize the epidemic curve to help inform response. Using the epidemic curve at a granular level, allows national communication plans to be tailored in time and place in relation to the movement of the epidemic, ensuring messaging and activities are tailored to where and when communities are in the epidemic evolution and combines with local context
**Background**: The focus on community engagement and the role of 'Social and Behavior Change' (SBC) during development and emergency interventions is not new. Much work has been done in this area with a plethora of theories and models to support implementation across health topics and sectors, as diverse as obesity and STD prevention. These models, often based on social science, psychology and social marketing have a commonality that includes triggering motivation for change, supporting and maintaining the new behavior. They rely heavily on in depth assessments of root causes of the behavior, cultural contexts and reflective program design. However, how do these models interface in an epidemic, where time and resources can be limited, the motivation for change is often clear, the threat time limited and moving geographically?
**Methods**: The IFRC supports an average of 20 public health threats a year. Providing quality SBC programming at scale in low resources settings, remain a significant challenge, however new models of implementation are being field tested.
**Results**: A new model was developed.
**Conclusion**: Providing a clear link between the epidemic evolution in time, place and person allows specific targeting of interventions to support prevention, reduction and eradication of transmission to at risk groups. The combination of the improved utilization of social science to inform programming, needs to be a two-way dialogue, where epidemiological data is used to target and tailor SBC.
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## Nutrition Centers in Protracted Crisis Context: Field Study from Syria

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**Study/Objective**: The objective of this field study is to examine the effectiveness of implementing comprehensive nutritional services at the community level in the complex humanitarian crisis in Syria; and to disseminate this knowledge among other humanitarian actors.
**Background**: Syria is one of the largest and most complex crises, experienced by the international humanitarian system. Difficulties of access and transportation of goods have increased the prices and reduced the availability of commodities. Cases of Severe Acute Malnutrition (SAM) and Moderate Acute Malnutrition (MAM) – both components of Global Acute Malnutrition (GAM), are on the rise in Syria. The Syrian Arab Red Crescent in cooperation with Canadian Red Cross are supporting 6 nutrition centers in Hama, Salamiyeh, Al Tal, Tartous, Aleppo and Swaida.
**Methods**: In Syria, the Community-based Management of Acute Malnutrition (CMAM) approach targets of acutely malnourished children under five, and pregnant and lactating women through community outreach, Supplementary Feeding Program (SFP) and Outpatient Therapeutic Program (OTP). The cases either come directly to the centers or referred by doctors or outreach mobile teams who conduct door-to-door nutritional assessments, using Mid-Upper Arm Circumference (MUAC) measurements. Quantitative and qualitative data are collected and analyzed on regular bases.
**Results**: Until the end of October 2016 the centers were able, collectively, to screen a total of 38,847 children and 8,434 pregnant and lactating women. We've identified and treated total of 254 SAM cases and 1,574 MAM cases amongst children, and 1,167 cases of MAM among pregnant and lactating women. With ensuring humanitarian principles are always respected, we consider various tactics to overcome evolving challenges that may include access, security, patients and family compliance and disruption of nutritional supplements.
**Conclusion**: Implementation knowledge generated from this project can model challenges and solutions in comprehensive nutritional services at the community level in complex humanitarian crisis.
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## Applying the Experience of Level-2 Military Surgical Teams to Disaster Medicine

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**Study/Objective**: The objective of the paper is to assess the options of using the experience of level-2 military surgical teams operating in military conflict in the context of treating mass casualty and disaster victims.

**Background**: Procedures applied by Polish military surgical teams during foreign missions conducted from 2008 to 2013 (total number of trauma patients –1,327), specifically in terms of treating locals, and the operations of the Urban SAR Groups of the Polish State Fire Service during earthquake-related rescue missions from 1999 to 2014, were assessed.
**Methods**: Medical procedures applied by the Polish military surgical teams and the Urban SAR Groups were analyzed, specifically in terms of using their experience to improve the efficiency of medical treatment of disaster victims.
**Results**: The operations of the level-2 surgical teams in Afghanistan have greatly advanced knowledge of dealing with trauma victims with limited personnel and restricted transport resources. The challenges involved in treating local patients always include limited options of long-term observation, and treatment which necessitates modification of treatment methods. Based on the experience of the Urban SAR groups acquired during post-earthquake rescue efforts, there is significant need for more extensive medical aid, specifically in cases of dealing with damage to the extremities, wound treatment and the "crash syndrome". Experience of and procedures followed by the level-2 surgical teams in the course of damage control surgery and damage control orthopaedics, may be directly applicable to treating disaster victims, and also if there is no continued observation of victims.
**Conclusion**: Damage control surgery procedures may be applied to treatment of disaster victims. However, methods and standards of treatment must be carefully tailored to the inability to provide long-term care and patients relying on local healthcare services for continued treatment. That is specifically important in case of orthopedic trauma treatment procedures.
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## Emergency Teams in Cascading Disasters

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**Study/Objective**: To analyze the role of non-medical disaster response teams in cascading disasters, and their fit within wider Disaster Risk Reduction and Response (DRR&R) efforts.
**Background**: The field of disaster studies has recently seen a focus on so-called "cascading disasters." What is meant is disasters with cascading effects across functional and national boundaries, leading to secondary disasters of a similar or larger magnitude than the initial event (Pescaroli and Alexander, 2015). The notion of cascades points our focus to an important question within current disaster response: Are we sending the right people? Put differently, is the composition of our disaster response teams fit for DRR&R in cascading disasters? In this regard, the role and potential of non-medical personnel to prevent, stop, and respond to cascading disasters has received little attention. Yet, considering how cascading disasters spread across critical infrastructures, such as electrical, transportation, or sewerage systems, clearly the focus on sending predominantly medical teams to disaster zones is insufficient.
**Methods**: This study is conducted in in three steps: 1. An extensive literature review. 2. 20 in-depth, semi-structured interviews with: a) non-medical key personnel in areas such as construction, municipal planning, and the electrical grid to understand their perceptions of their role and abilities within DRR&R in cascading disasters. and b) key personnel from international DRR&R teams to understand their perceptions of the role of non-medical personal in cascading disasters.
**Results**: The insights of the literature review and interviews will be analyzed and consolidated into meaningful conclusions and actionable recommendations.
**Conclusion**: The research aims to suggest improved compositions of response teams that may prevent deterioration in disasters scenarios rather than focusing on the initial disaster situation alone. Final conclusions will be presented at the 2017 WADEM conference in Toronto.
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## Medical Response to the 2016 Fort McMurray Wildfires - Descriptive Epidemiology of Patients Presenting to a Field Hospital

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**Study/Objective**: To describe the epidemiology of patient presentation to a physician, nurse, and paramedic staffed field hospital during the 2016 Fort McMurray Wildfires (FMMW).
**Background**: The FMMW was the most economically devastating natural disaster in Canadian history, resulting in the evacuation of over 80,000 citizens, burning of over 1,600 structures, with a cost of over $9 billion CDN. Canada Task Force 2 (CAN-TF2) is Alberta's all-hazards disaster response team, which includes Heavy Urban Search and Rescue (HUSAR) and Disaster Medical Assistance Team (DMAT) capabilities. As part of CAN-TF2's deployment, a field hospital was established to support the incident as a result of the evacuation of local healthcare facilities.
**Methods**: A retrospective chart review was conducted of all Patient Care Reports from the field hospital to determine chief complaint, organized by Canadian Emergency Department Information System (EDIS) Presenting Complaint List. Disposition and patient demographics were also recorded.
**Results**: A total of 162 patients were seen over a 14-day period. Medical force protection accounted for 32/162 (20%) of patient presentations, with the remainder being patients external to CANTF. Evacuation to higher levels of care was required for 23/162 (14%) patients. Table 1 describes presenting complaints. The leading presenting complaint was prescription / medication request (n = 47), followed by foreign body eye injury (n = 14), GI complaints (n = 11 and n = 9), and foot care (n = 9).
**Conclusion**: The majority of patients presented with primary care complaints. While CAN-TF2's primary mission was to provide medical force protection, most of the patients treated were external to the agency. Of the incident responders who

presented for care, the majority were able to return to work. A major medical challenge encountered was responding to a serious GI illness outbreak. Future medical planning will focus on provision of pharmacy services and promoting the use of eye personal protective equipment in wildfire hazard zones.

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## Discovering Best Practice for the Implementation of Evacuation Centers for Vulnerable Populations: Findings from a Japanese Pilot Study

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**Study/Objective**: This paper will report the preliminary findings of a pilot study, undertaken with local government officials in Japan, concerning their involvement in planning for, setting up, and managing evacuation centers for vulnerable populations in Japan during the Great East Japan Earthquake in 2011. The objective is to illuminate the challenges that officials faced, and the resolutions and lessons learned in the preparation of evacuation centers through this event.
**Background**: Potentially vulnerable population groups in disasters include the elderly and frail, people who are isolated, and those with chronic diseases including mental health conditions or mobility issues. The 2011 Great East Japan Earthquake disaster affected regions of Japan where the proportion of older population is relatively higher than other parts of the country. In 2008, the Japanese Government Cabinet Office implemented guidelines for the preparation and establishment of evacuation centers for vulnerable populations. However, the 2011 disaster highlighted issues regarding the role and responsibility across governments relating to planning, setup, and management of evacuation centers.
**Methods**: The study was comprised of two phases. The first involved interviews with local government and relevant agencies' officials who have been involved in establishing evacuation centers for vulnerable populations in Japan. Five officials were recruited from the local government area affected by the disaster in Japan. Face-to-face, semi-structured interviews were audio-recorded and thematic analysis was conducted using NVivo software.
**Results**: Four themes emerged. They were: (1) reflecting on role and responsibility for community, (2) awareness of the need for preparedness, (3) factors causing organizations to be underprepared, and (4) the need for greater community resilience.
**Conclusion:** This pilot study demonstrated that the establishment of clear role descriptions and responsibilities are key for local governments to prepare for the establishment of disaster evacuation centers, particularly for vulnerable populations.

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## Hospital Surge Capacity in the 2011 Great East Japan Earthquake and Tsunami

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**Study/Objective**: Until now, there is no experience or evidence about hospital surge capacity in Tsunami disasters in Japan. In the meantime, we had experienced the 2011 Great East Earthquake and Tsunami. So, we will investigate how we make hospital surge capacity in Tsunami disasters.
**Background**: Surge capacity is a functional expansion capability for catastrophic situations within the organization to deal with a disaster. For hospitals, it can be said that it is the ability of the health care system to accept a large number of patients that occur in a sudden disaster. Not just one of the hospitals, the hospital group, the first-aid station in the area, and more must be considered, as well as the ability of the health care system in the affected prefecture, neighboring prefectures, and nationwide.
**Methods**: We have investigated five hospitals in Miyagi Prefecture. All hospitals are disaster-based hospitals that were prepared for natural disasters and designated by the local government. We compared bed capacity of these hospitals at peacetime and at the time of disaster; how they effected their surge capacity, and the regional bed capacity. We studied bed capacity in Yamagata Prefecture and places next to Miyagi Prefecture at that time.
**Results**: Two of the five hospitals that were near the pacific coast should install additional (extra) beds. The number of beds were about two or three times short of daily new admissions. Another two of five that were placed at inland hospitals had no need for additional beds. All hospitals stopped ordinary work to make or expand their capacity of beds and medical staff. Yamagata Prefecture could make slightly more bed capacity.
**Conclusion**: Except big hospitals in the affected area by Tsunami, hospitals were required to expand their additional (extra) beds for two or three times the daily new admissions, medical staff, and equipment suitable for disaster situations.

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## Evacuation Burden of a Safety-Net Academic Medical Center during Hurricane Sandy: Implications for Reverse Triage

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**Study/Objective**: We describe evacuation burdens of a municipal, safety-net academic medical center, following the largest Atlantic hurricane in United States history.
**Background**: Typically applied to hospitals receiving surge capacity, reverse triage models have suggested that up to

50-60% of hospitalized patients are dischargeable in acute disaster. In this case, reverse triage occurred in practice in an evacuating facility to minimize interfacility transfers.
**Methods**: A retrospective review of the electronic records of patients evacuated from Bellevue Hospital Center during Hurricane Sandy and its aftermath, from October 30 - November 2, 2012 was undertaken. Demographic and clinical data, equipment needs, ambulatory status, transport requirements, forensic status, and ultimate disposition were evaluated.
**Results**: A total of 732 patients were admitted to the hospital or undergoing treatment in the emergency department at landfall. Of these, 723 records (98.8%) were available for review. Only 226 (31.3%) patients could be discharged home; 38 (5.3%) were discharged to shelters, while the remaining 459 (63.4%) patients required transfer to neighboring hospitals, subacute nursing facilities, or correctional facilities for further care. There were 236 (32.6%) either non-ambulatory or demonstrated gait instability; 66 (9.1%) patients were being treated in intensive care settings, including 16 (2.2%) patients who were ventilator dependent, and 19 critical neonatal patients. There were 324 (44.8%) patients admitted to inpatient psychiatry. Patients were directly transported to at least 37 individual facilities in multiple hospital networks.
**Conclusion**: Pragmatically, we found a lower incidence of dischargeable patients than previously assumed. The burden placed on hospital staff, evacuation teams, and neighboring hospitals during evacuation of a large, urban, quaternary care public hospital is severe. Simultaneous citywide evacuation of multiple hospitals may be untenable without prior plans to coordinate resources for such large-scale healthcare system stresses. This study highlights the need to carefully reconsider evacuation, operational and modeling assumptions and solutions in at-risk healthcare infrastructures in cities across the country.
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## DMAT Operation in 2016 Kumamoto Earthquake

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**Study/Objective**: Evaluation of the Japan DMAT activities in a recent domestic major earthquake, referring to learnings from the past.
**Background**: The Japan DMAT system was established in 2005. At the time of the 2011 Great East Japan Earthquake, 1,852 members responded and provided hospital operation support and patient air evacuation. However, we found that the command system, safety and function screening of clinics and small hospitals via Emergency Medical Information System (EMIS), operation hand over to the subacute disaster phase, and logistic support needs to be improved. We have evaluated if those findings improved in the 2016 Kumamoto Earthquake operation.
**Methods**: We evaluated all 466 who responded, DMAT post activity reports and investigated any improved activities from the past responses.
**Results**: There were 2,071 DMAT members who responded. Among 10-day operation, the EMIS system was utilized to screen the level of damages to the clinics, small hospitals and also the evacuation shelters. The DMAT logistic team was activated and resulted in rapid replenishment of medical supplies to the damaged hospitals, and helped shifting of the command system from onset of earthquake to the subacute phase.
**Conclusion**: Compared to the past, the Kumamoto Earthquake had less trauma patients even though there were a lot of collapsed housing. People stayed inside of their own car due to fear from collapse. This declined activity of daily living in all ages, and created major needs in public health and welfare improvements. It is expected that the Nankai trough Earthquake may result in the biggest damages to Japan. Therefore, with our experiences, we must establish everyday cooperation and drills with local public health services, to operate quick responses to maintain and improve public health. Also, we must establish the psychological first aid system for the patients and the rescuers, which includes DMAT, and needs to cooperate with building inspections personnel to secure the safety of medical support in the damaged buildings.
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## Mitigating Matthew: 5 Lessons to Help Improve Hurricane Hospital Preparedness

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**Study/Objective**: Following Hurricane Katrina, US hospitals have largely improved their approach to hurricane preparedness. Yet the timing and uncertainty of hurricanes present unique challenges for hospitals and emergency preparedness officials. Here we present the experience of one coastal hospital directly in the path of Hurricane Matthew (October 2016).
**Background**: Hurricane Matthew made US landfall on October 8, 2016 near McClellanville, South Carolina, just north of Charleston. The storm caused nearly $10-15 billion in damages along the southeast coastline, representing the 22nd most damaging storm in US history.
**Methods**: This presentation "from the field", documents one coastal hospital's experience preparing for, responding to and recovering from Hurricane Matthew.
**Results**: Key lessons addressed to better prepare hospitals for hurricanes, include decision making regarding evacuation or shelter in place, evaluation of clinical services to maintain during the storm, the preparation and organization of staff, and the importance of developing an early recovery process to resume hospital operations.
**Conclusion**: In retrospect, the massive mobilization of resources may have been safely modulated downward without risk. But the potential for damage was real and the early call to evacuate was the right call. Our hospital experienced a committed, compassionate and coordinated response; and with minor modifications, coastal hospitals that follow simple rules should be ready.
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## The Operations of Nagasaki Prefectural DMAT Headquarters in Kumamoto Earthquake: Safety, Management and Coordination

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**Study/Objective**: To assess the role of prefectural Disaster Medical Assistance Team (DMAT) headquarters, on the safety management of dispatching DMAT to earthquake-hit areas, and the preparation of the advance agreement between the prefecture and relevant organizations.
**Background**: Nagasaki prefecture is located next to Kumamoto prefecture. Immediately after the Kumamoto Earthquake, Nagasaki prefectural DMAT headquarters was set up. The missions were dispatch and coordination of Nagasaki DMAT, and preparation for mass transport of casualties from Kumamoto in cooperation with Kumamoto prefectural DMAT headquarters.
**Methods**: The coordination process of Nagasaki DMAT headquarters was retrospectively reviewed, and was also assessed for the adherence to the existing advance agreement.
**Results**: The following coordinations were observed. Safety management: 1. The coordinated arrival of more than one DMAT in Kumamoto. 2. Consistently punctual and regular communication between the headquarters and the Nagasaki DMATs in Kumamoto. 3. The request to ensure warm greetings and relaxation space, and provision of psychological care for the DMAT staff by DMAT station hospital. Coordination: Securing the transport means for injured people proved difficult, but was managed by a coordinated request of transport by ambulance services, nursing home taxis, and self defense forces.
**Conclusion**: The current state of advance agreement was not deemed sufficient for the medical support of the earthquake-hit areas. The reflection of Kumamoto Earthquake experience should lead to improved advance agreement and dispatch coordination.

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## Deployment Nutrition - Development of Disaster Responder Rations

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**Study/Objective**: To provide Australian Medical Assistance Team (AusMAT) members access to a broad range of food to meet their individual nutritional requirements during deployment.
**Background**: Given the key role nutrition plays in overall health, disaster responders should be provided with high quality food during deployments. While military rations are an option, the nutritional requirements of disaster responders and soldiers vary markedly. Hence, six ration packs were developed for AusMAT members by the National Critical Care and Trauma Response Centre (NCCTRC).
**Methods**: The nutritional values selected were designed to meet recommended averages for healthy Australian adults participating in moderate activity. The packs contain commercially available food that responders are familiar with, increasing the likelihood of food consumption. Responders are familiarized with ration packs during training and the packs have been provided to AusMAT members during deployments since 2011.
**Results**: The nutritional content pack 1 is provided as an example, with the remaining packs providing similar nutrition through different pack contents.
**Conclusion**: Meeting the nutritional needs of a disaster responders team in austere settings is challenging. Through the use of six ration packs designed specifically for disaster responders and containing commercially available food, the risk of inadequate nutrition impacting AusMAT members has been mitigated.

| NUTRIENTS | TOTAL IN PACK |
|---|---|
| Calories | 2,637.7 |
| kJ | 11,169 |
| Carbohydrates (g) | 359.2 |
| Sodium(mg) | 5,304.4 |
| Sugar (g) | 84.1 |
| Fat (g) | 92.3 |
| Saturated fat (g) | 31 |
| Protein(g) | 110.2 |
| Fibre (g) | 11.5 |
| Zinc (mg) | 5 |
| Vitamin C (mg) | 268 |
| Thiamine (mg) | 0.94 |
| Potassium (mg) | 843 |
| Calcium (mg) | 231 |
| Magnesium (mg) | 0 |
| Iron (mg) | 3.6 |
| Phosphorus (mg) | 0 |
| Vitamin B12 (μg) | 1 |
| Vitamin B2 | 0.35 |
| Vitamin B3 (mg) | 2 |
| Vitamin E | 0 |
| Omega 3 | 200 |
| Folate | 81 |

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## Development of a Coordination System: Lessons Learned in Earthquakes in Nepal and Japan

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**Study/Objective**: Designing a local health emergency coordination system for the disaster relief, based on the lessons we learned in international and domestic disaster medical relief.
**Background**: Major earthquakes with a magnitude of 8-9 are anticipated to occur in Mie Prefecture, Japan. Health emergency management services in local governments need to establish an efficient and accountable coordination system.
**Methods**: While having participated in disaster relief in recent earthquakes in Nepal and Japan, we observed the need for coordinating immediate medical assistance and support, to maintain local healthcare in transition from acute to later phase. We utilized the concepts of a health cluster meeting, and explored the roles of disaster medical coordinators in the regions.
**Results**: In 2015, we visited Nepal two weeks after the first earthquake and observed that the government was overwhelmed to distribute many international and domestic medical teams focusing on trauma, and emergency medical relief for mass casualties. Although the health coordination mechanism worked in the initial phase, support to local healthcare facilities where employees were also suffering, did not gain much attention. There was a gap between the disaster support in acute phase and long-term humanitarian relief, and the national and local authorities seemed unable to fill the gap. In the East Japan Earthquake and Tsunami 2011, many medical teams rushed to the areas without formal agreement. We requested to be dispatched as a prefectural medical team under the authority of affected prefectural government, which enabled us to support an acute and recovery phase under authority of local government. Based on the experience, Mie prefecture and Mie University have developed and distributed a local coordination system adapting concepts of a cluster approach.
**Conclusion**: We developed a local health emergency coordination system to cope with the disasters, considering the lessons we learned at the recent earthquakes.

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## Counter-Terrorism Medicine: It Is Time

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**Study/Objective**: To demonstrate the demand for a new medical specialty committed to the unique mitigation, preparedness, and response requirements needed to be proactive in addressing terrorist attacks, based on the growing amount of medical literature analyzing such attacks to date. There is currently no such field.
**Background**: Asymmetric and multi-modality terrorist attacks represent an emerging and global healthcare crisis, increasing since the September 11$^{th}$ attacks. The particularity of modern intentional acts of violence is their non-conventional characteristics, that often result in a surge of specific injuries and wound patterns that put high demand on our healthcare systems. In addition, such attacks carry unique target-hardening, logistics, operations, and safety issues in order to positively impact morbidity and mortality.
**Methods**: The authors performed a systematic review of peer reviewed literature indexed in PubMed, with no limits on year of publication or language. Exploded search terms included "Counter-Terrorism Medicine" "Terrorist Attacks", and "Terrorism".
**Results**: Search strategy yielded 12,309 citations for "Terrorism", 2,046 citations for "Terrorist Attacks", and 0 citations for "Counter-Terrorism Medicine" that use the words together as a phrase. There was a clear increase in articles since 2001, with 96.7% of the articles written between 2001 and 2016.
**Conclusion:** We found 14,355 articles reporting on terrorism and terrorist attacks in the medical literature. The majority of articles were written after the September 11$^{th}$ attacks. This vast amount of data supports the need for a unique area of expertise dedicated to mitigation, preparedness and response to these events. We call that specialty 'Counter-Terrorism Medicine'.

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## Response of a Tertiary Care Teaching Hospital following a Grid Collapse in North India: Through a Contingency Plan

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**Study/Objective**: The current study brings about the response of a tertiary care teaching hospital in the event of a northern grid collapse that occurred in July 2012 in North India.
**Background**: Continuous and uninterrupted supply of electricity is vital for the smooth functioning of a hospital, as it is required for the functioning of life saving equipment. Electricity failure can lead to major adverse events in a hospital. Power disruption is not always predictable or preventable.
**Methods**: The real challenge was not only to address individual hospital services which were dependent on feeder electricity, but also to have a fine synchronization among various hospital operations to mitigate chaos and to avert any adverse outcome.
**Results**: The response to this major electricity failure was a contingency plan in place. As per the plan, we had a priority power back up system in the form of Diesel Generator (DG) back up. DG sets could provide power back up for a continuous eight hours, after which it had to be refueled. A liaison was created with the city-level engineering department to remain updated about resumption of power, and with government operated fuel stations to get the required amount of diesel on payment. Concurrently, various supportive functions and services of the hospital dependant on electricity were switched over from automatic modes to manual mode, without letting the patient care services be affected by it. The communication system was catered in through the use of

mobile phones from the closed circuit user group. Vertical transport systems were affected, and hence ramps were utilized for internal transportation of patients and supplies. The water crisis was averted by impressing upon need of water conservation among various users.

**Conclusion**: In the event of any crisis, having a contingency plan in place is the advantage to systematically and effectively make use of resources on hand.

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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## Event Medicine: An Evolving Academic Subspecialty in Emergency Medicine

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**Study/Objective**: Introduce the rationale for formally establishing Event Medicine (EVM) as a subspecialty in the discipline of Emergency Medicine (EM).
**Background**: EVM involves highly-specialized management of unique medical and logistical challenges during mass gatherings or major special events. While hundreds of attendees will become ill or injured, events also can involve many "on-the-road" support staff members who may need care for acute or chronic medical issues or injuries. Promoters are becoming increasingly focused on ensuring safe/secure productions for major sports and entertainment tours, including expert medical support. Although various medical personnel have staffed such events for years, a small but evolving cadre of expert academic emergency physicians have begun to envision EVM as a unique practice, ripe for both training and research opportunities. For example, just for tours/professional sports alone, formal training would need to specifically address atypical challenges in travel, environmental, toxicological, protective and tactical medicine as well as exceptional risks for MCIs, terrorism, public health and hazmat threats (requiring close coordination with public safety/law enforcement teams), as well as networks of EVM specialists who can facilitate follow-up of personnel at the next venue. Predictive medical needs investigations and sentinel case reports are classic research examples.
**Methods**: In this well-illustrated talk, the speaker will detail recent experiences with EVM apprentices (prototype fellows), at dozens of mass gathering events (including those involving >100,000 attendees). Presenting their findings, a distinct academic niche with solid areas for research and training will be identified, that will include concepts for competencies and unique skillsets that will be compliant with American Board of Medical Specialties (ABMS) and Accreditation Council for Graduate Medical Education (ACGME) ACGME Residency Review Committee requirements. Several resulting outlines for research needs, investigative opportunities and experiences for academic productivity will be delineated.
**Results**: Trainees identified at least a dozen knowledge competencies and skillsets not provided in high-profile training programs, and 5 research niches.
**Conclusion**: The evolving discipline of Event Medicine has become a unique subspecialty with special competencies, that has tremendous opportunities for an academic model.

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## Evaluation of Public Health Aspects of the 100th "Walk of the World" International Four Day March Nijmegen

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**Study/Objective**: Evaluation of Public Health aspects of the 100th "Walk of the World" International Four Day March Nijmegen
**Background**: The International Four Day March in Nijmegen has grown into the largest multi-day walking event in the world. Over 42,000 participants walk a total of 120-200 kilometers (7-12 mi.). Alongside, festivities took place, visited by more than 1.5 million people. The Director of Public Health may advise the mayor of the City of Nijmegen to impose conditions and restrictions on events in order to protect public health and safety. An important role is being held by the National Office of Public Health and Safety (GHOR) to optimize the collaboration of all the medical chain parties involved, including the Dispatch center, Ambulance Services, Red Cross, Volunteers and Hospitals. To mark the 100$^{th}$ edition, the extra option of (daily) distance of 55 km (3mi.) was popular. Weather conditions were unfavorable, with high temperatures and no wind. The Radboudumc, a level one Trauma center was situated nearby the start and finish line, and was prepared for the worst. The major concern was accessibility in case of disaster for patients as well as employees, due to self-presenting patients. The Emergency department of the university hospital in Nijmegen was visited by a significantly larger number of patients than the previous editions.
**Methods**: All steps in the medical chain were evaluated both from a medical and an organizational point of view. All data on patients, either participating or visiting the event in relation to the total patient flow presented at the level one trauma center, were evaluated on efficiency and effectiveness of care.
**Results**: Based on the organizational and medical issues observed, recommendations are formulated relevant to protect Public Health and Safety during this yearly event.
**Conclusion**: All data of each step in the medical chain should be evaluated thoroughly, as input for improved future advice on Public Health and Safety issues.

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## Dutch Guidelines to Assess Risks of Mass Gatherings and Public-Health and Safety Measures

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**Study/Objective**: Dutch guidelines to assess risks of mass gatherings and public-health and safety measures.
**Background**: As mass gatherings in the Netherlands are growing in number, scale and complexity, guidelines on risk assessment and public-health measures should be evaluated and adapted accordingly. Lessons learned from incidents, such as the Monster Truck crash (2015) and the Marches of Nijmegen (2016), illustrate the necessity for improvements. The inspectorates (IGZ, IVenJ 2016) still concludes a lack of attention for public health and safety measures. This strengthens the demand from the emergency medical services and municipal health organizations involved, for renewed guidelines for public health experts, event organizers and decision makers. The current threat of possible terroristic attacks enhances the urgency. The National Office of Public Health and Safety (GGD GHOR Netherland) and the Academic Network of Public Health and Emergency Management (ANAPHEM) started a project to improve the quality of the advice of the Director of Public Health (DPG) that concerns public health care and safety issues including major incident medical planning and coordination.
**Methods**: Lessons learned and documents such as the WHO guideline, have been used to improve the current approach.

- The current guideline (GHOR NL 2011) has been evaluated by field-experts.
- Insights of the World Congress on Disaster and Emergency Medicine (WCDEM) 2015 formed the basis for:
  - o A new administrative framework.
  - o A new guideline for recognition and assessment of risks and public health measures needed.
  - o Improvement skills, related to the advisory roles.
  - o Uniform definitions, registration process, resilience, operations and building, an (international) knowledge platform.
- In collaboration with ANAPHEM, several workshops have been organized to develop a shared understanding and support for the improved approach.

**Results**: A new guideline for risk assessment of mass gatherings and required public health and safety measures.
**Conclusion**: The new guideline includes the current knowledge that support an improved and solid basis for the advisory role of the DPG.

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## Factors Influencing Patron Egress from Nightclubs During Emergency Events

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**Study/Objective**: In an emergency situation, movement within a mass gathering is governed by a variety of influences. We will review the mechanics concerning the motion of bodies under the action of forces, that come about when an event of an unexpected nature occurs. This presentation will provide the basis for the actions of the individuals, small groups and the mass as a whole within the group. Also considered are the group dynamics that can hinder or facilitate the evacuation of a venue. The impact may be caused by either biomedical, psychosocial or environmental factors.
**Background**: Evacuation studies reveal that patrons are often unaware of the environment, and therefore exit strategies are made quickly but may be confounded by incomplete knowledge of evacuation routes, or by chemical intoxication. Additionally, staff may not have been trained in emergency procedures and safety overall. Among the characteristics that impact egress in an emergency are the ages of those attending the event, substance use/abuse, the density of the crowd and the infrastructure of the venue itself.
**Methods**: The methods include a comprehensive review of current and past literature.
**Results**: The nightclub scene has consistently shown to more likely be fatal in a fire than similar situations in other venues. The causes of this difference will be revealed to provide a basis for future changes in prevention, regulations and enforcement.
**Conclusion**: At the conclusion of this presentation the audience will understand the psychosocial elements that may impede or promote movement within crowds. This is a continuation of previous research, and will specifically be investigated in populations who attend night clubs.

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## Altered Mental Status at Music Festivals: A Case Study Examining Clinical Concepts and Controversies

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**Study/Objective**: To describe patients with altered mental status at an electronic dance music event.
**Background**: Music festivals are a subset of mass gatherings that have predictable medical needs for attendees. Altered

mental status is one of the most common presentations to medical services at these events. It is challenging to care for these potentially critically ill patients, in and out of a hospital environment. To date, best management practices remain unclear for this common and high-risk subset of the festival population.

**Methods**: We present a case series of patients presenting to medical services with an altered mental status, attending a 15,000 attendee, multi-day, electronic dance music event. A retrospective chart review was performed on patient encounter forms from 2014-2016 to identify alterations in patient content or consciousness.

**Results**: Three event years were reviewed with 328 of 4,032 unique medical presentations deemed to have had altered content or consciousness. Of the altered content subset, 22 required physical or chemical restraint. Of the 255 altered consciousness presentations, 144 were transient syncope-like cases, 37 were seizure-like cases, and 41 had GCS <= 8 documented at some point during the visit. There were no endotracheal intubations or deaths. Seventy percent of altered patients stayed less than 30 minutes, and LOS was found to be inversely proportional to the lowest recorded GCS.

**Conclusion**: Managing the altered patient at a music festival is challenging. True aspiration risk in the GCS <= 8 subset remains unclear. High risk features for poor outcomes in altered patients include significant desaturations, active vomiting in an unresponsive patient, metabolic abnormalities, associated trauma, severe agitation, and failure to meet discharge criteria. Analysis of medical presentations for altered mental status at a music festival suggest a handful of discrete clinical presentations and best practices. A good understanding of these presentations aids in preparing, training, and equipping for similar events.

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## Camping, Cowboys, and Country Music: Patient and Resource Management at Canada's Largest Multi-Day Country Music Festival

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**Study/Objective**: This case study examines types of patients, methods of patient management, types of medical staff/responders used to manage and build medical capacity at a Canadian multi day, residential music festival. Objectives also include how a similar model could be used to manage lower acuity patients in an out-of-hospital context during disaster situations.

**Background**: Medical response and deployment of a field hospital at Canada's largest multi-day country music and camping festival. With over 60,000 attendees camping on site, in a rural area for a 5-day period. Medical needs at this large mass gathering event are varied and diverse. Over the 5-day period, a private event medical company had over 3,000 patient contacts, which significantly deferred from local EMS and hospital resources. Diversion and planning ensured local capacity did not become overwhelmed.

**Methods**: Data collection is from the event company's patient documentation forms, which are correlated electronically through a database.

**Results**: Data includes: number of patient contacts, types of injuries/illnesses, duration of patient contact, duration of patient contact per injury/illness type, acuity levels of patient transports, breakdown of injuries/illnesses diverted from local hospital and EMS, festival incident location (campground, music stages, other), number and type of personnel used at event and types/amounts of medical equipment/consumables used at the festival.

**Conclusion**: As a case study on an entire multi-day music festival in Canada of 60,000 attendees and 3,000 patient contacts, on-site patient management contributed greatly to reduce EMS transports and hospital visits.

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## Global Mass Gatherings: Implications and Opportunities for Global Health Security

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**Study/Objective**: To look at how planning and delivering mass gatherings can be used to enhance global health security through enhancing compliance with International Health Regulations (IHR) and cross government working.

**Background**: Mass gatherings pose a health care challenge because of the increased risk of transmission of communicable diseases, due to the influx of international visitors, and the fact that participants disperse soon after the gathering - potentially spreading disease within their communities and potentially internationally. Early identification and response helps reduce the risk of widespread exposure and minimize the impact on both visitors and the local community. The dispersion of participants also poses a challenge for traditional surveillance methods. Planning and preparing public health systems and services for managing a mass gathering is a complex procedure. Advanced risk assessment and system enhancement are critical to identifying potential public health risks, both natural and manmade, to preventing, minimizing, and responding to public health incidents. However, these events are opportunities to enhance public health systems, International Health Regulations (IHR) compliance, and provide a significant legacy to the host country.

**Methods**: Reviewing the experience gained from planning and delivering a range of mass gatherings to determine the legacy for public health capacity and capability building - the legacy. This included looking at different approaches across a range of countries, types of events, and reviewing the recent management and preparations for mass gatherings during Public Health Emergencies of International Concern.

**Results**: Overview of some of the key areas of public health legacy from mass gatherings and the long-term impact.

**Conclusion**: Mass gatherings provide an excellent opportunity for the host country to enhance systems and preparedness

against potential public health risks. The high profile, political, and media interest often associated with these events provides an excellent driver for this work.

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## Influence of the Program on Patient Presentations at Outdoor Music Festivals

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**Study/Objective**: This presentation will focus on the influence of the program on audience behavior and patient presentations through comparing two separate events: an outdoor contemporary music festival and a multi-cultural world music festival. Both are outdoor events held over multiple days and are staged within a week of each other in public parks in Adelaide, South Australia.
**Background**: The performer or performance is central to an event, yet the influence of the performance, or more generally the program, is an area yet to be explored in relation to the impact of health and safety at mass-gathering events. The program is defined as the planned activities, experiences, or performances scheduled to take place over the duration of the event, comprising the effects of the music, performers, and their actions.
**Methods**: Ethnography was the chosen approach, as it allowed for data collection in various forms including observation, photography, environmental data, and patient presentation rates. Content analysis was used to interpret the data. The data were organized into classification types and the empirical data were then further analyzed to identify the nature of the interactions and consequences of the program against patient presentations.
**Results**: While there were no standardized patterns identified, relating to changes in audience behavior or patient presentations based on temperature, humidity, or audience density, there was a clear relationship between the program and the amount and type of patient presentations at each event.
**Conclusion**: The program is the primary influencer having a direct influence on, and relationship with, audience behavior and the consequent number of patient presentations. By understanding the program's influence on audience behavior at outdoor music festivals, event designers and managers are able to modify programs in response to the real-time observable audience behaviors.

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## A Proposed Minimum Data Set for Mass Gathering Health - Updates and Moving Forward

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**Study/Objective**: Collaborative, ongoing development of an integrated, systematic, evidence-supported data set for Mass Gathering Health (MGH).
**Background**: There is currently no standardized approach to data collection at mass gatherings, making comparisons across/between events challenging. From 2013 an international team of researchers collaborated to develop a Minimum Data Set (MDS) for Mass Gathering Health (MGH). They undertook a Delphi process for those with a strong background/interest in MGH, preceding and during the 2015 World Congress on Disaster and Emergency Medicine (WCDEM). At that time, consensus was reached about the need for a standardized dataset to support researchers and clinicians, to build the knowledge base underpinning MGH science. This presentation will provide an update about the next steps in developing the MDS.
**Methods**: Drawing on literature, previous Event/Patient Registry development, expert input and the results of the team's work, the authors developed a MDS framework with the aim to create an online MGH data repository. The framework was populated with an initial list of data elements. Experts and those interested in MGH were invited to participate in an online survey, to rank these data elements in terms of importance.
**Results**: A framework for a MGH-MDS together with a list of potential data items will be presented. Embedded in the data set will be the essential event phases (pre, during and post). Initial field names, field description, format and source(s) for data will also be shown. In addition, further steps towards developing an online data repository will be outlined. WCDEM 2017 participants will also be provided with a further opportunity to refine the framework and data elements during a congress workshop.
**Conclusion**: The development of a MGH-MDS can grow the science underpinning this emerging field. Input from the international community is essential to ensure that the proposed MDS is systematic, comprehensive, and rigorous while remaining fluid and relevant for various users and contexts.

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## A New Concept of Disaster Preparedness for Mass Gathering in Ethiopia: Experience from In-depth Conference of Addis Ababa, Ethiopia

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**Study/Objective**: To describe a new concept of preparedness in mass gatherings for resource-limited settings.

**Background**: A Mass Gathering (MG) World Health Organization (WHO) definition is an occasion, either organized or spontaneous, where the "number of people attending is sufficient to strain the planning and response resources of the community, city, or nation hosting the event" (WHO, 2008). It can be planned or spontaneous, which can bring their own unique challenges to public health and other risks. Addis Ababa in Ethiopia has held the 13th INDEPTH ISC/AGM International Conference, which has brought together 350 participants from HDSS in the world from 22 countries, 38 HDSS leaders, INDEPTH board members, INDEPTH scientific committee, editors of the Lancet, editors of Global Public health, chair-person of the African Public Health Association, and 14 university presidents or vice-presidents which do not have HDSS. Six university presidents and/or vice presidents where the six HDSS in Ethiopia located, Representatives of Embassies, Save the Children, WHO, and key researchers from Stanford University have also been among the participants; hundreds of local scientific communities were all in attendance.
**Methods**: A total of three Emergency Medicine and Critical Care residents based in Addis Ababa University and one consultant where involved. A duty room fully equipped of emergency drugs and other equipments were ready. Prehospital transportation plans were undertaken and hospital ambulances directory created.
**Results**: The conference was finalized with no major incidents. The mass gathering preparedness team was available throughout the conference dates.
**Conclusion**: Mass-gathering preparedness is a new concept for Ethiopian emergency care and should continue from this blueprint. Such preparedness should be continued for future mass-gathering events.
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| Team response | Average likert score |
|---|---|
| This was a new start of mass gathering preparedness. | 4.8 |
| Preparations were adequate. | 4.5 |
| Future recommendations. | 4.8 |

**Table 1.** Mass Gathering Preparedness Team Response: Likert Scale.

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## Event Medical Life Support (EMLS): Event Medicine for Multidisciplinary Teams

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**Study/Objective**: To create a consolidated, standardized, comprehensive, core-concepts curriculum to support multi-disciplinary health care professionals at Major Planned Events (MPEs).

**Background**: MPEs occur in all communities. Increasingly, attention is directed toward making MPEs safer and minimizing impact on host community health infrastructure. Event Medicine context:

Multi-disciplinary health-care providers new to MPEs have a wide variety and depth of clinical and operational expertise but may have very little knowledge of the event context of practice (eg, event risk profiles, prehospital resources, unique procedures and policies, stakeholder issues, customer service, etc).
Events are heterogeneous and have unique characteristics (eg, size of event, duration, location, terrain, climate, high-risk activities, etc).

Planning for event health services involves a complex skill-set for those in leadership roles. No formal training program is available for those offering health-care services in the setting of MPEs.
**Methods**: Referencing the substantial growth in the literature that underpins mass gathering health, and seeking expert stakeholder input, Core, Elective and Planning level courses are proposed.
**Results**: The "Event Medical Life Support" (EMLS) courses will provide concise, accessible, applicable learning opportunities for clinicians and planners. Requisite knowledge domains will include risk assessment, human resource planning, inventory management, infrastructure, logistics, transportation, communication, insurance and liability, records management, medical direction and financial considerations. The EMLS curriculum will be offered online and via flexible face-to-face adaptations for pre-conference or pre-event workshops. Participants will have access to a series of core and specialty (elective) e-modules. A full-day, face to face workshop will focus on applying knowledge and experience to interactive case and tabletop scenarios. Accreditation through appropriate continuing professional development programs will be pursued.
**Conclusion**: The creation of an EMLS curriculum will build capacity and standardize our approaches based on the best available evidence in the mass gathering community.
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## Human Stampedes: What do we know today?

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**Study/Objective**: This study summarizes available literature on stampedes, their prevention, preparedness, and response.
**Background**: Human stampedes are among the major causes of mortality in mass gatherings, but have received scarce scientific attention. The literature has increased over the last years but, to our knowledge, there is no updated review of results from new publications.
**Methods**: A scoping review was conducted with an initial search using PubMed, Google Scholar, Web of Science, the WHO Library Database, and Relief Web. Peer-reviewed and grey literature referring to human stampedes was selected

according to predefined eligibility criteria. Included items were read and results were compiled and summarized.
**Results**: In a total of 64 included items, 34 were published between 2013-2016. The most studied events were Germany's Love Parade stampede in 2010 (n = 6) and the UK Hillsborough stadium stampede in 1989 (n = 4). The literature retrieved was from a wide range of different disciplines. Conflicting definitions of human stampedes were found. The common belief that they result from an irrational and panicking crowd has progressively been replaced by studies suggesting that successive systemic failures are the main underlying causes. Stampedes are not reported in global disaster databases, making unusual sources like news reports often the only information available. Prevention measures are to date mainly related to crowd management and venue design, but their effectiveness has not been studied. Best practices for preparedness and response are not consensual.
**Conclusion**: Stampedes are a complex phenomenon that remains incompletely understood, hampering formulation of evidence-based strategies for their management. Many of the findings come from high-profile events and are difficult to extrapolate to other settings. More research from different disciplines is warranted to address these gaps in the knowledge in order to prevent and mitigate future events. A start would be to agree on a commonly accepted definition of stampedes.
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## Common Injuries of Marathon Runners in Nigeria, Epidemiology and Preparedness

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**Study/Objective**: To identify the epidemiological spread of athletes, the injuries and medical conditions they present with, to assess the level of preparedness and organization of the medical care at the event, and how the medical preparedness coped with the surge at the medical tent.
**Background**: Marathons and ultra-marathons have become increasingly popular in Nigeria and other developing countries. Participants are more dedicated, investing time and effort to prepare and compete. As the field increases, so do the types of injuries and medical conditions that present to the medical tent on event day. As a result, a lot more goes into preparation and medical capacity for these events.
**Methods**: A mass gathering matrix will be applied to the event demographics to assess the projected need for the event. Actual preparedness on the ground will be assessed and studied. All athletes entering the medical tent, picked up along the route, or taken directly to hospital will be triaged and a questionnaire applied to them.
**Results**: Musculoskeletal injuries, dermatological, respiratory problems, collapse and hypotension have been shown to be common problems in marathon runners. The result should clarify, if this is so in marathons in Nigeria. Organization of medical coverage of these events needs to be well coordinated and staffed to be effective. The matrix will help organizers have a baseline or template for proper preparation.
**Conclusion**: The epidemiology of marathon injuries may follow conventional events, but a proper understanding of this will aid proper preparation for the event and organization of medical coverage. Though nothing is definite, a mass gathering matrix can give an effective guide or template for Medical organizations for marathon events.
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## Can the Patient Influx at Mass Gatherings be Predicted? A First Attempt to Crunch the Numbers

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**Study/Objective**: To determine whether there are certain patterns that emerge at mass gatherings, in order to create a model for future predictions concerning the pace of patient influx at mass gatherings. Patient influx is an important parameter to determine the capacity of the first aid post.
**Background**: The Belgian Red Cross staffs first aid posts at more than 50 events with an attendance of more than 10,000 people every year. Since 2006, every patient encounter gets logged in a database called MedTRIS. The MedTRIS database contains more than 150,000 unique patient encounters.
**Methods**: The time of entry gets logged in the MedTRIS database for every patient. A chart is made showing the evolution of the number of patients that enter the first aid post every 30 minutes. To compare data over different editions (years), these data are 'normalized' by dividing these numbers by the total amount of patients that entered the first aid post that day. By doing this, abstraction is made of the total amount of attendees or other parameters.
**Results**: For all events where the number of patients is more than 300 per day in a particular first aid post, it is clear that the patient influx always follows a similar, event specific trend. Calculating the correlation between the different normalized graphs over the different years for a same first aid post on the same event, renders high rates in the range between 0.6 and 0.8.
**Conclusion**: For a given mass gathering, there seems to be a constant patient influx trend over the years. Further exploration is needed, and may lead to the start of creating a predictive model to determine the capacity of the first aid post.
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## What Skills does a Physician Need at Mass Gatherings? An Analysis of more than 16,000 Patient Encounters that Required Medical Attention

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**Study/Objective**: To determine the most common type of injuries that need medical attention, to better prepare physicians at mass gatherings.

**Background**: The Belgian Red Cross provides first aid at 50 events with an attendance of more than 10,000 people every year. Since 2006, every patient encounter gets logged in a database called MedTRIS. The MedTRIS database contains more than 150,000 patient encounters.
**Methods**: The triage category of a patient is recorded upon entering the first aid post. Four categories are used: without treatment, first aid, medical condition and medical emergency. A "medical emergency" requires immediate attention of a physician, a "medical condition/case" can wait. Other patient's characteristics, such as type of injury and type of event, are also recorded. All recorded information was coded for analysis in SPSS©.
**Results**: 162.611 patient encounters are recorded in the MedTRIS database. 16.989 (10,5%) patients needed medical attention. 1080 (0,8% of total patient encounters) of these patients presented as a medical emergency. In the "medical condition/case" triage category the most prevalent type of injury was of the miscellaneous kind. This category represents -among others- urological and gynecological problems, eye abrasions and patients with chronic conditions. It is worth noting that some of the patients in the miscellaneous category probably belong in one of the other, more specific categories. Other types of injuries such as skin lesions, traumas and intoxications were roughly equally represented. However, in the "medical emergency" category, intoxications were more than three times as common as other type of injuries.
**Conclusion**: True medical emergencies remain infrequent. An on-site physician needs to be capable to treat a multitude of different conditions. However, it is important to note that a medical emergency often concerns an intoxicated patient. Therefore, extra training in this specific type of injury is advisable.
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## The Most Prevalent Injuries at Different Types of Mass Gathering Events: An Analysis of More Than 150,000 Patient Encounters

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**Study/Objective**: To determine the most prevalent injuries at different types of mass gatherings, to optimize the resources available on site.
**Background**: The Belgian Red Cross provides first aid at 50 events with an attendance of more than 10,000 people every year. Since 2006, every patient encounter gets logged in a database called MedTRIS. The MedTRIS database contains more than 150,000 patient encounters.
**Methods**: Upon entering the first aid post at a mass gathering, every patient receives a unique identifier. This identifier can be used to log patient data in a database called MedTRIS. Among the data recorded are the type of event (outdoor music festival, indoor music festival, outdoor Electronic Dance Music (EDM) festival, indoor EDM festival, city festival and sport event) and the type of injury (skin lesions, intoxications, traumas, neurologic events, gastrointestinal complaints, cardiac and respiratory problems and a miscellaneous group). All the recorded information was coded for analysis in SPSS©.
**Results**: There were 162,611 patient encounters recorded in the MedTRIS database. Overall, the most prevalent type of injury are skin lesions (44,6%). The second most prevalent injury is trauma (15,5%). In third place comes neurological symptoms (12,7%), mainly because headaches are represented in this group. Intoxications only represent 3,5% of patient encounters. However, at (indoor) EDM events intoxications are more common and can represent up to 20% of patient encounters.
**Conclusion**: Skin lesions are by far the most prevalent injuries at mass gatherings. As such, the caregivers in the first aid post must be adequately trained in treating this type of injury. However, special considerations must be given to the type of event, especially at indoor EDM festivals where intoxication is more common.
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## Mobile Response by Medical First Responders at a Music Festival

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**Study/Objective**: Music festivals are a subset of mass gatherings prone to high-risk illnesses and injuries requiring dedicated on site medical services. Implementation of a mobile medical response to rapidly reach, stabilize, and transport patients is a major component of safety planning.
**Background**: The delivery of tailored mobile medical care at these types of events has the potential to improve outcomes by enhancing the speed and appropriateness of care to patients.
**Methods**: Mobile first response records were reviewed for a multi-day electronic dance music event. Information reviewed included demographics, call and transport times, chief complaint, acuity, location, and all interventions delivered on scene. Audio recordings of communications and mobile GPS data were also reviewed.
**Results**: 174 mobile responses were catalogued over the 120 hour period. 62 licensed prehospital volunteers served 15,000 attendees over a five-day period. 10% of calls were high acuity, 40% intermediate and 50% low. Peak call volume occurred in an eight hour period from 20h to 04h, with the three busiest hours from 21h to midnight (68% and 41% of all calls respectively). Altered mental status was the most common chief complaint. 79% of patients required transport to medical services and 7% were transported to harm reduction services. The average high acuity patient was reached in 4 minutes, with 8 minutes spent on scene performing targeted interventions. Basic airway manoeuvres and oxygen were the most common interventions required.
**Conclusion**: Response to medical emergencies at a multi-day music festival is aided by a well-prepared and organized mobile first responder program. The goal is to deliver rapid targeted care to the scene as part of the chain of survival. Suitable preparation for first response calls is likely to maximize benefits

and minimize negative outcomes for patients, liability for festival leadership, and impact on local health care resources.

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## First Aid Training and Comfort in Non-Medical Event Staff

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**Study/Objective**: To evaluate whether non-medical personnel feel adequately trained and prepared to act as first responders to potential medical emergencies at a multi-day music festival.
**Background**: Music festivals are a high-risk environment for medical presentations. Although dedicated medical services are often present at such events, non-medical volunteers and staff generally outnumber those with formal medical roles and are more likely to make the first point of contact with attendees in distress. Preparation for foreseeable emergencies makes sound safety sense, and more recently litigation has also underscored its importance in minimizing liability. Using the chain of survival model, the provision of timely first responder care by appropriately trained personnel has the best chance of affecting outcomes by minimizing morbidity, mortality, liability and impact on local health care infrastructure.
**Methods**: This study used an online survey provided to 2,200 non-medical staff and volunteers, at the 2016 edition of a week-long electronic dance music event for 15,000 attendees.
**Results**: A total of 369 personnel participated, of that 87% had direct contact with festival attendees and 85% had some form of formal first aid training. However, only 51% of this training was up to date, 19% had no CPR training at all, and 49% of those who had did not consider it up to date. A majority of respondents felt first aid training would benefit attendees, but that it should not be a requirement for their position. Respondents were receptive to basic and advanced training free of cost. Most felt comfortable acting as a first responder in scenarios dealing with unconscious, agitated, non-breathing or pulseless patients.
**Conclusion**: Preparation of non-medical personnel for medical emergencies at music festivals can potentially increase safety and minimize negative outcomes. Such personnel appear comfortable with first response roles but may need help in maintaining training currency. Results may be applicable to other event types.

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## Effectiveness of Gamification of Mass-Gathering Health Concepts

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**Study/Objective**: To measure the effect of participation in a facilitated, board game-based, tabletop exercise focused on health services planning for Major Planned Events (MPEs).
**Background**: Current best practice for medical care at mass-gathering events involves the integration of event safety plans, on-site health services, and community acute health services into a systematic, coordinated, proactive approach. Unfortunately, as most teams operate in silos, lessons learned from previous event planning and implementation are not often systematically shared. In this study, we assessed the effects of an interactive tabletop gaming exercise on delivery and retention of mass-gathering conceptual knowledge. The use of gamification to deliver medical education is not a novel concept, but rather a well-documented method of engaging learners. Gamification provides opportunities for participants to apply knowledge in a "live-fire" context, to reflect on outcomes critically, and to use feedback and acquired skills to inform future behavior.
**Methods**: A convenience sample of 28 event race directors and 44 medical students were surveyed before and after engaging in a 90-120 minute, interactive, facilitated mass-gathering table-top exercise. Survey content assessed respondent comfort on a variety of pertinent considerations faced by event planners and medical direction teams. Domains of survey assessment included: attitudes and beliefs surrounding event preparation, event-specific medical knowledge, and event logistics.
**Results**: Comparison of pre- and post-exercise responses revealed that the mean and median comfort in all of the domains assessed improved within both populations. Participants rated this exercise as informative, and identified ways in which new knowledge would be applied at future MPEs.
**Conclusion**: In a convenience sample of race directors and medical students, the use of a facilitated mass-gathering health tabletop exercise is an effective delivery modality for the transmission and integration of knowledge related to the planning and delivery of health services for MPEs.

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## Point of Care Ultrasound at a Remote Multi-Day Mass Gathering: A Prospective Case Series

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**Study/Objective**: We describe a novel application of Point of Care Ultrasound (POCUS) in a remote mass gathering at the 4-day Pemberton Music Festival 2016 attended by over 40,000 participants per day. The objective of this study is to prospectively evaluate the impact of POCUS on diagnosis, management, and disposition of patients.
**Background**: POCUS has become an important tool for hospital-based clinicians. This is the first study characterizing its use at a remote mass gathering where physicians face numerous challenges including limited resources, complex disposition decisions, and dynamic environments.

**Methods**: A handheld GE V-Scan™ with Dual Probe ultrasound was available for use by physicians in the main medical tent. All treating physicians consented to participate and self-reported their training and proficiency using POCUS. After each use of POCUS, physicians completed a survey recording the indication, scans performed, and impact on diagnosis, management, and disposition of patients.
**Results**: In total, POCUS was used on 28 patients out of the 686 patients seen in the main medical tent. The three most common indications for ultrasound were abdominal pain, gynecological complaints, and dyspnea. POCUS narrowed the differential diagnosis in 64% (18/28) and altered the working diagnosis in 21% (6/28) of patients. It confirmed the management plan in 57% (16/28) and altered it in 39% (11/28) of patients. Use of POCUS reduced the burden on the local healthcare infrastructure in 46% (13/28) of patients and prevented ambulance transport to a higher level of care in 32% (9/28) of patients.
**Conclusion**: Physicians reported that POCUS aided in the diagnosis, management, and disposition of select patients at a remote multi-day mass gathering. POCUS helped to reduce the local healthcare burden caused by hosting a large-scale mass gathering by preventing or altering the urgency of transport to hospital for higher level care or diagnostic imaging.
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## Organization of Health Services and Risk Preparedness during the 2016 Rio de Janeiro Olympic Games

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**Study/Objective**: To present information on an organization of health services and risk preparedness during the 2016 Rio de Janeiro Olympic Games.
**Background**: Mass gatherings of international importance occur frequently in Brazil, especially in Rio de Janeiro. In 2014 and 2016 the country received two global sports events - the 2014 Fifa World Cup, and the 2016 Olympic Games in several Brazilian state capitals and in Rio. These events joined a great contingent of people and demanded the health sector to prepare for reception of incoming participants and visitors.
**Methods**: The 'Prepara Brasil' Project investigated health services preparedness in Rio de Janeiro. A literature-based data collection instrument to assess available health infrastructure, health services and safety risks concerning the 2016 Olympic Games was made available online for spectators in all Olympic events. Filling out the survey form in real time and directly from the sports venues, was voluntary and participation was maximized through snowballing. After the Games data was accrued and analyzed.
**Results**: A total of 61 spectators, 70% of which were university graduates completed the form. Participants attended 26 events in 42 different sports, during 17 of the 19 days of competition. Roughly 45% of respondents clearly identified locations of health services in Olympic venues. Inside the arenas, 17% of respondents could point out health services and health services personnel at a maximum distancing 50 meters or less (.3 mi) from their seats. Half of participants identified emergency exits and escape routes, and 80% considered safety measures in sports venues as strict. According to participants, crowding was observed in 3% of sports events.
**Conclusion**: Shortcomings regarding overall information and identification of health services were perceived by spectators to the 2016 Rio de Janeiro Olympic Games. However, spectators also regarded that risks related to infrastructure and safety were adequately approached by the venue organization.
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## Health Service Impact from Mass Gatherings: A Systematic Literature Review

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**Study/Objective**: This literature review aims to develop an understanding of the impact of mass gatherings on local health services.
**Background**: Mass gatherings are events where a large number of people congregate for a common purpose, such as sporting events, agricultural shows, and music festivals. When definitive care is required for participants of mass gatherings, municipal ambulance services provide assessment, treatment, and transport of participants to acute care settings, such as hospitals. The impact on both ambulance services and emergency department services from mass gathering events was the focus of this literature review.
**Methods**: This research used a systematic literature review methodology. Databases were searched to find articles related to aim of the review. Articles focused on mass gathering health, provision of in-event health services, ambulance service transportation and hospital utilization.
**Results**: Twenty-four studies were identified for inclusion in this review. These studies were all case-study based and retrospective in design. The majority of studies (n = 23) provided details of in-event first responder services. There was variation in reporting of the number and type of in-event health professional services at mass gatherings. All articles reported that patients were transported to hospital by the ambulance

service. Only nine articles reported on patients presenting to hospital.
**Conclusion**: There is minimal research focusing on the impact of mass gatherings on in-event and external health services, such as ambulance services and hospitals. A recommendation for future mass gathering research and evaluation is to link patient-level data from in-event mass gatherings to external health services. This type of study design would provide information regarding the impact on health services from a mass gathering, to more accurately inform future health planning for mass-gatherings across the health care continuum.
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## Interagency Collaboration in Mass Gatherings: The Case of Public Health and Safety Organizations in the 2012 London Olympic Games

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**Study/Objective**: Mass gatherings pose unique challenges for inter-organizational collaboration. The diverse public health and safety organizations involved in a mass gathering, such as the Olympic Games, are a good empirical example of the challenges involved in this process. This study used the 2012 London Olympic Games as the empirical setting, to examine the inter-agency collaboration among the multiple public health and safety organizations involved in a mass gathering.
**Background**: Mass gatherings often bring together organizations that collaborate irregularly, or have never engaged in a joint working activity. They often involve interaction and collaboration among multiple and diverse agencies, aiming at delivering a service to a large clientele.
**Methods**: A single, holistic, and exploratory case study design was used, and data were collected before, during, and after the Games; utilizing 39 semi-structured interviews with key informants, direct observations of field exercises, and documentary analysis. Data collection commenced in May 2011, which was 14 months before the actual Games, and was completed in October 2012, two months after the completion of the Games. Template analysis was used to thematically analyze the interviews' transcripts, the fieldnotes from observations, and the documents.
**Results**: Findings discuss inter-agency collaboration in mass gatherings along three main activity domains: leadership, communication, and learning. In each domain, a number of challenges and facilitators emerged as influential to collaboration. The analysis suggested that the lack of engagement of the leading organization, the ambiguous decision-making processes across organizations, and the complex structure of the involved agencies negatively influenced organizations' collaboration. The study found that shared micro-level leadership, the use of linkages, and experiential learning enabled the development of collaboration.
**Conclusion**: The findings in this study provided a deeper understanding of how inter-agency collaboration was formed, before and during a mass gathering, through the interplay of the three domains of leadership, communication, and learning.
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## Heat Stroke Patients of a Mass Gathering Festival in Japan- Kishiwada Danjiri Festival

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**Study/Objective**: A mass gathering.
**Background**: Kishiwada Danjiri Festival is famous in Japan for its brave characteristics of rushing around in the city area. It has been held in every mid-September for about 300 years. Over 500,000 visitors and players gather in a small area downtown (about four square kilometer). We have introduced an admission criteria for "heat stroke:" CK ≥10,000 U/L or s-Creatinine ≥ 2.0 mg/dl. We evaluated the heat stroke patients who were transferred to our emergency center during these festival days.
**Methods**: A total of 88 patients were transferred by ambulance to our emergency center during September 17-18, 2016. Among them, 53 cases were players of the festival. Excluding 28 cases of injuries, there were 25 cases of heatstroke and dehydration brought in by ambulance.
**Results**: Eleven cases (seven by ambulance and four by walk-in) of heat stroke were admitted during the two festival days. On the other hand, 18 patients were able to be back at home after receiving liters of fluid infusion. There were no dead cases. All cases were male and comparatively young (age 24.5 [SD = 7.2] years). Continuous renal replacement therapy was introduced to one case because of acute kidney injury, but the other 10 cases were successfully treated by crystalloids infusion and discharged within two or three days.
**Conclusion**: Among the traditional festival players in Japan, mild heat stroke or collapsed patients due to dehydration and running are frequently seen. Though most patients easily recover, severe cases with AKI have to be treated intensively. To prepare for a mass-gathering disaster, "festival in hot circumstances," it is useful to introduce simple criteria for heat stroke and dehydration.
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## Medical Support for the Special Olympics Canada 2014 Summer Games: Unique Requirements for a Mass Participation Event with a Specific Population

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**Study/Objective**: To describe the patient presentation rates and range of injury and illness observed, as well as the medical support required for a large scale multi day event serving a distinct population.
**Background**: The Special Olympics Canada Summer Games held in Vancouver BC in July 8-12, 2014 with over 2,000

athletes, coaches and staff participating. These games are distinct since all athletes possess intellectual or developmental disabilities and a high prevalence of comorbidities.
**Methods**: A prospective observational study of all patient encounters during the Games. Standardized patient encounter forms were completed by medical staff at all event venues and are reported.
**Results**: Approximately 2,000 athletes and coaches attended and participated in 11 events over 6 days. The games were held on the University of BC campus allowing for accurate collection of all medical treatment encounters during the games. Temperatures ranged from 15–28 C (50-80 F). In total, 314 patient encounters were documented, of which 88% involved athletes. Of these, 75% were due to event related injury and 25% due to illness. There were 14 patients (5.2%) transferred to hospital for assessment and/or management, 2 via Ambulance and others via non-emergency vehicles. Track and Field competitions had the highest number of incidents of all the sporting events (29.7%), and limb extremity pain was the most common patient (chief) complaint (26.4%).
**Conclusion**: A large scale mass participation event with athletes possessing developmental disabilities and a high prevalence of comorbidities, can be safely cared for with an appropriately designed medical support system, and not overburden local resources. This paper reviews historical injury and illness data that form the basis for planning in this population.
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## Mass Gathering Medicine Tabletop Game - A Systems Approach to a Major Planned Event, Health Services Planning

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**Study/Objective**: The creation of an interactive learning activity to explore knowledge domains required for planning a robust event, health services response.
**Background**: We created three interactive board game-based, tabletop exercises to enhance systems learning for Major Planned Events (MPEs).
**Methods**:
Literature synthesis of potential effects of gamification on learning.
Development of knowledge domains (7 steps) core to the creation of an effective health services response at MPEs, and face validity was addressed.
'Rules of engagement' were created (eg, cooperative versus competitive play, optimum size of each tabletop team 6-8 players, duration of play 90-120 minutes).
Conceptualization of chronology including pre, during, and post-event phases.
'Character' cards were implemented to represent the diverse stakeholders involved in MPE health planning.
Illustration of 'field of play' through creation of three, individual game boards (ie, obstacle adventure course, endurance running event, multi-day music festival) and depicting a detailed map of the specific event and the course (as applicable).
Generation of a series of scenarios used to create a set of event-specific 'Bonus', 'Challenge', and 'Patient' cards, each presenting an issue to be addressed by the players through collaborative 'free-play.'
**Results**: To date, the tabletop gaming exercises have been deployed at three workshops and have received extremely positive reviews. Formal evaluation has recently been pursued through a summer student research project. Thus far, a convenience sample of 28 event race directors and 44 medical students have been surveyed before and after the tabletop exercise. Mean and median comfort in all of the knowledge domains assessed improved. Qualitative feedback has been organized in themes.
**Conclusion**: The use of a facilitated mass gathering in a health tabletop exercise is an effective and engaging delivery modality for the transmission and integration of knowledge, related to the planning and delivery of health services for MPEs.
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## Development of a Mass Gathering Triage Tool: An Australian Perspective

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**Study/Objective**: This project aimed to outline the existing literature relating to triage in the mass gathering environment, and develop a mass gathering triage tool applicable to the Australian context.
**Background**: Many health service organizations deploy first responders and health care professionals to mass gatherings, to assess and manage injuries and illnesses. Patient Presentation Rates (PPR) to on-site health services at a mass gathering range from 0.48-170 per 10,000 participants. Transport to Hospital Rates (TTHR) range from 0.035-15 per 10,000 participants. Triage practices at mass gathering events vary.
**Methods**: A search of various online databases was undertaken to identify existing triage tools. This included a search of grey literature to identify the Australian contextual triage tools.
**Results**: A triage tool was developed based on the principles of triage, previous mass-gathering triage tools, existing Australian triage systems, and Australian contextual considerations. The triage tool is designed to be appropriate for use by first responders.
**Conclusion**: Further research should be conducted to test the validity and reliability of this Australian mass-gathering triage tool. In the absence of any other triage tool for the Australian mass-gathering environment, this triage tool should be considered for implementation for future clinical practice at Australian mass gatherings, where first responders are providing clinical assessment and management of patients presenting for on-site care.
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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## A Model Curriculum for Improving the Clinical Capabilities of Public Health Nurses for Acute Care Applications during Disasters and Public Health Emergencies

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**Study/Objective**: Improve the ability and willingness of health department nurses to provide patient care during disasters.
**Background**: Public Health Nurses are a critical component of public health preparedness plans, often intended to provide direct patient care that is outside the scope of their day-to-day public health nursing roles. When analyzing drills and exercises in New York, it was noted that when asked to perform clinical care of acutely ill victims of disasters, there was a marked decrease in both the comfort and willingness of nurses to participate in a disaster response, or even a disaster exercise, that might expose an individual's weakness in clinical skills proficiency.
**Methods**: A needs assessment was conducted and an 8-hour clinical skills training for public health nurses was designed and taught by experienced critical care and emergency department nurse educators and paramedics. This course was delivered in two 4-hour modules and focused on specific areas of low skill confidence as reported by health department and medical reserve corps nurses. The training consisted of a didactic introduction, followed by clinical skills stations where task trainers and simulation was used to practice psychomotor skills.
**Results**: Following the didactic and especially the psychomotor education on triage, physical assessment and clinical skills we found to be low to moderate increases in self-efficacy for didactic training, and moderate to high increases following skills training. The most reported comment by participants in subjective evaluation was a desire for more frequency of training in these skills.
**Conclusion**: Although public health nurses do not perform acute care or certain clinical skills during their day-to-day nursing roles, implementing pre-event training programs designed to re-familiarize experienced nurses with certain clinical skills or procedures results in an increase in self-efficacy and an improvement in the willingness of these nurses to act in their intended clinical roles during a disaster or public health emergency.

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## The Need to Increase Disaster Nursing Education in the Undergraduate Curriculum

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**Study/Objective**: To measure the effect of what disaster nursing education has on the attitudes and skills of undergraduate nursing students.
**Background**: Nursing is the nation's largest health care profession with more than 3.1 million registered nurses nationwide. Nurses possess a wealth of medical knowledge and communication skills, yet many don't know how to care for a person outside their clinical environment. If a disaster occurs and a nurse wants to help, they may not know where to go or be allowed to participate due to lack of disaster response training. Some medical schools require their students to be trained in disaster medicine and preparedness. Nursing schools designate little, if any, time to the role nurses' play in disaster preparedness, response, and recovery. This lack of education translates into a reluctance for nurses to volunteer when a disaster occurs, which may lead to poorer health outcomes for victims.
**Methods**: The study is a sequential explanatory design. The subjects are undergraduate students enrolled in the Community Health course at the Texas A&M College of Nursing. Using the World Health Organization (WHO) International Council of Nursing Disaster Nursing Competencies as a reference, four to five competencies not currently addressed in the curriculum will be identified. The students' skills and critical thinking ability will be quantitatively assessed. Didactic, scenario, and simulation-based education concerning disaster preparedness, response, and recovery will be provided. Quantitative reassessment of the students skills and critical thinking ability will then take place. Focus groups will be conducted to qualitatively capture the students' perception of self-efficacy before, during, and after the experience.
**Results**: Expected outcomes will reflect the findings found from the literature in that increasing this disaster nursing education will benefit the student and the community in which the future nurse will work.
**Conclusion**: Continued research may influence more nursing schools and colleges to increase disaster nursing education in their curricula.

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## Emergency Nursing in Mass Casualty Incidents: Effects on Staff Turnover at a Large Suburban Hospital Emergency Department

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**Study/Objective**: Emergency nurses have one of the highest turnover rates in healthcare. A systematic review indicated that

emergency nurses experience secondary traumatic stress and compassion fatigue at significant rates. Many studies, including a meta-analysis, explore the correlation between burnout and secondary traumatic stress in workers exposed indirectly to trauma. This study seeks to explore the correlation between treating victims of intentional acts of violence in a mass casualty incident, and Emergency Department staffing changes.

**Background**: On July 20th 2012, a gunman opened fire in a movie theater in Aurora, Colorado, killing 12 and injuring 70 others. There were 23 victims treated in the Emergency Department of a local hospital, and additional patients were treated at two other local hospitals.

**Methods**: The frequency of terminations, department/unit transfers, and sick-days will be compared to the year prior to the mass casualty incident. Statistical variances will be analyzed and inferences reported.

**Results**: Preliminary informal data shows a larger than expected turnover in nursing at three local hospitals receiving patients from the Aurora Theater Shootings. Results may reveal implications for future staffing, and staff interventions post-mass casualty incidents in Emergency Departments.

**Conclusion**: s will discuss the effects of mass casualty incidents on emergency nurses and implications for future practice. Effects of mass casualty incidents are wide and varied, but relatively little research has been conducted into the effects on those treating patients in a hospital setting. Future research should explore the many repercussions for healthcare workers, and effectiveness of various interventions aimed at understanding and assisting with the psychological impact of mass casualty incidents.

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## Lessons Learned: How Much do we Really Take Forward?

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**Study/Objective**: This research focuses on the significance of learning from existing research, and the degree to which this occurs in the practice setting. The New Zealand emergency setting is used to present a case study identifying perceived utility of research findings.

**Background**: New Zealand has experienced a number of major earthquakes, with a series of significant quakes in 2010 following an initial 7.1 magnitude event, and more recently a second series of major earthquakes commencing with a 7.5 magnitude quake on November 14, 2016. There have been numerous studies in the intervening time period; the intention of this study is to identify the preparedness and awareness of staff of the recommendations from previous research, either from the NZ studies or from international research.

**Methods**: A survey of staff in the Wellington and Christchurch hospital EDs is being undertaken, together with a series of individual interviews seeking to understand where individual nurses gain knowledge in relation to disaster preparedness. These findings will be presented, together with the results from an integrated review of the literature around this topic.

**Results**: From the survey and interviews will be formulated and incorporated into the presentation prior to the conference.

**Conclusion**: Current literature suggests that there is a need to focus on disaster education for nurses, in both under and postgraduate levels. What has not been clearly shown is the degree to which nurses working within areas of known risk, whether from earthquakes or other natural disaster, are able to integrate the 'lessons learned' from previous experiences into their current workplace settings. This study hopes to clarify the degree to which nurses are aware of existing research regarding natural disaster threats in a country where this is a recognized hazard.

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## A Study to Assess the Determinants of Self Extubation, the Predictive Factors for Reintubation, and the Role of Documentation and Compliance to Protocol in Reducing Reintubation. A Tertiary Care Neuro Trauma ICU

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**Study/Objective**: A study to assess the determinants of self extubation and the predictive factors for reintubation, and the role of documentation and compliance to protocol in reducing reintubation in a tertiary care Neuro Trauma ICU.

**Background**: Endotracheal extubation and reintubation are frequent events in the Intensive Care Unit's throughout the world, that can cause significant morbidity and mortality. Factors contributing to these events are not well recognized in Neuro patients, and needs to be explored further. The objectives of the study were to assess the determinants of self extubation in Traumatic Brain Injury (TBI) and Spinal Cord Injury (SPI) patients, to determine the predictive factors for reintubation, and to assess if ensuring documentation and compliance to protocols will be useful in reducing the rate of reintubation.

**Methods**: An intervention based observational study was done in a Level III, NeuroTrauma ICU, Jai Prakash Narayan Apex Trauma Center (JPNATC), AIIMS. The intervention was the introduction of an extubation/reintubation register and check list, maintained by Neuro-nurses. All intubated patients of TBI and SCI admitted during a six month period prior to intervention (May 1, 2014 - October 30, 2014) and six months following the intervention (November 1, 2014 – April 31, 2015) was included. The data collected from the Extubation Reintubation Register and a checklist were retrospectively analyzed.

**Results**: After the implementation of the register, reintubation rates reduced to 11% from 24% in the pre-implementation phase, and this was statistically significant ($p < 0.001$). Self extubation rates were found to be more in males, and in patients with head injury. The age group with maximal frequency of self extubation was 20-40 years. Self extubation was found to be higher when the assigned nurse cared for more than1 patient in ICU. Reintubation was found to be

significantly associated with age, weaning status and GCS of the patient ($p < 0.05$). Patients with lower GCS had higher chances of reintubation. Reintubation was not associated with sex, operation status and time of extubation.

**Conclusion**: The rate of unwanted extubations and subsequent reintubations in Neuro ICU, can be decreased with protocol based monitoring, and through well maintained registers by neuro nurses. The knowledge of determinants of self extubation and the predictive factors of reintubation can be used as an effective tool by Nurses, for the prevention of self extubation and accompanying complications.

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## Assessment of the Knowledge and Skills in Caring for Life Threatening Arrhythmias among Nurses working in Critical Care settings at Muhimbili National Hospital, Dar-es Salaam, Tanzania

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**Study/Objective**: The main objective of this study was to assess knowledge and skills in caring for life-threatening arrhythmias among nurses working in critical care settings at Muhimbili National Hospital (MNH).

**Specific Objectives**: 1. To determine the level of knowledge among nurses regarding caring for life-threatening arrhythmias in critical care settings at MNH. 2. To recognize skills of nurses regarding caring for life-threatening arrhythmias in critical care settings at MNH. 3. To identify barriers to acquiring higher knowledge and skills in caring for life-threatening arrhythmias among nurses in critical care settings at MNH.

**Background**: Life-threatening arrhythmias, if not intervened immediately, can cost a patient's life. There is no clear understanding on the nurse's knowledge and skill level in the areas of life-threatening arrhythmias, caring, and arrhythmia identification at Muhimbili National Hospital (MNH). Meanwhile, the intensity of barriers met by nurses on achieving higher levels of knowledge and skills in developing countries, including Tanzania, are significantly not analyzed. The aim of this study was to assess knowledge and skills in caring for life-threatening arrhythmias among nurses working in critical care settings at MNH.

**Methods**: A descriptive, cross-sectional study design was used while a convenience sampling method was employed. Data were analyzed by using SPSS Version 20.0. Results were presented in frequencies and percentages and presented using figures, tables, and text.

**Results**: The majority of the participants (60%) were identified as having high knowledge, while observational skills in caring for life-threatening arrhythmias among study participants was generally poor (15.6%). The most barriers identified in acquiring higher knowledge and skill was stress caused by overwhelming workload (68.8%).

**Conclusion**: The study revealed that nurses have a high knowledge level; however, the observational skills were low in caring for patients with life-threatening arrhythmias. A high level of knowledge might be due to training performed; yet skills were low due to minimal usage of available equipment or guidelines.

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## A Survey on Disaster Preparedness Knowledge and Attitudes of BAVU Nursing Department Students

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**Study/Objective**: The survey was aimed to determine knowledge and attitudes of BAVU (Bezmialem Vakif University/Istanbul-Turkey) nursing students as part of disaster preparedness.

**Background**: A disaster is something that affects our surroundings in such a negative way. It happens so unexpectedly and opens doors to many different crisis. The habitats for all human, plant, and animal has different kind of risks. Society had immigrated because of wars, diseases and seasonal differences. Health Professionals are expected to be ready for these catastrophic conditions.

**Methods**: Under the main three titles (demographic information, the level of information, attitude and behavior level), a total of 54 questions were addressed to 200 nursing students.

**Results**: All participants fulfilled the questionnaire. The results were adequate for assessment. The results emphasized that all factors (age, gender, class, marital status, city and country) affect the awareness of disasters. Health professionals are considered to have adequate knowledge and ability for disaster responses. Education procedures must be proactive and updated due to new situations.

**Conclusion**: As a result, countries of the whole World can stay in touch with disaster as a natural process. Last of all, disease, death, loss of function and reduction of labor due to disaster, countries must be ready to face such problems. The price to put against disaster, to minimize the loss and destruction of natural phenomena in the society against the general attitude, seems to depend on the level of knowledge and consciousness. Disaster planning, discipline and support should be implemented. It should not only be theoretical, but also ready for implementation. Nurses may encounter many traumatic situations and should be admitted to team work before and after the disaster. Participation in the exercises made within the scope of Hospital Disaster Plans can provide this.

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## Success Strategy for Nursing Professionals in Health and Disasters

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**Study/Objective**: This was descriptive, cross-sectional research conducted in the Latin American Center for Disaster Medicine (CLAMED) in the period from March 2010 to October 2013. The objective that was developed: Designing a strategy for the improvement of nurses in helping to raise their professional skills in disaster.
**Background**: Some of the most serious consequences of disasters are often: the impact it has on populations with increased morbidity and mortality, deterioration of environmental hygiene, the risk of epidemics, damage to health infrastructure, inaccessibility to services, and involvement in the development of health programs. Thus, the higher the vulnerability, there will be an increased risk of the occurrence of disasters and the exponential association of the frequency and intensity of threats. As such, governments and health systems in many countries should focus their efforts on preparing health professionals, as well as for the prevention and mitigation of disasters.
**Methods**: The research, supported in different areas of knowledge, made possible the construction of its theoretical framework, relying on documentary analysis, system approach, modeling, and historical and logical thought. From the research process, the level of knowledge of nurses on disaster risk reduction was diagnosed, and in that sense, a strategy that asks for consideration was prepared.
**Results**: It was found that 66.6% had not received readying on the issue Health and Disasters. It was evident that general disasters and organization of prehospital and hospital care in disaster situations were the issues that most impacted the level of knowledge, behaving 24.6% and 18.1%, respectively. They were diagnosed as having an insufficient level of knowledge for disaster risk reduction.
**Conclusion**: A strategy for nurses in Health and Disasters showing a harmonious configuration in the system, given the close link between the different organizational forms of postgraduate training in Cuba, was designed.

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## Evaluation on the Myth Evaluations of Nursing Students on Elders in Cases of Disasters and Emergencies

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**Study/Objective**: This study aims to examine some factors that affect the myth evaluation of students studying at the Nursing Department of a university, on elders in cases of disasters and emergencies.
**Background**: Even though there are many evidence-based studies on disasters, there are many mis-informations (myths) about its medical and social outcomes. Myth evaluations constitute one of the first steps of helping the elderly population.
**Methods**: The cross-sectional epidemiological study has been conducted on the students of Çanakkale Onsekiz Mart University, Department of Nursery. The data of the research has been collected by means of a survey that had been composed by the authors. Within the survey, some questions of a survey study used in a research about elders by the UN Office for Disaster Risk Reduction (UNISDR), and the myth questions from the book International Disaster Nursing (Editors: Robert Povers & Elaine Daily, 2010). In the research, the elder vulnerability index, elder valence index and elder myth index have been generated. In the further analysis of the data, the logistic regression method where the elder myth index in dichotomous structure, was included as a dependent variable, has been used.
**Results**: In all, 80,4% of the 377 students participating in the study are women, 56,0% of them are junior class students, 93,6% of them are living with both their parents, and 38,5% of them have experienced disasters. In the group where the average (SS) age is 19,89 (1,7), the average points of the participants are 2,97 (1,07) for the elder myth index, 30,94 (6,19) for the vulnerability index, and 6,41 (1,73) for the valence index. According to the logistic regression result, the junior classes are ranking 2,11 (GA: 1,06 – 4,23, $p < 0,05$) times above the elder disaster myth index average.
**Conclusion**: Myth evaluations of the students about the elder individuals in case of emergencies and disasters should be improved.

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## Development and Effect of a Multi-Modality Disaster Training Program for Hospital Nurses

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**Study/Objective**: To develop a multi-modality disaster training program for hospital nurses, and to investigate the effect of the program.
**Background**: Despite the importance and perception of nurses in disaster crisis, a standardized program to develop competencies is still lacking in Korea. There are few programs focusing on the prehospital aspect of disaster, but none exist that focus on nurses left in the hospital to care for victims transported from the scene. Since disaster response requires multiple aspects of competencies, such as triaging, incident command, life-saving procedures, teamwork, communication, and leadership, it is important to develop a multi-modality training program that is best suitable for the content to be trained.
**Methods**: The educational intervention consisted of a 3-day workshop (see Table below) for a selected 24 emergency nurses. Pre- and post-surveys were conducted to evaluate the differences in perception of disaster nursing. Disaster Preparedness

Questionnaire for Nurses (DPQ-N) was used to assess the competencies of the nurses. All pre-to-post differences within subjects were analyzed with paired tests. The statistical level of significance was set at 0.05.
**Results**: Pre- and post-survey differences for interest in disaster nursing, expectation of disaster training, and importance in emergency nursing were 6.7 to 8.1, 7.1 to 8.9, and 8.0 to 8.8, respectively. Results for DPQ-N pre- and post-intervention for basic concepts, planning, patient care, psychological issues, special hazards, epidemiology, communication, personal preparedness, and ethics were 2.1 to 3.6, 2.2 to 3.6, 3.4 to 3.9, 2.9 to 3.6, 2.0 to 3.7, 2.3 to 3.4, 2.1 to 3.6, 3.1 to 3.6, and 2.9 to 3.7, respectively. All results were statistically significant.
**Conclusion**: A multi-modality disaster training program for hospital nurses positively affected perception and performances of the nurses.

| Content | Modality |
|---|---|
| Triage | Table-top, Virtual |
| Incident Command | Table-top |
| Life Saving Procedures | Part-task mannequin |
| Surge Capacity | Table-top |
| Special Hazards | Scenario-based mannequin |

**Table 1.** Content and Modality Matching of the Training Program.

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### Emergency Nurse Knowledge of Emergency Preparedness: An Education Gap Analysis

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**Study/Objective**: This project assessed gaps in emergency nurses' knowledge of Emergency Preparedness and preferred methods of acquiring the necessary education.
**Background**: The New Jersey Emergency Nurses Association (NJENA) Emergency Preparedness Committee was established to assist emergency nurses with preparing for disasters. The 2014 survey was to discern specific educational needs of emergency nurses. The 2016 study was to determine how and where emergency nurses obtain emergency preparedness education professionally and personally.
**Methods**: Survey tools were developed by committee members active in emergency nursing or education. The 2014 tool identified the following areas for study: Emergency Department specific plans; Decontamination Procedures; Active Shooter Procedures; Disaster Triage; CBRNE Events; Incident Command Principles; and Documentation During a Disaster. The 2016 tool assessed where emergency nurses receive emergency preparedness education and their preferences to receive this education (online, in class, or combination). The surveys were distributed to convenience samples of emergency nurses attending the NJENA Emergency Care Conference in 2014 and 2016.
**Results**: The 2014 gap analysis indicated respondents received ED-specific annual education on Active Shooter, Haz-Mat, and Mass-Casualty incidents; however, 44% indicated they didn't feel adequately prepared by their institution. Less than one-half of the respondents were able to correctly identify the elements of the START triage system and only 50% selected the correct triage category in presented scenarios. The 2016 survey indicated the majority of emergency nurses access health care/hospital emergency preparedness education on their facility's website, while using United States federal government websites personal EP information. Forty-seven percent of respondents preferred self-paced online courses with 38% preferring an instructor led class.
**Conclusion**: This project highlights areas identified as gaps in Emergency Nurses disaster preparedness and preferred methods of receiving the necessary education. The NJENA Emergency Preparedness committee is formulating plans to develop training sessions on the identified gaps in emergency preparedness.

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### Primary Health Care Team Response to Floods in Brazilian Rural Areas

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**Study/Objective**: To describe the practice undertaken by Primary Health Care (PHC) teams to rural populations, flood-related, health-related problems after a disaster in Southern Brazil.
**Background**: Brazil is greatly affected by climate change and natural disasters such as storms and floods. This type of disaster enhances the demand for health services in PHC. Developing clear facility preparedness plans, with the identification of specific job descriptions, is recommended. During the winter of 2014, a flood in Southern Brazil affected rural populations with significant impact on their health and living status.
**Methods**: A qualitative, descriptive, exploratory study was developed. Flanagan's critical incident technique was adopted. Twenty primary health care nurses from 10 municipalities were interviewed. Data analysis allowed the construction of a hierarchy of categories about health problems identified and actions taken by PHC teams during and after the flood.
**Results**: The effects on health status described were: deaths, injuries, psychosocial and behavioral disorders, hypertension, leptospirosis, vector-borne diseases, diarrhea, and skin infections as described in the literature. Other problems were related to lack of medication, shelter situation, and vulnerable populations, such as older adults and pregnant women. PHC practice involved actions to supply medication, assessment of the flooded area, with visits before and after the disaster to warn people and provide help, meetings for response planning, immunization, education and prevention of waterborne diseases, psychological

support, referral to the hospital, dressings, health surveillance, consultations, and participation in social support activities.
**Conclusion**: Although no facility preparedness plan was available, most of health problems identified were solved by PHC teams, since just one patient was referred to the hospital. There was an involvement of PHC teams to assist affected populations, although specific job descriptions and the difficult access to the rural population consisted of a barrier to qualified and sufficient care.

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## Determining the Effect of Internet Usage Habits on Academic Success in University Students

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**Study/Objective**: The frequency of Internet use in today's society is proven by various studies conducted to increase innovation brought about by the Internet and plays an important role in increasing the ease of use. Requested information searches, homework, and uses for social interaction, the Internet brings with it many advantages, as well as some problems, which are mostly used by young people. With increased usage, especially among young people, it has been revealed that the Internet adversely affects the decrease in academic achievement and social life problems of young people.
**Background**: Research is planned as a descriptive study. Bezmialem Vakıf University Clinical Research Foundation with written permission from the Ethics Committee Students.
**Methods**: The research was conducted by the Bezmialem Foundation University. The main campus where the students of vocational school (including preparatory class), students of medicine, dentistry, pharmacy, nursing, physiotherapy, audiology, health management, nutrition dietetics, and health services were educated; and took place in February-March 2016 at Eyüp and Gayrettepe settlement. In this study, it is assumed that the rate of Internet use in university students is 50% and the tolerance value is taken as 0.05 and the sample size at 95% confidence level is calculated as 333-363 of the students who were included in the study.
**Results**: According to the results of the research, most of the students (92.6%) use Internet in their daily life. As a result, no statistically significant difference was found between students' academic achievement status and Internet usage habits.
**Conclusion**: In the direction of findings and discussions: There was no significant difference between academic achievement and Internet use; (92.6%) in daily life, attachment purposes, reduction in the number of Internet connections and studying time (63.1%), indicate that we are unconscious about the use of high quality Internet. It is recommended that elective courses be put into university curricula for effective computer and Internet use.

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## A Retrospective Survey to Determine the Nature and Risk Factors for Injury among the Victims admitted in the Emergency Department of a Selected Government Hospital of India, Using Pretested Trauma Registry Performa

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**Study/Objective**: To identify the nature of injury in terms of causes and severity of injury.
**Background**: In 2010, an estimated 1.3 million RTI deaths occurred worldwide, accounting for about 2.5% of all deaths. Mortality in serious injuries is 6 times worse in a developing country such as India compared to a developed country. Strengthening and undertaking research on the public health burden and impact and understanding the risk factors of trauma is the need of the hour.
**Methods**: Using quantitative approach, a retrospective cross sectional survey was conducted at an Emergency and trauma center in Ram Manohar Lohia (RML) Hospital, New Delhi. The information of all the injured patients seeking health care during the past year from October 2015 to September 2016 at the Emergency and trauma center, was collected from the trauma registry performa at the time of registration.
**Results**: A total of 1,952 cases of injury sought health care during the study period. The average number of cases reported per day was five. The maximum cases (40%) were reported between 12-6 pm. Among the injured, 82% were males and the majority of victims were between 20-30 year age group, followed by 30-40 years.
**Conclusion**: It can be concluded that there is a high incidence of RTI and measures should be taken to prevent the RTI focusing on the risk factors.

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## Australian Civilian Hospital Nurses' Lived Experience of the Out-of-Hospital Environment following a Disaster: A Lived-Space Perspective

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**Study/Objective**: This research explored what it may be like being an Australian civilian in-hospital nurse, in the out-of-hospital disaster environment following a disaster, as part of a disaster medical assistance team. This presentation will explore the specific aspect of lived-space from a larger phenomenological research project.
**Background**: In the minutes following a disaster, reports from the media focus on the measurable impact. For example, the magnitude of an earthquake or the number of hectares burnt by a wildfire. Lived-space is concerned with felt space, going beyond these measurable physical, visible and touchable spaces. Lived-space is the way in which we find ourselves in our life-world through the spaces of our day-to-day existence.

**Methods**: For this phenomenological study, narrative was obtained from eight Australian civilian hospital nurses following a disaster. Semi-structured interviews were conducted at two points in time. Descriptive moments of a possible lived experience were identified from participant narrative. These moments formed a lived experience description as an anecdote of an experience. A preparatory epoché-reduction and reduction proper was used to guide a reflection on the lived-space of being a nurse, following a disaster from the lived experience description.
**Results**: Lived-space was described as shrinking then being open too-wide, where nurses were drawn into the disaster lived-space, then returning home to a wide-open but crowded lived-space. Disaster health lived-space was described as occupying, sharing and giving back.
**Conclusion**: This research provides insight into Australian civilian in-hospital nurse in the out-of-hospital disaster environment, following a disaster as part of a disaster medical assistance team. In particular this work adds a lived-space perspective to the existing literature. These insights may inform future education, research, clinical practice and policy.

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## How Disaster Response in the Emergency Department Disrupts our Lived World

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**Study/Objective**: According to van Manen (2015), there are five existential aspects common in the lived world of all humans. These include: "relationality" which is how we relate to others; "corporeality" how we experience our body; "temporality" our experience of time; "spatiality" how we experience space; and "materiality" our experience of things. This presentation will discuss how these existential aspects are experienced in the context of working as a nurse in the Emergency Department (ED) during a disaster.
**Background**: Our current understanding of emergency nurses and disaster response comes largely from narrative accounts which describe what it is like to work in the ED during a disaster response, or descriptive studies that explore emergency nurses' perceptions of as yet-hypothetical events. However, we have a limited understanding of how disaster response is experienced within the context of our existing lived world.
**Methods**: A Hermeneutic Phenomenological approach informed by van Manen underpins the research process. Thirteen nurses participated in this research. Thematic analysis and a guided existential reflection resulted in two different perspectives of the experience of working as a nurse in the ED during a disaster response. This presentation will report on the existential aspect of the research.
**Results**: Reflection on the five life existentials places a strong emphasis on the relational, spatial, and material aspects of disaster response, while corporeal and temporal aspects were minimised. Consideration of the existential aspects highlights how disaster response disrupts the everyday experience of working in the ED. The findings from this research can raise awareness for emergency nurses, and can inform preparedness for future disaster response.
**Conclusion**: This presentation focuses on one aspect of the findings of a PhD study and provides an in-depth insight into the meaning behind the experience of nursing in the ED during a disaster response.

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## Moments of Disaster Response in the Emergency Department

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**Study/Objective**: "In the end, we will not remember the years we spent in nursing. We will only remember the moments" (Donahue 1996). We experience our lives as a series of memorable moments, some good and some bad. Undoubtedly, the experience of participating in disaster response is likely to stand out as a memorable moment in a nurses' career. This presentation will describe five distinct moments of nursing in the Emergency Department (ED) during a disaster response.
**Background**: Our existing understanding of emergency nurses' participation in disaster response comes largely from narrative accounts of single events. This study is unique because it explores the experience of nursing in the ED during a disaster across different geographical regions and disaster types.
**Methods**: A Hermeneutic Phenomenological approach informed by van Manen underpins the research process. Thirteen nurses from different countries around the world participated in interviews about their experience of working in the ED during a disaster. Interviews were conducted face to face or via Skype. Thematic analysis and a guided existential reflection resulted in two different perspectives of the experience of working as a nurse in the ED during a disaster response. This presentation will report on one of these aspects.
**Results**: "The moments of notification, waiting, patient arrival, caring for patients, and reflection" described by nurses who participated in this research provide insight into the experience of nursing in the ED during a disaster response. Consideration of these individual moments will lead to recommendations for future preparedness of emergency nurses.
**Conclusion**: This presentation focuses on one aspect of the findings of a PhD study, and provides an in-depth insight into the experience of nursing in the ED during a disaster response, which can help generate awareness and inform future disaster preparedness of emergency nurses.

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## A Proposed System for the Development of an Online Learning Environment for the Initial Action of Clinical Nurses at Times of Disaster

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**Study/Objective**: The purpose of this poster presentation is to propose a system to support the education of nurses working in medical facilities, and to raise the capacity of disaster-resistance among regional medical institutions, using ICT (Information and Communication Technology).
**Background**: Sharing reviews of daily nursing among individual nurses has played an important role in the development of nursing science. How to accumulate the knowledge and skills of experienced professionals is a big challenge for those working in the fields of disaster medicine/nursing. Therefore, we conduct a project in the followings steps.
**Methods**: Development of nursing competencies required for emergency response, focused on disaster "initial movement".

Construction of an online learning environment using open source (Mahara), for accumulation and sharing of knowledge.

Providing online learning materials with an adequate self-evaluation method, such as portfolio or rubrics based on the competencies acquired in initial disaster nursing.

Sharing information regarding practical implementation of appropriate initial disaster nursing activities via the internet.
**Results**: We expect to obtain the following outcomes through the project:

Development of nursing competencies results in the standardization of disaster nursing education.

Online learning materials based on experiences of accomplished nurses, will become available for simulation learning about disaster "initial movement" in many hospitals.

Utilization of mobile devices like smart-phones, tablet terminals, and PCs can give equal learning opportunities, regardless of time and place, contributing to the improvement of knowledge and skills of nurses.

Using the Rubric analysis, it is expected that reachability will be visually indicated, and the learning plan will be easy to formulate.
**Conclusion**: Development of a systematic educational program is required for nurses working in hospitals, to raise knowledge and skill levels on disaster medical care.

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## A Qualitative Case Study to Explore how Nursing Educators Address Disaster Knowledge and Competencies in Nursing Schools in British Columbia

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**Study/Objective**: The purpose of this study is to explore and describe disaster-nursing curricula, particularly the development and inclusion of disaster-nursing knowledge/competencies within Schools Of Nursing (SON) in British Columbia.
**Background**: The province of British Columbia in Canada is experiencing an increase in both natural and human-made disasters, as evidenced by recent forest fires, mudslides, and oil spills. Nurses are known to be one of the largest groups of health care workers and are often challenged by a trifecta of roles, that of being victims themselves, first responders, as well as having acute/community employment roles. Meeting the challenges of these multiple roles can be positively influenced through disaster education; however, it is difficult to know what or how to provide this education without first knowing what nurses are currently being taught in Schools of Nursing. This qualitative case study will explore, through the lens of nursing educators, how disaster knowledge is addressed in nursing schools in British Columbia.
**Methods**: A qualitative case study research approach informed by Stakeholders was used to address the purpose of my research. Ten interviews were conducted with nurse educators from a variety of geographical locations across the province of British Columbia. Following ethics certifications, interview data were collected during face to face sessions, or by electronic means for this research using a semi-structured interview method. Data were managed using NVIVO for coding and thematic analysis.
**Results**: Preliminary results are indicating that nurse educators are not teaching disaster knowledge within their programs due to inadequate time in the curriculum, not enough interest, and the educators do not feel they have enough knowledge themselves to adequately teach this knowledge. Final results for this study will be available at the WADEM conference.
**Conclusion**: Final conclusions will be presented at the Toronto conference.

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## Knowledge of Cardiology Nurses, Regarding Care of Patients with Permanent Pacemakers and Implantable Cardioverter Defibrillators in Karachi Pakistan

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**Study/Objective**: The primary research question of the study was: What is the level of knowledge among cardiology nurses regarding the care of patients with permanent pacemakers and ICDs at two tertiary care hospitals in Karachi, Pakistan?
**Background**: It is recognized increasingly that patients with implanted PPMs or ICDs are a real challenge, especially when they require long-term care. Adequate knowledge of nurses about the care of PPMs and ICDs improves accuracy in measurement of parameters, assists in setting realistic goals and making clinically wise decisions, and improves their overall performance.
**Methods**: A descriptive, cross-sectional study design was selected, and a total 139 study participants were enrolled in this study from the Aga Khan University Hospital and the Tabba Heart Institute, Karachi, Pakistan. The data were collected through a structured questionnaire to assess nurses' knowledge regarding care of patients with PPMs and ICDs.
**Results**: The findings of the current study revealed that 26.6% of the study participants had a high knowledge regarding the

care of patients with PPMs and ICDs, 64% of the study participants had a moderate level of knowledge, whereas 9.4% of the study participants' knowledge was poor. The current study also found a significant difference between novice and expert nurses' knowledge; moreover, a significant difference was also found between the mean levels of knowledge score of nurses having different levels of qualification. Thus, the study also identified a significant difference between the specific study questions; however, a true comparison could not be assured, as dip card nurses were 19 in number.

**Conclusion**: The majority of the nurses were found to have a moderate level of knowledge regarding the care of patients with PPMs and ICDs. Furthermore, the finding of the study has created a platform for nursing leaders to start a comprehensive training program in order to improve the care quality of the patients.

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## Stress Among the Nurses: Working in an Emergency Unit of a Tertiary Care Teaching Hospital of Eastern Nepal

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**Study/Objective**: To assess the stress among the nurses working in Emergency unit of BPKIHS, and to find out the association between stress and selected demographic variables.

**Background**: Nurses who work in highly stressful situations are constantly under pressure, and are vulnerable to a variety of symptoms in reaction to the stress.

**Methods**: A cross-sectional descriptive design was used for the study. The Total Enumerative Sampling technique was used. The sample consisted of all the staffs (25) working in the critical care units. A semi-structured questionnaire was used for data collection. Verbal permission was obtained from each respondent maintaining confidentiality and anonymity. The data were collected from the nurses July 7-14, 2016. The total score of the stress components in the tool, to determine the stress, was 82. The cut off value was taken as 50% (41), to categorize the presence or absence of stress among the respondents.

**Results**: Among the total 25 respondents enrolled in the study, the majority (68%) were below 20 years of age. The majority of them (84%) were married. Maximum respondents (72%) worked up to 48 hours/week, less than one-half (28%) worked more than 48 hours/week. The study showed that 12% of the respondents had stress working in critical care units, whereas 88 % had no stress. Among the socio-demographic variables, the marital status of the nurses had association with stress ($P = .011$). Considering the job related variables, the over-time duty performed by the nurses per week had association with stress statistically ($P = .04$).

**Conclusion**: This study shows that very few nurses (12%) were experiencing stress while working in the Emergency Unit of a tertiary care teaching hospital in eastern Nepal. Apart from their marital status, no other socio-demographic variables were statistically associated to the stress experience.

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## Knowledge, Attitude and Practice Study of Oxygen Therapy among Emergency Department Nurses in Addis Ababa, Ethiopia

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**Study/Objective**: We aimed to identify factors impacting the appropriate use of oxygen by nurses within this setting, with a goal to improve delivery of this therapy.

**Background**: Oxygen ($O_2$) should be considered a drug as it is prescribed to prevent or treat hypoxemia. The concentration of oxygen prescribed aims to bring oxygen saturation ($SpO_2$) to normal or near normal levels. Oxygen is a common part of medical care for critically sick patients. As emergency medicine care grows in Ethiopia, nursing practice has expanded to include, providing therapies such as oxygen. Our study aimed to assess understanding, belief and usage of $O_2$ among nurses working in the emergency departments (EDs) of four public hospitals in Addis Ababa, Ethiopia.

**Methods**: A structured self-administered questionnaire was used to assess knowledge, attitudes, and practices.The collected data was analyzed using SPSS version 20.0.Frequency distributions, cross-tabulations and a graph were used to describe the results of the study.

**Results**: A total of 152 nurses completed the survey. The mean score of knowledge, attitude and practice (KAP) with regards to $O_2$ use was 3.03 (SD = 1.6665), 13.76 (SD = 2.102) and 3.0921 (SD = 1.76183) respectively; 38.2% of participants were males and their median age was 26-30 years. The level of KAP of oxygen therapy was poor and good in 97 (63.8%) and 55 (36.2%) of nurses with regards to knowledge; 71 (46.7%) and 81 (53.3%) with regards to attitude; and 86 (56.6%) and 66 (43.4%) with regards to practice.

**Conclusion**: This study showed that there are knowledge, attitude, and practice gaps among nurses who were working in an ED of a public hospital in Addis Ababa. The possible associated factors for this gap were also identified, which included lack of proper oxygen therapy training, guidelines, workload, and inadequate supplies of oxygen delivery devices. This indicates that there is a need for increased training in this area; regular supportive supervision, health facility guideline development, and adequate oxygen devices are also needed.

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## Swedish Prehospital Emergency Nurses Prepardness to Care for Pediatric Trauma Patients

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**Study/Objective**: To explore prehospital emergency nurses' preparedness care for pediatric trauma patients.

**Background**: Registered Nurses with a Master's degree in Prehospital Emergency Care (PENs) are required to provide advanced prehospital care to patients of all ages. Caring for pediatric trauma patients is described as especially demanding. There is a need to explore further the PENs' preparedness caring for these patients.
**Methods**: A present pilot-study analyzed the content of a valid questionnaire with 36 questions about PENs' self-reported preparedness in caring for pediatric trauma patients. The questionnaire included background characteristics and questions about experiences, education, equipment, practice, knowledge, and the probability of a mass-casualty event. A five-point Lickert-scale was used. Thirty-five PENs from northern Sweden participated.
**Results**: PENs reported a greater than a high degree of having received trauma care education, but education relating to pediatric care was scarce, and none of the education included mass-casualty events. However, one-half of them reported more than a high degree of expectancy that a mass-casualty event involving pediatric trauma patients could take place within their ambulance catchment area. Only 40% have a high degree or more of knowledge concerning pediatric patients' vital signs and normal values. PENs (97%) reported low experience in pediatric trauma patient triage in the prehospital setting. One-half of the PENs experienced symptoms of stress when responding to a pediatric trauma alarm, and some also reported reactions such as depression, sadness, unpleasant memories, and fatigue after the alarm.
**Conclusion**: It seems that too few of the PENs have high or more preparedness for caring for pediatric trauma patients in a prehospital setting. Improving the PENs' preparedness for caring for pediatric trauma patients may lead to better opportunities for quality in patient care and for PENs' health. These pilot results indicate a need for further studies.

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## A Program to Reduce Nurse Attrition Rate in a Tertiary Care Emergency Medicine Department in Addis Ababa, Ethiopia

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**Study/Objective**: The objective of this study is to assess factors that lead to high nursing attrition rates in the emergency department.
**Background**: Emergency medicine is a medical field that is recently introduced to African settings. Among so many particularities of the field, consistent and effective teamwork is the most prominent. Despite the need for consistency, there is often a high turnover for non-MD staff in the emergency department, which leads to a loss of expertise, experience, and affects care delivery.
**Methods**: A pilot study on needs assessment for improving emergency care was conducted on professionals working in the emergency center of Black Lion Hospital. From these, one of the recommendations was recognition of role models. Subsequent interventions will include recognition letters and awards for outstanding performers. The baseline data will be compared with the data after intervention. A standard questionnaire and SPSS version 20 will be used.
**Results**: The pilot study data were collected from a total of 21 nurses working in the emergency room. The mean working experience in the ED was 2.1 (SD = 2.39) years. Problems with setup, system, and communication were identified as discouraging factors to work in the emergency room of Black Lion. Actions to improve the clinical service included improving the setup, developing systems, working on the staff retention, eg recognizing those with outstanding performances and improving inter-professional communication.
**Conclusion**: The nursing attrition rate is high in the emergency room of Black Lion Hospital. There is a need to improve the system, setup, management, and communication problems. Subsequent interventions are expected to bring a change in the nurse attrition rate and better clinical service.

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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## Assessment of Disaster Preparedness Among Select Children's Summer Camps in the United States

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**Study/Objective**: We assessed disaster preparedness among selected camps nationally for a range of disasters.
**Background**: Man-made and natural disasters are increasingly common. Summer camps are at-risk for multiple pediatric casualties during a disaster. Degree of disaster preparedness among summer camps is unknown.
**Methods**: We partnered with a national, web-based, health records system (CampDoc.com) to send camp leadership (315 camps) a 14-question online survey of disaster preparedness. One response from each camp was selected in the following order of importance: 1) Owner, 2) Director, 3) Physician, 4) Nurse, 5) Medical Technician, 6) Office Staff, and 7) Other. Results were analyzed using descriptive statistics.
**Results**: A total of 181 camp responses were received, of which 169 were complete. Camp types were Overnight (59.7%); Day (20.7%); Medical/Special Needs (14.2%); and Other (5.5%). Survey respondents were Directors (52.1%), Nurses (14.2%), Office Staff (10.1%), Physicians (5.3%), Owners (5.3%), and Other (11.2%). Almost 18% of camps were located >20 miles from a major medical center, and 36% greater than five miles from police/fire departments. Many camps were missing emergency supplies: car/booster seats for evacuation (68%), shelter (35%), vehicles for evacuation (26%), quarantine isolation area (21.3%), or emergency supplies of extra water (20%) or food (17%). Plans were unavailable for the following: Power outage (23%); Lockdown (15%); Illness outbreak (15%); Tornado (11%); Evacuation for fire, flood, or Chemical spill (9%); and other severe weather (8%). Many camps did not have online emergency plans (53%); plans for special-needs children (38%); methods to rapidly communicate information to parents (25%); or methods to identify children for evacuation/reunification (40%). Respondents reported staff did routinely participate in disaster drills: Weather (37%); Evacuation (49%); or Lockdown (59%). The majority (75%) had not collaborated with medical organizations for planning.
**Conclusion**: A substantial proportion of camps were missing critical components of disaster planning. Future interventions must focus on increasing partnerships and developing disaster guidelines for summer camps.

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## Challenging Assumptions: What do we Need to Address in our Disaster Risk Reduction Efforts?

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**Study/Objective**: To propose a novel, collective, and comprehensive measure of disaster survival knowledge and skills in the critical first 72 hours; explore its relationship with a series of independent predictors, including country-specific characteristics; and explore its relationship with independent predictors, perceived entities responsible for DRE, and selected interactions.
**Background**: Specific knowledge and skills are required, especially in the first 72 hours post-disaster, to bridge the time gap until essential services are restored and emergency services can focus on individuals' needs. This study explores disaster knowledge and preparedness in the first 72 hours, as a function of the individual's engagement in discussions about disasters, and several other factors (both at personal and community/country level), as well as the entities/organizations perceived by the individual as being responsible for disaster risk reduction education.
**Methods**: A prospective, cross-sectional survey of 3,829 final year high-school students was conducted in nine countries with different levels of disaster risk and economic development. Regression analyses examined the relationship between a 72-hour disaster preparedness composite outcome (ability to make water safe for drinking, knowledge of water potability, home evacuation skill, improvising a safe room) and a series of independent predictors.
**Results**: Respondents from countries with lower economic development were significantly better prepared for the first 72 hours post-disaster than those from developed countries (OR = 767.45; CI = 13.75-48,822.94; $P = .001$). While several independent predictors showed a significant main effect, combined disaster risk education efforts as a partnership between school and local government had the best predictive value (OR = 3.52; CI = 1.48-8.41; $P = .005$).
**Conclusion**: Disaster preparedness in final year high school students is significantly better in developing countries. Further improvement requires a convergent effort in aligning the most effective educational policies and actions to best address individual and community needs.

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## Disaster Risk Education of Final Year High School Students, Requires a Partnership with Families and Charity Organizations: An International Cross-sectional Survey

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**Study/Objective**: This multinational study of the terminal year of high school students aims to explore the relationship between engaging in discussions about disasters, as primary outcome, and the entities best situated to deliver Disaster Risk Education (DRE), in addition to a series of independent predictors identified in previous research.
**Background**: The aim of Disaster Reduction Education (DRE) is to achieve behavioral change. Over the past two decades, educational activities have been developed based on unverified assumptions, while the literature has not identified any significant change toward disaster preparedness at the individual level. Previous research suggests that change is dependent on multiple independent predictors. This study describes the relationship of the perceived entity responsible for disaster education, disaster education per se, sex, and country-specific characteristics with students discussing disasters with friends and family, as a measure of proactive behavioral change in disaster preparedness. School lessons and a national educational program are essential, but it's less clear which educational and delivery methods are best suited for DRE, which entities are best placed to engage with teenagers, and whether the assumptions that DRE can be learned like any other subject are true.
**Methods**: A total of 3,829 final year high-school students participated in an international, multi-center prospective, cross-sectional study using a validated questionnaire. Nine countries with different levels of disaster exposure, risk, and economic development were surveyed. Regression analyses examined the relationship between the likelihood of discussing disasters with friends and family and a series of independent variables.
**Results**: While several independent predictors showed a significant main effect, DRE through school lessons in interaction with Family & Charity organizations had the highest predictive value.
**Conclusion**: A behavioral change towards disaster preparedness in teenagers requires a synergistic partnership between different entities. DRE providers should engage with the entities with which the teenagers are more likely to collaborate, most and foremost, their families.

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## A Brief Structured Educational Curriculum Improves Pediatric Emergency Department Staff's HAZMAT Response Skills

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**Study/Objective**: To design, implement, and evaluate an educational curriculum for pediatric Emergency Department (ED) staff to improve their skills, knowledge, and comfort in responding to a Hazardous Materials (HAZMAT) event.
**Background**: ED providers need competency in responding to HAZMAT events to treat contaminated patients, protect responding staff, and ensure the ED remains operational. The optimal strategy to teach HAZMAT response principles, including decontamination, to ED providers and to ensure the retention of these skills is not known.
**Methods**: This is a prospective cohort study assessing an educational curriculum comprised of didactics, skills stations, a tabletop exercise, and simulation focused on critical aspects of pediatric HAZMAT incident response, with an emphasis on donning Personal Protective Equipment (PPE) and patient decontamination. All ED staff were eligible to participate, and participants were randomly assigned to dyads. The primary outcome was the number of HAZMAT PPE donning steps correctly, completed by each dyad at pre and post-curriculum assessments using a 32-item checklist created by hospital expert consensus. Participants completed a 15-item questionnaire to evaluate their knowledge and confidence regarding HAZMAT skills pre- and post-curriculum. Donning skills were reassessed three months following the intervention.
**Results**: Eighty-four participants were enrolled and completed the curriculum: 56 physicians, 23 nurses, and four administrative staff. Compared to the pre-period, more steps were correctly completed following the intervention (median of 19 vs. 31; $P < .001$). Additionally, multiple-choice knowledge scores increased (64% vs. 91% correct; $P < .001$). There was also an increase in provider confidence (Likert level 3 vs. 6; $P < .001$). Skill retention for the dyads relative to the baseline was maintained at three months (median 19 vs. 28.5; $P < .05$).
**Conclusion**: A multi-faceted curriculum improved performance, knowledge, and confidence in HAZMAT skills. HAZMAT education is feasible and effective for pediatric ED staff, and should be incorporated into existing training programs.

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## The Pediatric Disaster Mental Health Intervention. A Guide for Primary Care Providers

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**Study/Objective**: PDMHI (Pediatric Disaster Mental Health Intervention) was initially developed In response to Superstorm Sandy's impact on children and their families in New York City (NYC). The objective was to develop training for primary care providers in Pediatric Disaster Mental Health care and to subsequently study its impact on the trainees.
**Background**: The effects of a disaster on a community's mental health can persist after the physical effects of the event

have passed. The pediatric population is often overrepresented in disasters and prone to serious mental health disorders based on their developmental age and parental/community response. Pediatric Primary Healthcare providers require the Psychosocial skills necessary to work in disaster zones and to effectively care for children in disasters.
**Methods**: A faculty of experts in pediatric mental health, psychiatry, psychology, and disaster preparedness and response was convened to develop the PDMHI curriculum. The faculty developed a four hour intervention to equip health care providers with the skills and knowledge necessary to care for pediatric patients with mental health problems stemming from a disaster via evaluation, triage, intervention and referral.
**Results**: Three PDMHI training sessions were held; 67 providers were trained; 31 pediatricians, 18 nurses, 8 social workers 4 psychologists, 2 psychiatrists and 4 others . Pre and post-tests measured knowledge before and the impact 3 months post intervention; 62.5% of responding primary care providers made changes to their practice; 92% felt better equipped to identify, treat and refer patients; and 81% would be willing to work in a disaster zone, and felt prepared to treat patients with disaster mental health issues.
**Conclusion**: PDMHI covers psychosocial responses to disasters from normal to mental health disorders. Participants gained tools for managing pediatric mental health issues in primary care. Study data showed an increase in the participants perceived knowledge and skills about pediatric disaster mental health, and their willingness to participate in future disasters.
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### Feasibility of the Novel Combination of Influenza Vaccinations, and Child Passenger Safety Seat Fittings, in a Drive-Thru Clinic Setting.

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**Study/Objective**: We hypothesized that combining influenza vaccinations and child passenger seat fittings (CPSF) in a DTC format will be both feasible and desired by the community.
**Background**: Disaster Medicine and Public Health Preparedness are ever-evolving areas of medicine with the purpose of helping the masses quickly and efficiently. The drive-thru clinic (DTC) model is a disaster tool that allows distribution of supplies or services while participants remain in their automobiles. Influenza vaccination is the most commonly utilized form of the DTC and has been utilized in metropolitan areas successfully as a single service.
**Methods**: Each driver was verbally surveyed at each station of the DTC. The survey content involved satisfaction and background of health habits.
**Results**: In the inaugural DTC, six-hour session, there were 86 automobiles served that contained 161 children, of which 28 also participated in CPSF. The median total clinic time was 9:00 (Interquartile Ranges (IQR) 6:00-14:00) minutes. For those who only received influenza vaccines, the median total clinic time was 7:30 (IQR 6:00-10:00) minutes. For those who received both services, the median total DTC time was 27:00 (IQR 22:20-33:30) minutes, with an average of 1.75 CPSFs per automobile.
**Conclusion**: This was a pilot study involving two different services using the DTC model, and the first of its kind in the literature. Our DTC was successful in executing both services, without sacrificing speed, convenience, or patient satisfaction. Additional studies are needed to further evaluate the efficacy of the multiple service DTC.
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### Utility of Performing Serum Glucose Measurement and EKG in the Outpatient Evaluation of Pediatric Syncope

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**Study/Objective**: To determine the frequency of BG and EKG abnormalities in previously healthy children who present to an emergency department [ED] with Syncope.
**Background**: Syncope is characterized by sudden onset, brief duration episode of altered consciousness usually associated with loss of postural tone from which recovery is full and spontaneous. Prior studies have shown that evaluating a detailed medical history often provides discerning information regarding etiologic risk; despite this, routine tests are frequently performed in syncope cases.
**Methods**: Chart review of consecutive children aged 5-18 years presented to the Pediatric ED at Maimonides Medical Center, Brooklyn from 2004-2014 with a discharge diagnosis of syncope, fainting, or vasovagal event. All events were acute, of sudden onset and brief duration [ < 10 minutes], with loss of or altered consciousness, and spontaneous full recovery. Patients with known underlying metabolic or endocrine, cardiac, psychiatric disorders; anemia or pregnancy; preceding head trauma, acute blood loss [except epistaxis], current intoxication, observed seizure activity; currently receiving an oral hypoglycemic medication were excluded. All had BG measured prior to administration of IV/oral glucose or parenteral glucagon. Data collected included patient demographics, past medical history/current medications, vital signs, laboratory values, EKG results per interpretation by an attending-level pediatric ED physician or pediatric cardiologist, medical interventions, and disposition. Hypoglycemia was defined at serum glucose <60 mg/dL.
**Results**: A total of 969 patients met the study criteria. Of these, hypoglycemia was present in 3 cases [0.3%]. EKG was performed and interpreted in 656 patients [68%]; in 4 cases [0.5%] an abnormality was identified: 1 case of prolonged PR interval, 3 cases of cardiac hypertrophy [2 ventricular, 1 atrial]. Follow up ECHO done on all these patients revealed no cardiac pathology. Financial analysis for performing BG and EKG on these patients amounted to total health care cost of $226,156.
**Conclusion**: Previously healthy children presenting for outpatient evaluation for simple syncope rarely have underlying hypoglycemia or EKG abnormality.
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## Introduction of Pediatric Acute Care into the Israeli Defense Forces (IDF) Field Hospital

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**Study/Objective**: The IDF Medical Corps has decades of experience in treating patients in disaster areas. The hospital was recognized as the leader in field medicine and disaster relief, and became the first field hospital to ever achieve a Type 3 rating according to a World Health Organization (WHO) scale.
**Background**: Worldwide, children are impacted by natural disasters particularly in Developing countries. Children in disasters are often the most affected segment of the population but also the most overlooked. They are more dependent on others for survival. The impacts of hunger following natural disasters can be tremendous, causing lifelong damage to children's development. Natural disasters can be particularly traumatic for young children.
**Methods**: Operating a field hospital for a population affected by natural disaster is a complex mission. However, pediatric care has its own unique, challenging characteristics. This realization led us to set up a separate special pediatric division which included: Pediatric emergency department, Pediatric ward, Pediatric intensive care unit, Neonatal intensive care unit, and an Ambulatory clinic. The pediatric division provides for the primary and secondary care for pediatric patients including: Emergency medical conditions, Trauma, Diagnosis and treatment of common acute & chronic diseases. The pediatric special team comprised of pediatric emergency medicine specialists, pediatricians, neonatologists, pediatric surgeons, pediatric orthopedic surgeons, pediatric anesthetists, nurses, medics, psychologists, and medical clowns.
**Results**: More than 1,000 pediatric patients were treated by the pediatric teams in previous delegations, hundred of them required surgery. We have implemented unique methods to treat children, protocols for triage, procedural sedation and analgesia, electronic medical record, etc.
**Conclusion**: We have a duty to learn and share our experience with colleagues worldwide. We hope that our experience will help to promote further knowledge regarding disaster medical response for children, and enhance the development of efficient algorithms and procedures for better preparedness.

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## Prepping for Peds: A Collaborative Approach to Improving Regional Pediatric Readiness in Oregon

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**Study/Objective**: Oregon has many geographic, resource, and training obstacles to providing quality care for critically ill and injured children. There is wide hospital variation in everyday pediatric preparedness and significant vulnerability to disasters affecting children. Together, experts from Oregon's two children's hospitals and Oregon Emergency Medical Services for Children, developed interactive workshops for medical providers covering the care of sick children at both individual and mass-casualty levels.
**Background**: In 2006, the Institute of Medicine noted that emergency departments "that are unable to meet everyday pediatric care challenges are, by definition, unlikely to be prepared to deliver quality pediatric care in a disaster." This is particularly evident in Oregon, a state challenged by a large geographic area, a high percentage of rural communities with limited resources, and a lack of pediatric medical specialists. Prior surveys have noted many hospitals lack pediatric-focused continuing education and quality improvement, pediatric champions, and disaster plans addressing the needs of children.
**Methods**: We designed and presented a pediatric emergency education program at community hospitals utilizing lectures, skill stations, telemedicine consults, and high-fidelity manikin case simulations. Secondly, we taught pediatric disaster preparedness workshops covering pediatric triage, weight-based medication administration in emergencies, and disaster planning.
**Results**: Thus far, 4 pediatric education days and 2 disaster preparedness workshops have been completed throughout Oregon. Participants included physicians, nurses, advanced practitioners, and prehospital providers. Feedback was overwhelmingly positive for both programs, with >80% of participants requesting similar offerings be available every 6-12 months. Participants valued most highly the interactive nature of the workshops (including simulations, equipment review, and case-based triage practice).
**Conclusion**: Together, these 2 programs represent a successful collaboration to improve pediatric care during everyday conditions and public health emergencies. Educational partnerships can foster relationships between hospitals, expand pediatric skills for individual providers, and improve hospital disaster planning for children.

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## Pediatric Critical Care Triage: Allocation of Scarce Resources

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**Study/Objective**: 1. Provide an overview of crisis standards of care[1] and current literature recommendations for pediatric critical care triage.[2] 2. Describe our regional Northwest Healthcare Response Network (NWHRN) and the Disaster Clinical Advisory Committee (DCAC). 3. Understand the unique differences between adult and pediatric patients with regards to allocation of critical care resources. 4. Present our

Pediatric Critical Care Resource Algorithms, Worksheet, and Triage Team Guidelines. 5. Discuss lessons learned and future considerations regarding scarce resource allocation.

**Background**: In a disaster situation when resources are scarce, it's agreed that health care providers have a duty to care, but also a duty to steward resources within an ethical framework.[3] Operationalizing these ideals is challenging, especially when pediatric critical care itself is limited and specialized. The population of Washington state is 7.1 million, with 22.5% <18 years.[4] There are only 119 PICU beds in the state, and only 30% are open at any time. During an overwhelming disaster, the number of critically injured and ill children may exceed resources available in spite of conservation and surge strategies. The NWHRN established the DCAC in 2012 to bring regional clinical leaders together to discuss scarce resource allocation.

**Methods**: Using a modeling tool developed by the US CDC, we estimated the potential pediatric critical care needs during a pandemic. We then gathered data regarding regional pediatric critical care resources, reviewed current literature, discussed conservation and surge strategies, and developed the Pediatric Critical Care Algorithm, Worksheet, and Triage Team Guidelines.

**Results**: The King/Pierce County Pediatric Critical Care Triage Algorithm and accompanying Worksheet are to be used with the Triage Team Guidelines. These documents are part of a regional Concept of Operations for Scarce Resource Management Plan.

**Conclusion**: This presentation outlines our process and provides our regional recommendations for pediatric critical care triage, as well as lessons learned and future recommendations.

[1,3]IOM reports Crisis Standards of Care 2009. [2]Kissoon N. Deliberations and recommendations of the Pediatric Emergency Mass Critical Care Task Force: Executive summary. Pediatr Crit Care Med. 2011;12:S103-108. [4]USA Census. gov est 2015.

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## Reunification Toolkit for Community Hospitals: Applying Education Principles to a Real World Problem

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**Study/Objective**: Our State Pediatric Disaster Coalition (PDC) was tasked with addressing community hospitals' concerns regarding reunification of children and parents/guardians in a disaster.

**Background**: Our PDC has representation from public agencies to hospitals. Many reunification tools currently exist on the internet. There were many new concepts to introduce to this audience of adult learners, the Cognitive Dimensions Chart (CDC) was applied during the creation of the toolkit.

**Methods**: A website was created to link key materials together. Regional hospital coordinators within our state could access materials for education and assist community hospitals to coordinate efforts with local agencies for reunification.

**Results**: Upon completion of this four component reunification toolkit, hospital emergency planners and safety personnel will have improved capability and capacity for pediatric patients that are separated from parents or guardians. A reunification plan is a vital part of a comprehensive hospital disaster. The first component creates awareness of facts and understanding of reunification for children and families through personal stories. The second component, a framework, explains a reunification plan and identifies key partners to conceptualize and apply to their unique situation. The third and cornerstone component, a checklist, with a step-by-step approach to creating a reunification plan. Included in this checklist are web linked resources to create procedures and detailed individualized analysis. Finally, a disaster drill narrative with a patient list and scenario are included to create either a live or simulated drill, to be able to test the new plan and create corrective actions to enhance the plan, and allows the learner to bring all the components together using metacognition.

**Conclusion**: This is a practical educational project, applied to a real-world problem, to benefit community hospital emergency management and safety personnel, in addition to children and families in our state to address the importance of reunification in disasters.

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## Improving Disaster Preparedness for Children and Families: A National Curriculum for Pediatric Emergency Medicine Fellows

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**Study/Objective**: Disaster Preparedness (DP) training is limited within Pediatric Emergency Medicine (PEM) fellowships.

**Background**: A survey of PEM fellowship directors revealed that 70% did not incorporate a disaster preparedness curriculum. Disasters can occur in any region and pediatric emergency medicine physicians play a key role in the response. A standard disaster preparedness curriculum is a necessary component of any pediatric emergency medicine fellowship. A nationally-based curriculum has the advantage of providing a common knowledge base for physicians in training that can be expanded and elaborated for individuals and programs.

**Methods**: PEM experts in disaster preparedness reviewed the curriculum competencies proposed by National Center for Disaster Medicine and Public Health (June 2013), and Entrustable Professional Activities (EPA) for PEM physicians related to disaster preparedness. Comparison of these

competencies were the basis for creation of content to be included in the curriculum for PEM Fellows. A web-based version was created for access by any fellowship program.
**Results**: Ten modules were created in educational online program (Softchalk LLC, Richmond, VA) and hosted on a Learning Management (LMS) website. Topics included personal preparedness, triage, bioterrorism, biological, chemical, radiological, blast and natural events, hospital management, ethics and legal issues, and culminate them in a drill scenario for adaptation to individual programs. Review activities and questions were embedded to promote learning in multiple layers of Bloom's taxonomy. Preliminary data to complete all components from users was less than 10 hours.
**Conclusion**: PEM Physicians are ideally situated to be the experts to their hospitals, communities, and systems of care for pediatric disaster preparedness. The online and group activities provide multiple modes for learners to acquire knowledge and integrate into their practice using broad educational principles. Evaluation of the curriculum regarding more participation by individuals and programs to further research in pediatric disaster preparedness and mentor individuals to become experts in DP.
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## Attitudes of Health Care Stakeholders Concerning Admitting and Treating Pediatric Trauma Casualties in Emergency Departments: A Qualitative Study

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**Study/Objective**: To examine the attitudes of policy makers, senior health care managers, and hospital medical administrators concerning admitting and treating pediatric trauma casualties in Emergency Departments (EDs).
**Background**: Pediatric trauma is a dominant cause of morbidity and mortality in children. A significant variability exists among health care systems concerning the ED designated to admit and treat pediatric trauma casualties. The medical staff appointed as case managers, or professional staff members, specific training and education programs.
**Methods**: Semi-structured interviews of 17 senior health care stakeholders from a variety of positions, including national, regional, and local organizations, to facilitate a wide variety of attitudes concerning the study. The analysis was made according to the Grounded Theory.
**Results**: All study participants emphasized the need for 24/7 availability of pediatric medical teams to admit and treat injured children. Varied views were presented concerning the preferred case manager and the required types of training. The pediatric emergency medicine system was defined as challenging, and often lacking in appropriate operating procedure. Ten of 17 respondents perceived the pediatric ED with trained medical staff as the optimal admitting and treating site. Furthermore, the majority believes that severe pediatric trauma casualties should be centralized solely in specific, pre-designated medical centers.
**Conclusion**: In order to optimize the treatment of pediatric trauma casualties, significant changes should be implemented concerning the ED sites assigned to admit and treat injured children. Designated legislation is recommended, concerning centralization of severe pediatric casualties in specific medical centers that are equipped with appropriate infrastructure, professional manpower, procedures, and protocols. Budget incentives to increase staff commitment for 24/7 availability should also be considered.
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## Comparison of Formulas for Orotracheal Intubation Depth in the Pediatric Population

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**Study/Objective**: Depth of oral endotracheal tube placement in the pediatric population is commonly calculated using Broselow Tape, Endotracheal Tube (ETT) size x 3, and the age-based formula of age divided by 2, add 12. The objective was to determine the accuracy of the three methods across the age and weight groups.
**Background**: All intubations performed in the pediatric emergency unit of KK Women and Children's Hospital from January 1, 2009 to December 31, 2013 were selected for review in this retrospective observational study.
**Methods**: ETT position between T2 to T4 vertebral bodies was taken as the reference position. The depths of ETT placement based on the formulas were calculated from the actual depth of ETT on the chest X-ray. These were compared to the reference position for accuracy.
**Results**: ETT size x 3 has the highest accuracy of 76.5%, as compared to 63.6% for age-based formula and 63.5% for Broselow Tape. When the formulas are inaccurate, Broselow Tape often predicted a depth that was too shallow as compared to ETT size x 3 ($p = 0.013$) and age-based ($p = 0.004$). All three formulas performed better for older children, particularly ETT size x 3, and age-based ($p < 0.05$). The depth using the age-based formula was too deep in 65% of children less than 1 year old. For weight, the depths using ETT size x 3 and age-based formula was too deep for children of lower body weight ($p < 0.05$), and the depth using age-based formula was too shallow ($p < 0.001$) for patients of higher body weight.
**Conclusion**: ETT size x 3 was the superior formula for determining orotracheal intubation depth. Caution should be exercised when applying these formulas in patients less than 1 year old, or in patients with extremes of body weight as they are less reliable.
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## Assessment of Child Health in National Adaptation Programmes of Action for Climate Change

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**Study/Objective**: This paper compares and assesses the child health component of one cross-cutting initiative aiming to support climate change adaptation in the least developed countries: National Adaptation Programs of Action (NAPAs) for the United Nations Framework Convention on Climate Change (UNFCCC).
**Background**: Climate change is expected to impact human health in numerous ways, positive and negative. Some of the most serious adverse consequences are expected to fall on children in least developed countries. The reason is, the already present vulnerability coupled with a lack of mechanisms for reducing this vulnerability. Adequate climate change adaptation measures for child health are needed as part of wider disaster risk reduction, but attempts to formulate and enact such measures have encountered numerous difficulties in least developed countries.
**Methods**: This paper compares and assesses the child health component of one cross-cutting initiative aiming to support climate change adaptation in the least developed countries: National Adaptation Programmes of Action (NAPAs) for the United Nations Framework Convention on Climate Change (UNFCCC). All NAPAs were read for mentions, information, policies, and actions related to child health.
**Results**: The results show that child health is hardly mentioned, with almost no specific focus or specific policies or actions for dealing with child health as part of climate change adaptation. Children's vulnerabilities and possibilities for coping with climate change are barely recognized; children are not adequately included in any form of national adaptation measures or actions.
**Conclusion**: Further progress in terms of developing public child health adaptation measures is needed, and could easily be an extension of typical child health measures for development, or as an impetus for enacting basic child health initiatives.

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## Impact of the Subsidized Rotavirus Vaccination Program in the Disaster-affected Area

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**Study/Objective**: This study investigated the effectiveness of the subsidized rotavirus vaccination program implemented in the Kesen area between January 1, 2012 and March 31, 2014.
**Background**: The Great East Japan Earthquake Disaster (2011) inflicted tremendous damage on the wide area, including its medical work forces and institutions. Bold interventions were required to maintain the child health care system in disaster-affected areas.
**Methods**: This program was designed by the Working Group of the Child Health Support Project in the Kesen area, established within the Japan Pediatric Society. The indices used to determine the effectiveness were the number of children hospitalized for rotavirus gastroenteritis (RVGE), and the number of children that visited emergency rooms for gastroenteritis (GE) per 10,000 children aged <5 years. The study was conducted between January 1, 2009 and December 31, 2013.
**Results**: (1) The number of children vaccinated and the vaccination rate were 367 children (92.4%) in 2012, and 342 children (95.6%) in 2013 in the Kesen area. (2) The number of children hospitalized for RVGE fell by 41% in 2012, and 84% in 2013. In 2013, the number of children hospitalized for RVGE in the Kesen area was significantly lower than that in the three regions where the program was not implemented ($P < .001$). (3) The number of emergency patients increased after the disaster struck, but the number of GE patients was significantly lower (2013; $P = .008$).
**Conclusion**: The results of this study strongly suggest that the subsidized rotavirus vaccination program was effective. Three municipalities of the target areas agreed to continue this program by their own budgets. This advanced model program implemented in a disaster-affected area will hopefully lead to the revitalization of the target region and greatly contribute to the advancement of child health care services.

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## Issues of Disaster Medical Management for Children in Japan

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**Study/Objective**: Children are included in the vulnerable population in disasters. To protect children, we need to clarify issues in disasters and make a framework which can resolve these problems.
**Background**: We had the Great East Japan earthquake in 2011 and the Kumamoto Earthquake in 2016. An inland earthquake is likely to occur in Tokyo in the near future; however, we have not established enough disaster management systems for children.
**Methods**: We reviewed the issues and problems associated to children in the recent major earthquakes in Japan.
**Results**: Children are not little adults and require special support in disasters. However, there are very few pediatricians in Disaster Medical Assistance Teams (DMATs) and other medical relief teams. Disaster medical coordinators in the headquarters of local government have limited knowledge of pediatric medicine. After the Kumamoto Earthquake, the

biggest Neonatal Intensive Care Unit (NICU) in Kumamoto had to be evacuated due to the damaged building. There were 38 NICU babies transported to other hospitals by medical helicopters and baby ambulances, cooperating with DMATs and pediatricians. Fortunately, there were no deaths during transportation. This luck was caused by quick and appropriate decisions made by medical staff on-site.

**Conclusion**: Cooperation between disaster medical networks and pediatric medical networks is absolutely necessary in any disaster phase to protect children in the aspect of medical and health care support. In Japan, we have started to improve the disaster medical systems for children. One of these systems is the development of a pediatric and perinatal disaster medical coordinator. When disaster occurs, coordinators connect everyday pediatric and neonatal medical networks and disaster medical networks. In 2016, we will train 100 coordinators and are expecting to improve disaster medical management for children.

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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## An Overview of the United States Strategic National Stockpile Capabilities and Formulary Decision-Making Through the Public Health Emergency Medical Countermeasures Enterprise

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**Study/Objective**: Learning Objectives: 1) Understand the mission and capabilities of CDC's Strategic National Stockpile. 2) Understand the Public Health Emergency Medical Countermeasures Enterprise governance process regarding review and recommendations for the SNS formulary. 3) Understand the current activities and initiatives of CDC's Strategic National Stockpile to enhance the nation's preparedness for an emergency response requiring rapid deployment and utilization of MCMs.
**Background**: The United States is prepared for responding to national health security threats from chemical, biological, radiological, and nuclear (CBRN) agents, and emerging infectious diseases. Under the leadership of the US Department of Health and Human Services (HHS), the Public Health Emergency Medical Countermeasures Enterprise (PHEMCE) is the federal coordinating body that reviews the SNS contents and makes MCM formulary recommendations annually. MCMs are held in the Centers for Disease Control and Prevention (CDC) Strategic National Stockpile (SNS), which contains a broad range of emergency medical countermeasures. The Division of Strategic National Stockpile (DSNS) works across the medical supply chain to ensure that stockpiled MCMs are maintained and are available for deployment on short notice, and that capabilities exist to rapidly distribute and dispense these MCMs. This session will address the mission and capabilities of the SNS, including: Federal prioritization process for current and planned medical countermeasure procurement and stockpiling; Ongoing work to ensure state and local capabilities exist to receive and dispense MCMs to their populations in an emergency response; Engagement with the private sector medical supply chain to improve access to limited MCM resources; and Current SNS capabilities to support state and local response to a public health emergency.
**Methods**: Not applicable.
**Results**: Not applicable.
**Conclusion**: This session will describe the role and capabilities of CDC's SNS to meet the nation's requirements for MCMs in a public health emergency. These processes may be scalable and adaptable to other countries performing stockpiling activities.

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## Legislations to Support the Pharmacist's Role in Natural Disasters

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**Study/Objective**: The objective of this study was to draft a document compiling key legislations required to support the pharmacist's role in natural disasters.
**Background**: In a natural disaster, access to health care providers becomes limited. Pharmacists possess the education required to support members of the health care team in a non-traditional pharmacist role.
**Methods**: Focus groups with a working group of experts at the International Pharmaceutical Federations were conducted. The focus groups were informed by a literature review of pharmacy legislations that support pharmacy practices around the world and what is needed in a natural disaster situation.
**Results**: This literature search resulted in a document that highlighted the importance of key legislations in supporting the role of pharmacists in natural disasters. The International Pharmaceutical Federation (FIP) working group met three times to provide feedback and revisions on the draft document. There were five recommendations identified. The first was allowing pharmacists to prescribe or dispense, for continuity of care and for optimization of therapy through emergency supplies, therapeutic substitutions, prescribing for minor ailments, and prescribing under medical directives. The second was allowing pharmacists to administer drugs by injection such as vaccinations. The third was allowing pharmacies or agencies to monitor and control the over-the-counter drug sales for outbreak detection. The fourth was providing specific protocols for the control and disposal of narcotic and controlled drugs. The final recommendation was human resources management, which would recognize foreign pharmacist/pharmacy licensures and registrations.
**Conclusion**: There are several components of these recommendations currently implemented in various countries, but there is no consistency between countries. Legislations regarding emergency natural disasters would improve response time, as well as quality of care in a crisis. Implementing these key recommendations would allow pharmacists to practice within their scope during a natural disaster to alleviate strain on the health care team.

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## Ready, Willing, and Able: The Role of Pharmacists in Natural and Manmade Disasters - Can We Do More?

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**Study/Objective**: The purpose of this study is to describe all potential roles pharmacists can undertake during disasters, across the four stages of disaster health management – Prevention, Preparedness, Response, and Recovery (PPRR), and identify the barriers to implementing these roles.
**Background**: The collapse of basic health care services following a disaster is the highest cause of mortalities, with the inability to access medications being the main reason. Pharmacists are reported to be the most easily accessible health care professional and are the third largest health care provider after doctors and nurses. In disasters, many affected people seek the assistance of pharmacists first before potentially being referred on to a doctor or hospital. Pharmacists are on the frontline of continuity of care. The traditional role pharmacists play in times of crisis is a logistical role, maintaining the medicines' supply chain from manufacturer to patient. Although this is an essential role during disasters, it is not utilising pharmacists' entire skill set and knowledge. Disaster research is beginning to identify potential roles pharmacists can fulfil during natural and manmade disasters.
**Methods**: Semi-structured interviews will be conducted with stakeholders and pharmacists across the disaster health management spectrum. Interviews will be recorded. Data will be analyzed by two methods - manual open and axial coding using the software NVivo, and then using the text analytics tool Leximancer. This will provide triangulation of methods. The data will be used to develop a conceptual framework model outlining the potential roles pharmacists can fulfil during disasters and highlighting the barriers to implementing them.
**Results**: The results will identify the roles and responsibilities pharmacists can undertake during disasters, expanding from the traditional logistical role to a patient-centered role taking care of the non-emergent health concerns. It will recognize and address the barriers and limitations to implementing these new potential roles.
**Conclusion**: These results will form the basis for a conceptual framework model identifying the roles pharmacists can undertake in disasters and the economic impact on the health care system on implementing them.
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## Impact of Cyclone Yasi on Antidepressant and Anxiolytic Medication Use in Affected Areas of North Queensland

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**Study/Objective**: The objective of this study was to determine whether there were significant changes in prescription rates of antidepressant and anxiolytic drugs following Cyclone Yasi, and if this was affected by the extent of damage sustained by the area.
**Background**: The global change currently occurring in climate is expected to increase the incidence of extreme weather events, such as cyclones and flooding in Australia, which are particularly prevalent in north Queensland. In monetary terms, the average annual cost of tropical cyclones in Australia is $266 million, equating to approximately 26% of total disaster spending each year. Natural disasters often elicit different responses, with the degree of exposure often influencing the presentation and severity of psychological events. Although the supply chain during natural disasters has been investigated, there has been little research into the effect on medication usage after natural disasters.
**Methods**: A quantitative determination of new prescriptions of antidepressants and anxiolytics was conducted. Using data collected from regulatory authorities for the affected region, the total number of new prescriptions for these drugs was calculated for the period six months after the cyclone, and compared with the same six month period in the preceding year. Two control drugs were also included to eliminate any changes in general rate of drug prescription in the affected communities.
**Results**: Prescriptions of all antidepressant and anxiolytic drugs increased in the periods following Cyclone Yasi. There was a greater increase in prescription rates in the 14 to 54, and 55-95 year old categories in those areas that were directly hit by Cyclone Yasi (6.4%:5.2%), compared to those not directly hit areas (2.7%:3.3%).
**Conclusion**: Although the increase was less than expected, it was concluded that there is a direct correlation between the extent of exposure to the event, the degree of damage, and increased rates of antidepressant and anxiolytic prescriptions.
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## A New Recipe for Disaster Training in Australia

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**Study/Objective**: To develop core competencies and training recommendations for Australian Pharmacists to prepare them for responding to disasters.
**Background**: Health professionals contribute during disasters in an array of settings and roles. Pharmaceutical associations encourage pharmacists to be prepared and participate in disasters within 'traditional' and 'extended scope' roles. A plethora of training and competencies exist globally for health professionals in disasters. However, for one of the most accessible health professionals, pharmacists, training and competencies are lacking. Within Australia, there are currently no competencies or comprehensive training exclusively for pharmacists within a disaster context.
**Methods**: Four key investigative methods will be used to contribute to final recommendations for competence and training. 1. A comprehensive review of disaster training and competencies available for pharmacists and other health professionals nationally and internationally. 2. Distribution and completion of a validated survey targeted at organizations known to utilize health professionals during disasters. 3. Semi-structured interviews to

be conducted with pharmacists and other health professionals who have participated in previous disasters. 4. Attendance to, and auditing of disaster training for health professionals, as well as interviews with participants.
**Results**: Data from pharmacists and other health professionals will be collated separately and then compared to identify common trends, gaps, and 'lessons learned'. This comparison will allow a set of core competencies to be formulated and presented to relevant stakeholders and organizations for comment. Once finalized, the core competencies will be used to formulate recommendations for the training of Australian pharmacists to participate in disasters.
**Conclusion**: In Australia, disaster competencies and training for pharmacists is currently lacking. The ultimate aim of this research is to enhance preparedness for pharmacists, and improve local professional resilience during times of disaster with education and training.
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### Does Australian Continuing Professional Development Activities Prepare Pharmacists to Play a Role in Disasters?

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**Study/Objective**: To determine if Australian Continuing Professional Development (CPD) activities, available from Pharmaceutical Associations (PAs) prepare pharmacists for disasters.
**Background**: PAs are key stakeholders for the pharmacy profession. In everyday practice, they advocate for progress, provide CPD resources, and distribute relevant professional information. During disasters, PAs are expected to fill these roles, as well as provide disaster specific advice, support pharmacists, and discuss with government bodies the appropriateness of expanded pharmacy practice legislation to assists pharmacists in disaster response. In Australia, it is unknown how well PAs prepare members for disasters before a disaster strikes.
**Methods**: CPD activities from four accredited PAs were examined for disaster content, as well as the presence six skill sets which may be useful in disasters. These included wound care, mass dispensing, first aid, mental health first aid, vaccination administration, and triage. The PAs websites were also searched for content that provided advice or procedures for disasters.
**Results**: Two organizations provided disaster planning information, one during a weekend emergency medicine seminar conducted once a year, and the other on its website, for anytime access. Two (50%) of the organizations taught four of the six (67%) skills which may be relevant during disasters. These include vaccination, first aid/life support, mental health first aid, and wound care. No mass dispensing or triaging skills were taught in CPD programs.
**Conclusion**: In general, PAs in Australia do not provide pharmacists with foundation disaster training. PAs train pharmacists in skills which are useful in everyday pharmacy practice. However, they failed to teach these skills within a disaster context. With appropriate training, pharmacists could be taught to develop and specialize their everyday skills to be useful during disasters, allowing them to respond to disasters with confidence and efficiency.
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### Does Australian Pharmacy Curricula Prepare Students to Play a Role in Disasters?

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**Study/Objective**: To determine if Australian pharmacy curriculum prepares Bachelor of Pharmacy (B.Pharm) students to play a role in disasters.
**Background**: While health students are unlikely to perform clinical tasks during a disaster, with appropriate training they may provide support in non-clinical roles. Globally, several universities have begun to incorporate disaster education and training for various health professionals into curricula.
**Methods**: B.Pharm curriculum was accessed and downloaded from university websites across Australia. These files were then examined for disaster content as well as the presence of skill sets with potential use during disasters. These included wound care, mass dispensing, first aid, mental health first aid, vaccine administration, and triage. For degrees that contained electives, university websites were searched for subjects which may relate to disasters.
**Results**: Curricula from twenty-one B.Pharm and B.Pharm (honors) degrees from sixteen universities across Australia were analyzed. None of the degrees offered disaster or emergency training as part of their core subjects. No electives relevant to disasters could be undertaken by pharmacy undergraduates. From the six skills of interest, only three were taught across eight degrees. Wound care and vaccine administration were included in the curriculum of seven degrees (33.3%), and mental health first aid in three (15%). While first aid was only actively taught in one degree, all universities required students to be trained in first aid for placements and internship. No degrees covered activities such as triage or mass dispensing.
**Conclusion**: Overall certain skills which may be valuable during disasters or pandemics are not included in the majority of Australian B.Pharm curricula. While B.Phrm degrees may prepare students by focusing on safe dispensing and pharmaceutical knowledge, which may assist in areas such as triage and dispensing, they fail to put these skills into a formalized context of disaster or emergencies.
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### Pattern of Acute Posioning in a Large Tertiary Care Settings in Ghana

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**Study/Objective**: To characterize acute poisoning cases admitted in an emergency department of a tertiary hospital in Accra, Ghana
**Background**: Acute poisoning is a common case in the emergency departments all around the world and involves high medical attention and significant cost. Many studies have showed that acute poisoning carries high mortality rates. The poisons used vary between different parts of the world and also within a country depending on cultural and socioeconomic factors. Different poisonous substances have been implicated in suicide attempts, accidental poisonings and attempted homicides. During the last few decades, there has been rapid growth in the number and variety of industrial compounds, pesticides and new drugs involved in acute poisonings.
**Methods**: The medical records of all admitted cases of poisoning to the emergency department of a large 2,000 bed tertiary hospital in Accra, Ghana from January 2013 to July 2016 were evaluated prospectively.
**Results**: During the period, 5,346 patients were seen. The age of the victims ranged from 14 to 78 years with majority (36%) between the age group of 21-30 years. The incidence was more common among females (66%) compared to males. The major agents of poisonings included household detergent (25%), organophosphorus compounds (23%), industrial chemical substance (18%), medicine overdose (6%), corrosives (6%), food poisoning (3%), and alcohol intoxication (2%). A high percentage (95%) was of suicidal attempts with (3%) being accidental and (2%) due to illness (depression). Mortality rate was 6% with 88% being discharged home within 72 hours.
**Conclusion**: The prevention and treatment of acute poisonings should be prioritized in health care delivery with strategies to provide psychological support.

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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

### When Rescue Needs To Be Rescued: A Case Review of the Rollover of a Critical Care Ambulance with Patient on Board

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**Study/Objective**: This past October, when evacuating critically ill patients in preparation for an impending serious hurricane, a critical care ambulance was transporting an extremely sick and intubated patient about 75 miles to another tertiary center, when it was involved in a severe accident involving an ambulance rollover, prolonged extrication of multiple patients including the original patient on multiple infusions and medications. The case study will discuss the events during and after this rescue, as well as lessons learned regarding when a medically intensive care patient becomes part of a technical rescue.
**Background**: According to the National Highway Traffic Safety Administration (NHTSA), there was an annual mean of 4,500 vehicle crashes involving ambulances, over a 20 year span. Of these, over 35% of them involved injuries or fatalities. Sick and injured patients in the ambulance and a more severe mechanism, increase the likelihood of a negative outcome or outcomes.
**Methods**: On the eve of when a major hurricane was supposed to make landfall, reports went out that a critical care ambulance with an intubated and ventilated patient on board was involved in a major accident in the far, rural edge of Alachua County. Multiple agencies, including multiple fire and rescue units from two county fire agencies, as well as an EMS physician responded to the call with reports of prolonged extrication needs of severely entrapped patients, and possibly at least one deceased. The combined efforts and skills ultimately rescued a paramedic, an EMT-basic, two severely entrapped patients, and an intubated patient still in the upside down ambulance on multiple unknown infusions.
**Results**: In the end there were no fatalities, a few critical patients, and overall great outcomes with respect to the traumatic event.
**Conclusion**: Reviewing calls like this, help prehospital providers prepare and provide the best possible care for the best outcomes.

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### Learnings from the National Medical Rescue Teams, Olympic Games

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**Study/Objective**: We want to mention about the preparedness of Turkey, for disasters via the National Medical Rescue Teams' simulation programs.
**Background**: National Medical Rescue Teams (UMKE) were founded in 2004 after the Marmara Earthquake of Turkey, by the Ministry of Health of Turkey. The organization of UMKE, (this foundation) provides medical rescue efforts, sanitation and psychological support. With permission of the Ministry of Health of Turkey, UMKE took a main role in the Haiti and Pakistan Earthquakes.
**Methods**: At the beginning of October we took a simulation program, with all twenty six National Medical Rescue Teams in the Antalya disaster simulation center. In this Olympic game, we got ten racetracks. In these tracks, institutional structuring of UMKE, disaster triage codes, field management in multi-trauma, burned patient management, field management of crush syndrome, immobilization procedures of broken bones, camping exercise, rescue from collapsed building, transporting rules and installation of field hospital took place.
**Results**: At the end of this game, we received feedback on our mistakes. Especially, we realized that we gave wrong commands about the stabilization of multi-trauma patients, security of disaster fields, burned patient infusion materials, hypothermia management of victims, and team cooperation according to situations. At the end of this organization we had a chance to recognize new medical rescue teams. According to our national disaster risks like earthquake, flood, forest fires and landslides, we have to possess coordination and stand-by medical rescue teams.
**Conclusion**: In this simulation program, we realized that our medical rescue teams had good coordination with those five (people) groups. Simulation programs like these, make us ready for disaster and correct our mistakes. With disaster organizations we can have good communication with neighborhood cities and rescue teams, that help enable us to minimize local disaster damages.

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### Comparison of Efficacy in Dispatch-Directed CPR (DCPR) for Out-of-Hospital Cardiac Arrest, Depending on Professional Levels of Dispatchers in Multiple Centers in Israel

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**Study/Objective**: We sought to determine the efficacy of CPR directions, depending on the level of training of the dispatcher (EMT vs Paramedic) and years of experience as a dispatcher.

**Background**: Although the incidence of Out-of-Hospital Cardiac Arrest (OHCA) is increasing, mortality is decreasing due to, in large part, early recognition and initiation of the chain of survival including prompt CPR and defibrillation, followed by advanced cardiac life support and transport to an appropriate cardiac center. Israel is an ethnically varied society with a large proportion of the population spread between urban centers and rural areas. Magen David Adom (MDA) is the Israeli national EMS organization with first responders, EMTs and Paramedics as providers. In contrast with most EMS dispatch centers which follow algorithms to provide instructions, MDA employs EMTs and Paramedics who answer emergency calls and provide CPR instructions to lay first responders in cases of OHCA.
**Methods**: Retrospective analysis of emergency-call recordings during the first half of each month in a 6-month duration. Efficacy was measured by time to cardiac arrest diagnosis, time to initiation of compressions, absence of barriers and cooperation, and spontaneous return of consciousness/circulation.
**Results**: Preliminary analysis of the results shows a significant inverse relationship, between average time to recognition of cardiac arrest and initiation of compressions, to years of experience. Nevertheless, the average time to recognition and initiation of compressions was not significantly different for Paramedics than for EMTs. Moreover, dispatchers with more years of service experienced greater cooperation from callers.
**Conclusion**: This study shows that centers with dispatchers with field experience, are able to provide high quality direction for OHCA DCPR. Years of service and overall experience correlate with higher cooperation and possibly improved patient outcome. More research and further studies are necessary to compare the efficacy in comparison to algorithm-based DCPR, as well as to determine the actual improvement in patient outcome.

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## Lessons from "Lehiwot Menor" Radio Show, and its Opportunities for Teaching Emergency Medicine to the Public in Ethiopia

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**Study/Objective**: To describe the lessons learned from the first two years of "Lehiwot Menor" (Living for Life), a radio show aimed at teaching basic emergency care principles to the general public in Ethiopia.
**Background**: In Ethiopia, despite a national initiative to standardize and strengthen prehospital and emergency care, the general public still lacks basic awareness regarding emergency care.
**Methods**: "Lehiwot Menor" is a twice weekly, one-hour radio show at Bisrat FM 101.1, broadcasting throughout Addis Ababa and neighboring cities since September 26, 2014. Founded and hosted by two nurses trained in emergency medicine and critical care. Lehiwot Menor seeks to educate the public on harm reduction and injury prevention, as well as appropriate use of prehospital ambulance and emergency services. This was a qualitative assessment on the impact of the show through discussions, text messaging, and social media portals with a station audience.
**Results**: Weekly live radio discussions with the public have helped disseminate information about the importance of emergency care in Ethiopia. Discussions have helped debunk several harmful traditional healing practices, while building awareness regarding appropriate prehospital lay response. Several new topics previously causing significant ethical dilemmas have also been introduced (eg, brain death evaluation). Public figures including actors/actresses, legislators, and journalists continue to participate in this teaching and increase public awareness. Additionally, Lehiwot Menor has served as a means of recruiting volunteers for first aid and blood donation.
**Conclusion**: Effective emergency care frequently starts with appropriate prehospital decisions made by lay first responders. These include basic resuscitation, as well as the decision to call for ambulance support or bring patients in for acute care evaluation. Radio programs like Lehiwot Menor can play an important role in helping teach the general public about early and appropriate utilization of emergency care, in settings where basic public awareness about these services is lacking.

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## Emergency Medical Service Usage and its Effect on Outcomes in Road Traffic Accident Victims in India

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**Study/Objective**: A study of Emergency Medical Services (EMS) utilization for road traffic accidents (RTA) in southern India is proposed to determine 1) proportion of victims transported by ambulance and 2) crude morbidity and mortality rates in patients brought by ambulance versus other modalities.
**Background**: In 2005, an EMS "1-0-8 Ambulance" was launched in Hyderabad to confront absence of centralized emergency response and high mortality rates from RTA. The program expanded to 15 Indian states, with over 10,000 ambulances, but remains underdeveloped; mired by prolonged transit to definitive care sites and lack of pre-hospital EMS interventions. It is not known if EMS utilization in India improves outcomes. Further investigation is warranted to identify strengths and weaknesses of the Indian EMS system.
**Methods**: A retrospective chart review is proposed of four hospitals receiving patients from 1-0-8 services in South India. All patients presenting for emergent care following RTA in 2015-2016 will be included. Data on 1) demographics, 2) transport, 3) injury mechanism and description, 4) treatment course, and 5) outcome will be obtained from emergency department and hospital patient records using a standardized tool. Impact of EMS usage on trauma score, duration of hospital stay, ICU stay and mortality will be assessed.
**Results**: Data collection and analysis are expected to be completed by March 2017.

**Conclusion**: The study is ongoing. Preliminary data suggest that a significant proportion of RTA victims do not arrive by EMS. We hope to review the data to determine if EMS transport confers advantage to crash victims and advise changes to improve EMS-based outcomes.

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## Prehospital Care of Spinal Cord Injuries in India

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**Study/Objective**: Prehospital Care of Spinal Cord Injuries in India.

**Background**: Injury is an increasing burden in Low and Middle Income Countries (LMICs) including in India. Prehospital care refers to the initial medical care given to a patient following injury, and before they present to a hospital. As in several developing countries, India lacks an established prehospital care system. Appropriate prehospital care is especially pertinent for a patient with a suspected Spinal Cord Injury (SCI), as effective immobilization and transportation is vital to avoid secondary injury.

**Methods**: Interviews were conducted at the 145-bed tertiary-level hospital, Indian Spinal Injuries Center in New Delhi, between March 10, 2016 and October 10, 2016 using a pre-designed questionnaire. Inclusion criteria was any patient >16 years who had suffered a SCI in India. Patients <16 years and who had suffered their injury outside of India, were excluded from the study. Interviews were conducted in the Rehabilitation Department with inpatients and outpatients attending for physiotherapy.

**Results**: Overall, 53.33% of SCI was caused by road traffic accidents and 26.67% were due to a fall from height; 50.00% of patients were transported to hospital by ambulance, with a median transfer time of 2.5 hours. The remaining 50% of patients were transported by private car (26.67%), auto-rickshaw (6.67%), police car (6.67%), taxi (3.33%) or bus (3.33%). Further, 33.33% of patients transported by ambulance received pain relief, and 26.67% were transported with a neck collar or on a back board. Overall 16.67% of patients received pre-hospital care.

**Conclusion**: As the burden of injuries, in particular those caused by road traffic accidents rises, India is increasingly in need of a country-wide, established prehospital care system. In the last decade, ambulance use has increased, but there are huge inconsistencies in the care ambulance staff provide. In addition, awareness of the identification and management of SCI needs to raised among both health care professionals and lay persons.

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## Cardiac Arrest, Are Two ALS Providers Better than One?

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**Study/Objective**: To determine if, in our geographic area of the US, the use of a duel paramedic Emergency Medical Service (EMS) system is a factor in improving cardiac arrest prehospital care, or should a single paramedic system be adapted.

**Background**: Among many urban EMS systems, there exists a paradigm of belief regarding dual ALS provider ambulances, that more advanced training must equal better care. Though much research has focused on the benefits of Advanced Life Support (ALS) versus Basic Life Support (BLS), far fewer studies have been devoted to whether there is any true benefit of dual ALS ambulances. Since 1966 and the publishing of Accidental Death and Disability: The Neglected Disease of Modern Society by the National Academy of Sciences, prehospital care has been in transition. Early research correlated survival with paramedic response, thus many systems quickly transitioned to a service with increasing number of ALS ambulances.

**Methods**: The Institutional Review Board (IRB) approved retrospective chart review of 14 EMS provider agencies in the Dallas County area (population > 2,300,000) for a year, from November 2012 - October 2013, looking at cardiac arrest and the success of Return of Spontaneous Circulation (ROSC) in this population.

**Results**: We analyzed 11,700 cardiac arrest calls during the time period, with 1,620 having a ROSC. Comparing BLS only vs single paramedic vs duel paramedic systems, 13.9% of dual systems had ROSC, 13.3% had ROSC that were single paramedic, with 0% having ROSC with a BLS only system.

**Conclusion**: ALS is important for ROSC during cardiac arrest; however, it is unclear if having two or more paramedic providers are necessary to achieve ROSC. If truly equivalent, then the cost savings of only having a single paramedic provider system might be worth looking into.

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## Prehospital Monitoring of Vital Parameters Using a Novel Device - RespiHeart

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**Study/Objective**: The study aims at validating a novel device (RespiHeart) for monitoring vital parameters in traumatically injured patients.

**Background**: There is a need for a simple-to-use method for monitoring of vital parameters in the prehospital setting. RespiHeart is a small medical device that is attached to the sternum. It sends light of defined wavelengths into the underlying vasculature, and measures the reflected light. The resulting signals are then treated using proprietary algorithms to obtain heart rate and respiratory rate. The device has the capability to also measure oxygen saturation, temperature and movement.

**Methods**: The device was tested during training sessions for medical personnel, where various traumatic wounds were inflicted on anesthetized pigs. The training was primarily

focused on teaching acute lifesaving interventions. The RespiHeart device was applied to the animal and used to monitor vital parameters throughout the training session. A total of 22 animals were included in the study. The data gathered from Respiheart were compared to results from a pulse oximeter and ventilator connected to the animal. Statistical comparison were performed using linear regression and Bland-Altman plots to analyze agreement of methods.

**Results**: The heart rate as measured by the pulse oximeter was correlated to the rate reported by RespiHeart. The $R^2$ was 0.9946 with a p-value of less than 0.0001. Bland-Altman analysis of heart rate revealed a bias of -0.06127 (95% CI -2.219-2.097). The respiratory rate as set on the ventilator was correlated to the rate reported by RespiHeart. The $R^2$ was 0.9978 with a p-value of less than 0.0001. Bland-Altman analysis of respiratory rate revealed a bias of -0.008584 (95% CI -0.42-0.4028).

**Conclusion**: The results obtained in this study demonstrate a high degree of correlation between the data obtained from RespiHeart and the pulse oximeter and ventilator. This renders RespiHeart as a promising device for prehospital use.

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## Alert Function of Emergency Medical Information System: Securing Sufficient Time and Medical Resources in Mass Casualty Incidents

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**Study/Objective**: To evaluate the efficacy of alert function for mass casualty incidents in which prompt information can be provided from fire departments to hospitals.

**Background**: In mass casualty incidents, securing sufficient time and resources for medical action/response is key. In 2003, Emergency Medical Information System in Hyogo Prefecture (EMISHP) was innovated with a special alert function, through which fire departments can simultaneously alert medical institutions about mass casualty incidents in local man-made disasters.

**Methods**: Retrospective analysis of mass casualty incidents/disasters in which the alert function was activated from 2003 to 2015. Number of casualties, destination hospitals to which the injured were transported, duration from emergency call to activation of alert function (activation time), time of search and rescue activity at the scene (S/R time), etc., were evaluated.

**Results**: In 13 years, the alert function was activated in 143 mass casualty incidents. These included motor vehicle accidents, fire/explosion, chemical spill, etc. The casualty count ranged from 0 to 662 (median value = 5). Activation time ranged from 1 to 89 minutes (median value = 12). S/R time ranged from 13 minutes to 23 hours 23 minutes (median value = 70 minutes). The number of destination hospitals ranged from 0 to 54 (median value = 3). In all cases, Emergency Medical Coordinators (EMCs) at Hyogo Emergency Medical Center, a principal hub hospital for disasters, directly or indirectly assisted, by providing prompt first aid at the hospitals, dispatching doctor-attending cars or helicopters and DMATs (Disaster Medical Assistance Teams) to the scene if requested, and coordinating activities across medical teams and fire departments.

**Conclusion**: By sharing up-to-date information with hospitals and fire departments, the alert function of EMISHP, along with the EMCs' coordination, enables smoother patient transport to hospitals and improved medical activities at the scene. This alert function contributes much in securing sufficient time and resources for medical response in mass casualty incidents.

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## So You Need to Suddenly Evacuate Hundreds of Hospital Patients - Without Power

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**Study/Objective**: This case study will discuss events during, after, and lessons learned from one of the largest 'entire' hospital evacuations to date in United States History.

**Background**: Between 1971 and 1999 there were about 275 reported hospital incidents involving hospital evacuations. Of these, a majority occurred because of an event that originated within the hospital. Whether natural disaster or not, hospitals are an easy target to become victims of sudden catastrophic events. In the summer of 2016, a lightning strike and fire forced the evacuation of a multi-story hospital of hundreds of patients without power.

**Methods**: After lightning struck a Florida Hospital, a fire then ensued that destroyed both the power and the backup power for the entire hospital, despite the fire itself spreading. This led to more than 70 ambulances from over 175 miles away, three ambulance Mass Casualty Incident (MCI) buses, multiple engine companies, emergency management response, a couple EMS physicians, and multiple sheriff's units evacuating over 200 patients, both ambulatory and Intensive Care Unit (ICU) intubated and ventilated patients, to various hospitals in the region.

**Results**: No deaths were reported, and no further injuries initially reported among rescuers during the approximately six hour operation.

**Conclusion**: While a large number of various agencies and hospitals had an impressively successful outcome, many lessons can be learned for other facilities as well as improvements for an even better response in the future, and hopefully disaster mitigation.

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## EMS Preparedness to Arson Terror

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**Study/Objective**: Research characteristics of arson terror and the differences between wildfires that occur naturally and those by arson, to learn the necessary preparedness concepts and reduce response times while improving response quality to such events.

**Background**: Wildfires occur where all elements of the fire triangle exist, these are an ignition source, combustible material and oxygen. During December 2010 Israel's Carmel forest experienced an extensive forest fire with 17,000 people evacuated from their homes and 44 dead, the fire did not extend out of the region where it started. During November 2016, the weather conditions were hot and dry and fires occurred in multiple regions in Israel, some not close to each other. The police investigations are yet to have final conclusions but preliminary reports show that 40/90 fires are due to arson.
**Methods**: Magen David Adom (MDA), the Israeli national EMS organization compared the difference between arson terror and wildfires from EMS perspective.
**Results**: Fires occurred in different regions of Israel, more than 1,500 apartments were consumed and 75,000 people evacuated. Two nursing homes were evacuated with more than 80 patients transported, including an ICU ward with 22 mechanically ventilated patients. More than 125 casualties were evacuated with smoke inhalation injuries. MDA resources utilized include 845 ambulances, 61 medicycles, 99 mobile intensive care units (MICUs), 2 mass casualty incident (MCI) vehicles, an advanced command & control vehicle and emergency backup ambulances.
**Conclusion**: Arson terror is characterized by multiple fires in different regions. The Magen David Adom response to extensive incidents is based on shift, on-call response and recruiting personnel and vehicles from nearby regions. Mobilization of EMS resources is complicated because of fires blocking roads, the need to simultaneously respond in multiple regions while holding preparedness in others because of the uncertainty factor about the locations of next arsons. Also, although they had been called, not all personnel can report to duty because their homes or families are affected.

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## Simulating Multi Casualty Incidents to Improve Preparedness of Potential Incident Commanders for Real Events

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**Study/Objective**: To study the influence of Mass Casualty Incident (MCI) simulator on the confidence and decision-making of potential incident commanders.
**Background**: Israel has been dealing with multi casualty incidents since before it was founded. Magen David Adom (MDA) as the Israeli national EMS organization, has gained extensive MCI experience. MDA personnel are trained in the concepts and algorithms of MCIs and incident commander training is mandatory for EMT's and Paramedics. A simulator was developed with cooperation of "Technicon" institute to simulate the high load on the thought processes while making decisions. The participant is briefed at the beginning of the scenario, then he must follow the initial MCI algorithm and start making decisions to distribute forces, triage and patient treatment. The simulator does not allow delegation of medical, parking and transportation responsibilities to deputy commanders.
**Methods**: The simulator was played by MDA personnel in a classroom mode. Participants were given 10 minutes per scenario, each participant played 3-5 scenarios after which, the participants had to fill out a survey about the scenario, and a concluding survey after the completion. The logs were retrieved and compared to the surveys to analyze change in confidence level as incident commander, action times and durations, prioritization skills and overall survival of casualties.
**Results**: With the completion of each scenario the participants reported a rise in their confidence level as incident commander, shorter response times for requests for additional resources, and shorter times for initial triage and patient treatment, and transportation to the hospitals.
**Conclusion**: The simulator engages participants to make quick and appropriate decisions while in state of stress. The main goal is to save as many lives as possible by conducting good initial triage and lifesaving treatment, transporting as many patients as possible - as quickly as possible and with the most appropriate medical personnel. The simulator was found to increase confidence, decision making and prioritizing among incident commanders.

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## Developing an Educational Intervention to Train Prehospital Responders in High Consequence Emerging Infectious Diseases

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**Study/Objective**: The goal of this session is to provide participants with an overview of efforts currently underway, to develop an interactive online curriculum to provide an awareness level, as well as, just-in-time training for issues surrounding response to high consequence emerging infectious diseases.
**Background**: From the global threat of Ebola Viral Disease, to outbreaks of novel influenza, through localized outbreaks of multidrug resistant tuberculous, the prehospital disaster and emergency medical community must continue to maintain a constant awareness of operational and clinical concerns associated with high consequence emerging infectious diseases. Such vigilance starts with syndromic recognition, and quickly transcends to include operational issues, clinical interventions, public health integration.
**Methods**: The University of Maryland, Baltimore County (Maryland, USA), Department of Emergency Health Services has partnered with the Maryland State Department of Health and the Centers for Disease Control and Prevention (USA), to develop an online educational curriculum. The curriculum is hybrid in design and includes awareness level training, as well as, just in time "medical minutes" for providers to review in near, real time. Once deployed, the content will be accessible via computer, tablet and smartphones. The curriculum is validated by subject matter experts and field providers for content and usability.

**Results**: Scheduled for deployment in mid 2017, this curriculum will be accessible to over 50,000 prehospital, hospital and clinic personnel throughout Maryland and the National Capital Region of the United States, as well as internationally through the web interface. Curriculum exists of twelve modules of didactic and live video-taped demonstrations.
**Conclusion**: Online education has been established as a well-validated means of content delivery, and offers an ideal means of content distribution to prehospital personnel. The development of an online educational intervention to educate prehospital personnel in critical issues surrounding high consequence emerging infectious diseases, can help ensure better patient care and prehospital EMS system readiness.
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## Three-Wheeler Driver Training on Prehospital Emergency Care Service Provision in Anuradhapura Sri Lanka

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**Study/Objective**: To improve the capacity of Three-Wheeler Drivers (TWDs) on prehospital emergency care provision and patient transport in the City of Anuradhapura.
**Background**: Since the Tsunami of 2004, the most destructive natural disaster in the country Government of Sri Lanka, together with a number of private organizations, attempted to establish prehospital care service provisions; however they failed to establish such to date. World Health Organization (WHO) recognizes, the development of a lay person first responder program, as the initiation towards establishing proper EMS in resource poor settings. Anuradhapura is geographically the largest district situated 220 Km, (137 mi.) away from the Capital.
**Methods**: A descriptive study was carried out over a period of two weeks in the Teaching Hospital of Anuradhapura (THA), the only tertiary care center in the district, to identify the contributions made by the TWDs on emergency patient transport. A group of TWD (N = 37) was trained on first aid, and some components of BLS and safe patient transport. A training module was developed with the aid of consultant anesthetists, surgeons and triage nurses working in THA. Pre and post assessments were compared to assess the effectiveness of the training program.
**Results**: Nearly three quarters of patients admitted to the emergency medical and surgical units were transported in TWS (74,7%, n = 454). Cardiovascular incidents including MI (14.9% n = 68), snakebite and poisoning (3.3%, n = 15) were the most common medical emergencies; while Trauma including RTA was the most common surgical emergency (44.9%, 204). Participants for the training program had an average of 13 years (SD 5.4) experience as a TWD, and has handled 12 emergency patients a year (SD = 7.95). Nevertheless, none of them has had a previous exposure to training on EMS; Paired t test showed significant improvement on the post training assessment (t = 16.954, 95% CI6.47tp 8.23, $p < 0.00$).
**Conclusion**: Considering the pattern of emergency patient handling in the area, TWDs could be the best layperson group to train on EMS. Training module should be designed in a way to address the most common emergency conditions.
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## Death in an Ambulance in Rural Haiti: Proper Care of the Recently Deceased

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**Study/Objective**: To describe the issues encountered during the profession of emergency care to a severely injured patient, who ultimately died during transport.
**Background**: Severely injured patients can die during ambulance transport to a hospital. The appropriate care and disposition of the deceased varies greatly depending on location, and carries significant implications.
**Methods**: The case was discussed with providers involved in the care of the patient, and the local Haitian staff who assisted in the ultimate disposition of the body.
**Results**: A severely injured man involved in a motor vehicle collision in rural Haiti was transported by ambulance to the nearest trauma hospital. No identification of the patient or his next of kin was possible. En route, the patient became pulseless despite active resuscitation. On arrival, a non-national physician entered the ambulance and declared the patient deceased, prior to accepting patient care or allowing the patient to leave the ambulance. He then refused to accept the deceased, stating the hospital lacked storage facilities and the resources to identify the next of kin. Consultation with the Haitian director of the clinic where the ambulance was based, led to the decision to return the deceased to the clinic and await the police. Following a police investigation, the deceased was transferred to the national hospital morgue.
**Conclusion**: Proper care of the deceased is a highly sensitive cultural matter. In this case, the clinic director's advice for future incidents was to await next of kin before transport in all cases. In regions where prehospital care is uncommon, cultural beliefs and legal statutes may not take into account the ramification of delayed care for the critically injured. Developing an understanding of local, legal and culturally acceptable means of properly caring for severely injured patients who die, is paramount to any international medical operation.
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## Does Rotor Wing Evacuation Shorten Total Prehospital Time? Analysis of Data from Southern Israel

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**Study/Objective**: To evaluate the effect of rotary wing evacuation by the Israeli air force medevac unit on prehospital time in the south of Israel.

**Background**: Rotor wing medevac operations are common worldwide in military and civilian systems. They potentially allow rapid on-scene arrival of medical personnel and evacuation, especially in remote locations or in cases of difficult land access. Until 2012, the only available rotor wing scene evacuation service for the southern part of the country was provided by the air force medevac unit. The south of Israel only has a level one trauma center, the Soroka hospital located in the city of Beer-Sheva. It receives all airborne evacuations from the region and most of the ground evacuations.
**Methods**: Data on evacuation times and injury severity, were collected from the Soroka trauma unit, Airborne Evacuation unit reports and from the national EMS archives. Air transports were matched with actual ground cases when available, or with computer extrapolated times, when matching ground transports were unavailable.
**Results**: In the three-year study period, 263 airborne scene to Soroka hospital evacuations were identified and matched to ground evacuations for each location. Airborne evacuations were shorter in 67.7% of the cases. The average evacuation time reduction was fifteen minutes; 73 of air-evacuated patients (27.7%), had an ISS score of 16 and above.
**Conclusion**: According to worldwide studies and guidelines, airborne evacuations should be reserved for severely injured where the time to ALS treatment and definitive care in a trauma center can be life-saving. Such evacuations may also be justified for less severe injuries in very remote or limited access locations. Our findings show that although helicopter evacuation allowed a mild reduction in evacuation time, this reduction was probably insignificant for the majority of evacuees who suffered only mild/moderate injuries.

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## Prehospital Blood Product Administration Opportunities in Ground Transport ALS EMS Services - A Descriptive Study

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**Study/Objective**: The purpose of this study was to determine whether opportunities for blood product transfusion by ground EMS services exist, and to compare them with HEMS.
**Background**: Hemorrhage remains the major cause of preventable death after traumatic injury. Recent data suggests that earlier blood product administration may improve outcomes. Helicopter EMS (HEMS) units are increasingly fielding blood products.
**Methods**: Single EMS agency retrospective study of ground and air transport between 1/1/2011-12/31/2015, for adult trauma patients transported from the scene of injury, who met predetermined hemodynamic parameters for potential transfusion (heart rate > 120 and/or systolic blood pressure < 90).
**Results**: There were 7,900 scene trauma ground transports that occurred during the study period, of which 843 were classified as emergent dispatch. Of the 420 (49.8%) patients meeting hemodynamic criteria for transfusion, only 53 (12.6%) had a significant mechanism of injury. Outcome data were available for 51 patients; 17 received blood products during their ED resuscitation. The percentage of patients receiving blood products based upon hemodynamic variables ranged from 1.0% (HR) to 5.9% (SBP) to 38.1% (HR + SBP). 27.3% of penetrating trauma patients were transfused, compared with 35.0% of blunt trauma patients ($P = 1.0$). Three prehospital traumatic arrests occurred; all were transfused and none survived. Of 333 HEMS transports, 74 met hemodynamic criteria for blood transfusion, and 28 received prehospital blood transfusion ($P < .0001$ compared with ground ED transfusion). No difference in transport times was noted between air and ground patients ($32.53 \pm 13.65$ vs $27.63 \pm 10.21$; $P = .26$).
**Conclusion**: In our study population, hemodynamic parameters alone do not predict need for ED blood product administration. Despite similar transport times, only one-third of HEMS patients meeting hemodynamic criteria for blood administration received prehospital transfusion. Given complex logistical issues involved in prehospital blood product administration, opportunities for ground administration appear limited.

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## Are Two Always Better than One? Is a Double Paramedic Prehospital System Necessary and Worth the Cost?

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**Study/Objective**: To determine if, in our geographic area of the US, the use of a dual paramedic EMS (Emergency Medical Service) system is an important factor in improving prehospital care.
**Background**: Among many urban EMS systems, there exists a paradigm of belief regarding dual ALS provider ambulances that more advanced training must equal better care. Though much research has focused on the benefits of advanced life support (ALS) versus basic life support (BLS), far fewer studies have been devoted to whether there is any true benefit of dual ALS ambulances. Although seemingly valid on the surface, the foundation for this thinking has rarely been studied and little literature has emerged in support of dual ALS ambulances.
**Methods**: IRB approved retrospective chart review of 14 EMS provider agencies in the Dallas county area (population >2,300,000) for a year from October 2012-October 2013 looking at ALS calls and their complexity. We looked at a three month sample from October through December 2012 to assess for medical complexity to begin to assess which calls might have needed two or more ALS providers.
**Results**: 2731 of ALS charts spanning three months were reviewed for complexity with only five procedures or pharmaceutical interventions deemed complex. This resulted in 30 (1.1%)

instances of use that after review would be deemed complicated and possibly needing greater than one ALS provider.

**Conclusion**: ALS is an important component for a small percentage of prehospital emergencies, but its widespread promotion and use might not be a fiscally sound option.

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## A Survey of 200 National Collegiate Emergency Medical Service Organizations

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**Study/Objective**: Our objective is to look at data collected by the National Collegiate EMS Foundation (NCEMSF) to present an updated statistical summary of the Collegiate-Based Emergency Medical Service (CBEMS) organizations.

**Background**: University campuses are unique, typically self-contained environments. In North America over the past twenty years, CBEMS organizations have proliferated on campuses. Today, hundreds of university-funded, student-run organizations perform prehospital medical care for the campus population of our universities.

**Methods**: We performed a retrospective observational study of 200 CBEMS organizations in North America. The NCEMSF has aggregated data from 1993 to 2015 from an annual survey of all CBEMS organizations. Of those, 329 organizations self-identified themselves to the NCEMSF and completed the survey. We excluded 129 organizations who were either not operational or who had not completed significant portions of the survey.

**Results**: In North America, the mean response time for CBEMS organizations is 3.09 minutes. The mean annual budget reported is $38,333. The mean annual call volume is 516 calls, while the mean number of total vehicles per organization is 3.8. Looking at the level of service provided by the CBEMS organization, 15.50% (31/200) are classified as first responder only organizations, 69.50% (139/200) are basic life support (BLS) capable, 3% (6/200) provide intermediate level of care, 8.5% (17/200) provide Advanced Life Support (ALS) care, while the remaining 3.5% (7/200) were classified as 'other'. For the type of response provided, 10.5% (21/200) provide 'event only' coverage, 54.5% (109/200) provide quick response services (QRS) only, 23% (46/200) provide ambulance response, 5.5% (11/200) provide a response type classified as 'other', while the remaining 6.5% (13/200) provide non-emergent response (see Table 1).

**Conclusion**: Collegiate EMS organizations are diverse, with the majority being urban Basic Life Support (BLS) Quality Rescue Services (QRS) services. CBEMS organizations are a relatively recent development in the history of EMS, paralleling other specialty EMS agencies, such as wilderness and tactical medicine.

| Variable | N Size | Mean Or % | Std. Dev |
|---|---|---|---|
| School Type [Private = 0, Public = 1] | 200 | | |
| Private | 103 | 52% | |
| Public | 97 | 48.50% | |
| Campus Type [Rural = 0, Urban = 1, Suburban = 2] | 200 | | |
| Rural | 47 | 23.50% | |
| Urban | 140 | 70.00% | |
| Suburban | 13 | 6.50% | |
| Mean Number of Total Students | 196 | 13515 | 13935.33 |
| Mean Number of Students Living on Campus | 81 | 6053.35 | 4558.12 |
| Level of Service [First Responder = 0, BLS = 1, Intermediate = 2, ALS = 3, Other = 4] | 200 | | |
| First Responder | 31 | 15.50% | |
| Basic Life Support (BLS) | 139 | 69.50% | |
| Intermediate | 6 | 3.00% | |
| Advanced Life Support (ALS) | 17 | 8.50% | |
| Other | 7 | 3.50% | |
| Type of Response [Event Only = 0, QRS = 1, Ambulance = 2, Other = 3, Non-Emergent = 4] | 200 | | |
| Event Only | 21 | 10.04% | |
| Quick Response Vehicle (QRS) | 109 | 54.50% | |
| Ambulance | 46 | 23.00% | |
| Other | 11 | 5.50% | |
| Non-Emergent | 13 | 6.50% | |
| Years of Existence | 192 | 22.05 | 13.79 |
| Volunteer Members | 161 | 44.97 | 29.15 |
| Paid Administrator [No Paid = 0, Paid = 1, Part-Time Paid = 2] | 200 | | |
| No Paid | 135 | 67.50% | |
| Paid | 27 | 13.50% | |
| Part Time Paid | 38 | 19.00% | |
| Portable Automated External Defriberallator (AED) | 156 | 3.01 | 2.33 |
| Coverage Area (Campus Only = 0, Campus + surround Area = 1, Events Only = 2 | 200 | | |
| Campus Only | 127 | 64.80% | |
| Campus + Surrounding Areas | 49 | 25.00% | |
| Events Only | 20 | 10.20% | |
| Number of Vehicles | | | |
| Number of Ambulances | 46 | 1.89 | 1.3 |
| Number of Gas Vehicles | 60 | 1.65 | 1.25 |

**Table 1**. Descriptive Results of Survey Data *(continued)*

| Variable | N Size | Mean Or % | Std. Dev |
|---|---|---|---|
| Other Vehicle (Golf Cart + Utility Vehicle + Bike + Other) | 200 | 1.56 | 2.44 |
| Total Number of Vehicles | 131 | 3.82 | 4.08 |
| Hours of operation [Day Time = 0, 24/7 School Year = 1, 24/7 Round = 2, Evenings = 3, Weekend = 4, Variable = 5, Events Only = 6] | 200 | | |
| Day Time | 11 | 6.51% | |
| 24/7 School Year | 41 | 24.26% | |
| 24/7 Year Round | 63 | 37.28% | |
| Evenings | 31 | 18.34% | |
| Weekends | 3 | 1.78% | |
| Variables | 9 | 5.33% | |
| Events | 11 | 6.51% | |
| Annual Call Volume | 148 | 516.06 | 1174.05 |
| Average Response Time (Mins) | 153 | 3.09 | 2.56 |
| Annual Budget (Dollars) | 101 | 39333.38 | 106217.2 |

**Table 1.** *(continued)*. Descriptive Results of Survey Data.

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## Prehospital Double Sequential Defibrillation: A Matched Case-Control Study

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**Study/Objective**: The goal of our study is to determine if Prehospital Double Sequential Defibrillation (DSD) is associated with improved "survival to hospital" admission, in the setting of refractory ventricular fibrillation/pulseless ventricular tachycardia (VF/pVT).
**Background**: The optimal management strategy of prehospital refractory ventricular fibrillation/pulseless ventricular tachycardia (VF/pVT) is controversial. One proposed management strategy is the prehospital use of Double Sequential Defibrillation (DSD). However, in the setting of Out-of-Hospital cardiac arrest (OHCA), prehospital DSD is a novel and unproven therapy.
**Methods**: This project is a matched case-control study, derived from prospectively collected Quality Assurance/Quality Improvement (QA/QI) data, obtained from the San Antonio Fire Department's Out-of-Hospital Cardiac Arrest (OHCA) database, between January 2013 and December 2015. The cases were defined as OHCA patients, with refractory VF/pVT, that survived to hospital admission. The control group was defined as OHCA patients, with refractory VF/pVT, that did not survive to hospital admission. The primary variable in our study was prehospital DSD. The primary outcome in our study was survival to hospital admission.
**Results**: Of the 3,469 consecutive OHCA patients during the study period, 205 patients met the inclusion criterion of refractory VF/pVT. Using a predefined algorithm, two blinded researchers identified 64 unique cases and matched them with 64 unique controls. Survival to hospital admission occurred in 48.0% of DSD patients, and 50.5% of the conventional therapy patients ($P > .99$; OR = 0.91; 95% CI, 0.40-2.1).
**Conclusion**: Our matched case-control study on the prehospital use of double sequential defibrillation for refractory VF/pVT found no evidence of associated improvement in survival to hospital admission. Our current protocol of considering prehospital double sequential defibrillation, after the third conventional defibrillation, in "out-of-hospital" cardiac arrest is ineffective and cannot be recommended at this time.

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## Frequent Users of Emergency Medical Services

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**Study/Objective**: We examined the proportion and characteristics of frequent EMS (Emergency Medical Services) users (≥four annual calls), reasons for calls, and needs for transportation.
**Background**: There seems to be a trend that the number of patients who are frequently using EMS is rapidly increasing. The reasons are multifactorial and include aging of the population, social problems, changes in health care services, and in home care. If this trend continues, EMS may be faced with major operational and financial burdens.
**Methods**: We conducted a retrospective cohort study. All emergency ambulance calls in Helsinki from January 1, 2015 to December 31, 2015 were included. We analyzed the ones in which the same patient had used the EMS service at least four times per year. Patients were divided into three groups based on the annual call volume; 4-9, 10-19, and ≥20. Appropriate institutional approval for the study was sought.
**Results**: Altogether, 62,400 ambulance calls were handled by EMS during the study period. The calls related to frequent users (n = 15596) comprised 25% of all calls. The number of frequent users was 2,490 (6.3 % of all patients), out of which 1,360 (55.0 %) were female. The median age was 72 (IQR 54-84) years. The number of frequent users with an annual call volume of 4-9, 10-19, and ≥20 was 2, 222, 210, and 58, respectively. The most common reasons for EMS activation was a deteriorated health condition, falls, back pain, mental

problems, and chest pain. In 9,686 (62.1 %) calls, patients were transported to a hospital.

**Conclusion**: This study showed that frequent users constitute a significant proportion of all EMS calls; they may explain the substantial increase seen in EMS call volumes in the last few years. Individually tailored interventions to users with an annual call volume of ≥10 should be considered.

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## Prehospital Care at a Mass Endurance Event: The Chicago Marathon Experience

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**Study/Objective**: To investigate the impact of prehospital care on patient outcomes and public health systems for the Chicago Marathon from 2012 to 2015.

**Background**: The Bank of America Chicago Marathon is a 26.2 mile race with approximately 40,000 runners annually. One of six World Marathon Majors, it serves as a model for mass event field medicine. The goals of this medical infrastructure are to decrease time to medical attention and transport, triage effectively, decrease hospital burden, and optimize public safety. This study examines impacts of medical structures at the Chicago Marathon, highlighting patient care volumes and trends.

**Methods**: A comprehensive retrospective study was conducted of the Chicago Marathon during 2012-2015. Prehospital medical care involved 21 medical aid stations on course, and two major medical tents in the finish area, including general care and intensive care units. Each facility, staffed with medical personnel, conducted its own triaging. Additionally, each site was equipped with an EMS Superior ambulance for transferring patients to a higher level of care if needed. Medical data was collected via paper and a digital Medical Patient Tracking System designed by Nika Tec.

**Results**: During 2012 to 2015, in total 4,963 people encountered pre-hospital care at the marathon. Of these, 175 people (3.53%) were transferred to a hospital for further care (Figure 1). One-hundred-thirty (2.62%) people were treated in the on-site ICU facilities, suggesting that the triage system imperatively connects patients to appropriate care without overburdening particular personnel and resources.

**Conclusion**: The majority of individuals seeking care were successfully triaged and treated by the personnel and resources on site, addressing the needs of an average of over 1,200 individuals per event. The small fraction transferred to hospitals minimized the public health burden, while identifying and mobilizing those who required transfer. This event can be likened to mass events both planned and unexpected, and it demonstrates strategic pre-hospital medical preparedness.

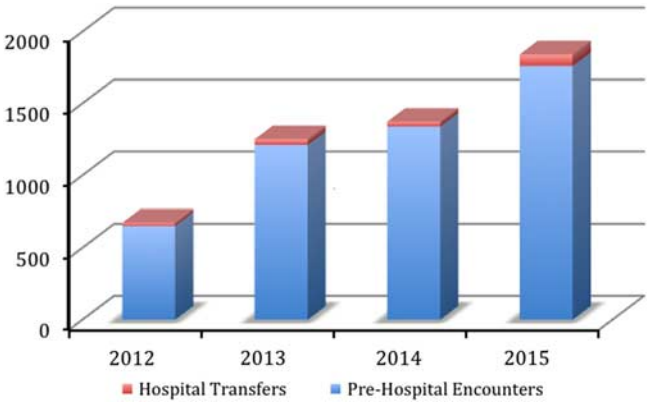


**Figure 1.** Number of Medical Encounters at Chicago Marathon 2012-2015.

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## Analysis of Prehospital Scene Times and Interventions on Mortality Outcomes in Victims of Blunt and Penetrating Trauma

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**Study/Objective**: This study was to perform an outcome analysis of patients presenting after blunt (BT) and penetrating (PT) traumatic events.

**Background**: Recent studies have suggested improved outcomes in victims of penetrating trauma, managed with shorter prehospital times and limited interventions.

**Methods**: Descriptive analysis of the 2014 National Emergency Medical Services Information System (NEMSIS) public release research data set for patients presenting after acute traumatic injury.

**Results**: A total of 2,018,141 patient encounters met criteria, of which 3.9% were PT. Prehospital cardiac arrest occurred in 0.5% BT patients, and 4.2% PT patients. 0.8% BT patients and 4.1% PT patients died in the ED. Scene times were 18.1 (IQR 11.0-21.0) minutes for BT and 16.0 (IQR 8.0-17.0) minutes for PT, while transport times were 15.1 (IQR 7.0-19.0) minutes and 14.4 (IQR 6.0-17.0) minutes for BT and PT, respectively. Mean scene time for BT patients who died in the ED was 24.9 (IQR 10.0-24.0) minutes compared with 18.8 (IQR 11.0-22.0) minutes for those admitted; for PT, scene times were 17.9 (IQR 8.0-18.0) and 13.4 (IQR 6.0-17.0) minutes, respectively. Mean number of procedures performed for BT patients who died in the ED was 6.5 (IQR 3.0-9.0) compared with 3.1 (IQR 1.0-4.0) for those who survived until admission; for PT, number of procedures performed were 5.7 (IQR 3.0-7.0) and 2.6 (IQR 1.0-3.0), respectively. 2.2% BT and 14.8% PT patients receiving prehospital venous access died in the ED.

**Conclusion**: Although less common than BT, PT is associated with higher prehospital and ED mortality. Increased scene time and the number of procedures was associated with greater mortality for both BT and PT. Further study is required to better understand any causal relationships between prehospital times, interventions, and patient outcomes.

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## Emergency Care in Cases of Occupational Traumas Among Members of a Vessels Crew, on Sea Transport Ships of Northern Water's Basin

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**Study/Objective**: Sea transport fleet is the main supplier of goods for commercial enterprises and settlements on the Arctic coast of Russia.
**Background**: Extreme conditions of navigation in the northern latitudes lead to the creation of dangerous situations for occupational traumas.
**Methods**: There were 1,367 damages with disability that occurred on vessels of sea transport fleet (208.1 per 1,000 employees).
**Results**: Heightened risk for traumas where the ship's work related to maintenance and repair mechanisms of the engine room (124.4); galley (73.4); maintenance of deck machinery (69.2); handling by the crew (54.8); moving on ladders and decks (44.9); mooring (30.2); machine tools (9.6); and with hatch covers (7.0). Blunt trauma applied in most cases (173.0), sharp (11.0), and thermal agents (11.0). Poisoning by acid, alkali, metal vapor, carbon monoxide, and poisons amounted just 2.4%. Alcohol intoxication among the sailors of the transport fleet was set to 8.9% of occupational traumas on sea transport fleet (18.0). Fractures of the bones of various localization occurs 2.5 times more frequently, and severe bruising almost 2.9 times. Bone fractures are the leading type of damage in the structure, in all the anatomical and functional segments ($P < .001$), including the closure, amounted to 85.5% of cases and open ones - 14.5% ($P < .001$).
**Conclusion**: For occupational traumas on ships, 27.7% of patients (54.1) were surgical procedures designed to stop bleeding from wounds, toilet of antiseptic solutions with elements of surgical treatment, and application of aseptic and plaster casts. More than one-half of the patients (63.6%; 123.7) were treated conservatively, and only 9.7% (17.7) were subjected to surgical intervention. Complications occurred in 15.5% of patients. The average number of disability days was 42.7; bed days 26.4. Recovery occurred in 85.4% (17.5) affected seafarers; they were transferred to light work, followed by vocational rehabilitation 7.5% (15.8), set disability 1.4% (2.8). Mortality was 5.7% (12.0).

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## Perceived Collaboration during Mining Incidents - Focus Group Discussions with Mining Workers and Managers, Rescue Service Personnel, and Ambulance Personnel

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**Study/Objective**: To study perceived collaboration among mining workers and managers, rescue service personnel, and ambulance personnel when mining incidents occur.
**Background**: Studies focused on rescue operations in mining incidents and on the emergency medical service's part in the rescue operations are scarce. In Sweden, usually the local rescue and ambulance services are dispatched to mining incidents. In a Swedish study, it was found that about one-half of the ambulance personnel in mining districts felt unprepared for managing mining incidents, and almost all the personnel desired to learn more about mining incidents.
**Methods**: Six focus group discussions were performed that included mining workers and managers, rescue service personnel, and ambulance personnel that have a mine in their uptake area in the county of Västerbotten, Sweden. Additionally, ten complementary individual interviews with ambulance personnel were undertaken. The interviews were transcribed verbatim and analyzed with qualitative content analysis.
**Results**: The rescue service personnel and the mining personnel perceived their collaboration to be good, but there are still things to consider, eg, being sure that all rescue personnel are willing to enter the mine. During a fire in the Kristineberg mine 2013, several difficulties arose uncovering the need for further collaboration. The ambulance personnel were mostly left out of the collaboration, as most often they waited for the injured to be brought up from the mine. Both the rescue service personnel and ambulance personnel need to rely on the mining personnel when entering the mine, which can lead to difficulties.
**Conclusion**: There is a need to prepare for major injury incidents in a mine, eg, a fire incident with several injured. Therefore, the three organizations need to collaborate more closely, especially the ambulance personnel need to be included more.

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## Early Implementation of BLS, Determining the Effectiveness of Cardiopulmonary Resuscitation

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**Study/Objective**: Correlation between the effectiveness of emergency medical actions taken by ambulance medical staff and early BLS implementation in cases of a sudden cardiac arrest was investigated.

**Background**: The coronary and cerebral perfusion in patients with sudden cardiac arrest in prehospital conditions mostly depends on quality of chest compression taken by the witness, and on the medical emergency procedures implemented by ambulance teams.
**Methods**: The retrospective studies analyzed 1,078 cases of a sudden cardiac arrest that occurred in the Siedlce District, Poland. The collected data emerged from medical documentation of Emergency Ambulance Service in Siedlce. The influence of early BLS implementation by witnesses before ambulance arrival, the type of ambulance medical staff performing medical actions, and ambulance arrival time to a place of an accident were taken under consideration on the effectiveness of a successful cardiopulmonary resuscitation. If the return of spontaneous circulation was obtained and a patient was taken to hospital, actions were considered to be effective.
**Results**: In the years 2013, 2014, and 2015, there were respectively reported 345, 354, and 379 cases of a sudden cardiac arrest. Having analyzed the whole group of 1,078 cases - early BLS implementation before ambulance arrival was taken by 31% of witnesses. It was noticed that taking early BLS implementation significantly increased the effectiveness of a resuscitation from 31% to 53%. Ambulance arrival time was compared (BLS/non-BLS cases) and it was 7 minutes 51 seconds and 8 minutes 12 seconds, respectfully. Moreover, the type of ambulance medical staff (with and without a doctor) did not have any impact on the effectiveness of a resuscitation.
**Conclusion**: The effectiveness of emergency medical actions, in cases of a sudden cardiac arrest especially, depends on early implementation of BLS by witnesses in prehospital condition.
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## Does EMS Performance Lead to a Reduced Number of Organ Donors?

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**Study/Objective**: To evaluate whether Emergency Medical Service (EMS) identifies potential organ donor candidates and initiates the care needed.
**Background**: According to Finnish Organ Donation guidelines, all patients in need of organ transplantation should have timely and fair access to transplants. Thus, every potential donor should be identified and referred to intensive care. For most potential donors, EMS is the point of entry to medical care, and unconsciousness is the most typical presentation in the prehospital setting.
**Methods**: We conducted a retrospective study with data from Helsinki EMS hospital and out-of-hospital cardiac arrest databases. Patients included were ≤80 years old, with a Glasgow Coma Score ≤8, and transported to hospital with code "702" (unconscious) in 2015, and EMS witnessed traumatic cardiac arrests in 2013-2015.
**Results**: In 2015, we identified 84 patients belonging to this study group; 24 patients (male n = 12, median age 57 [IQR = 48-66] years) were later diagnosed with stroke, traumatic brain injury, or were resuscitated from cardiac arrest and did not have contraindications for organ donation in theory. Of those, 22 patients were intubated and ventilated on scene, of which 11 died later in the hospital. Six of them were considered for organ donation and two patients became organ donors. Both patients who were not intubated on scene, and allowed to breath spontaneously, were subsequently intubated in the emergency department and considered for organ donation, and one of them became an organ donor. In 2013-2015, four trauma patients had an EMS witnessed cardiac arrest (male n = 3, median age 32 years). Three of them received Basic Life Support cardiopulmonary resuscitation. All had clinical evidence of severe blunt multitrauma and they died on scene.
**Conclusion**: Possible organ donor candidates are well recognized in EMS. EMS performance does not lead to a reduced number of organ donors.
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## Cold Exposure After a Train Crash - An Experiment in a Cold Environment

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**Study/Objective**: To explore the air cooling rate in an intact rail carriage, in a cold environment, after power was turned off.
**Background**: There have been a growing number of train disasters globally. The high speeds increase the risk of severe injuries, and many train routes are far from navigable roads. Rescue operations after international train crashes have been complicated and lengthy. In the circumpolar regions, cold exposure has to be added as a negative factor, as hypothermia could be lethal, especially in combination with trauma. However, there is a lack of knowledge about the specific milieu that the passengers could be exposed to in a train crash in a cold environment.
**Methods**: The experiment was performed inside an intact train, type Coradia Nordic X62, in Sweden. The outdoor temperature was -13.8ºC, and inside the carriage the air temperature at the floor was +21.0ºC when the power was cut. Air temperature was measured by air loggers every 30 seconds.
**Results**: After one hour, the air temperature at the floor reached approximately 15ºC, after two hours, 12ºC, and after four hours, 6ºC. A theoretical simulation shows that the floor temperature should reach temperatures below zero after seven hours.
**Conclusion**: The results draw attention to the importance of a rapid rescue operation, as well as an ability to retain heat in the carriages, is of great importance in order to reduce the risk for secondary injuries and fatalities due to hypothermia. In order to fulfill the needs of thermal comfort for passengers travelling in cold environments, and in rural areas far from passable roads, more effective material not dependent on electricity might be needed in the trains.
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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## Helping the Helpers Program

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**Study/Objective**: Emergency Responders benefit from the Mental Health and Psychosocial Support Network (MHPSS) for care, so that their well-being and capacity to provide quality care and support to beneficiaries improves; utilizing the International Committee of the Red Cross (ICRC), ensuring that persons in-need are identified, and receive initial psychological support.
**Background**: In the 2014 war, Emergency Responders were exposed to traumatizing events such as working in difficult conditions and evacuating wounded and dead bodies. They dealt with severely wounded including children and women. Sometimes, they had no access to beneficiaries, which was an important source of stress for them. Their facilities were targeted and some responders were wounded or killed. Added to such difficulties, they also face the same problems as the general population does (ie, fear, loss, home destruction, and displacement).
**Methods**: Capacity building for 32 MoH MHPSS professionals. Coordination with 16 structure/cycles, three cycles/year (hospitals, Civil defense). Providing support group sessions (eight sessions, 12 participants/structure/cycle). Sensitization of Structures' Managers on HH program. Supervision, monitoring, and evaluation. Data collection and analysis.
**Results**: Three hundred sixty-one Emergency Responders attended two cycles in 2016 with 87% attendance level. 70% were males and 30% females; regarding their occupations, 27% administrative, 21.5% nurses, 19% paramedics, 11.5% doctors, 11% drivers, 5.5% MHPSS professionals, 4.5% firefighters. HADS (hospital anxiety and depression scale). Anxiety: Normal to mild cases increased from 71.5% to 88%, moderate to severe decreased from 29% to 12%. Depression: Normal to mild cases increased from 89.5% to 94%, moderate to severe decreased from 10% to 5%. Qri-Sop Scale (Much and Very much improvement). 68% on self-awareness, 61% on social network, 57.6% on family relations, 61.3% on relation with beneficiaries, and 54% on work environment.
**Conclusion**: The success of this program relies in its sustainability and the quality of services provided, the ultimate objective is to promote MoH's capacity and ownership of the program.

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## Psychological Wellbeing as a Priority throughout the Deployment Cycle

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**Study/Objective**: Psychological support procedures for deployed Australian Medical Assistance Team (AusMAT) personnel.
**Background**: Disaster response personnel are deployed into stressful and traumatic situations. Although most organizations recognize staff care as an operational necessity, and psychological well-being can be easily overlooked if not built into a considered set of procedures. AusMAT has consistently applied a system of psychological well-being monitoring throughout the deployment cycle for its deployments to various disasters over recent years.
**Methods**: AusMAT has engaged Response Psychological Services to develop and facilitate a range of deployment cycle mental health and wellbeing support process. These have included pre-deployment Psychological reviews, deployment counselling and debriefing support, and post-deployment debriefing. Additional services being reviewed for implementation include online well-being checks, peer feedback and psychometrics for selection.
**Results**: Incorporating mandatory psychological well-being checks and processes as a deployment support procedure have benefited individuals, teams and the AusMAT organization. Individuals benefit from opportunity to review preparation, alignment and readiness to deploy at the crucial pre-deployment period. Individuals and managers can access counselling, debriefing and liaison support confidentially during and after deployment in relation to general issues and crises. The post-deployment process of debrief enhances individual and organizational consolidation of experience, and access to further support where necessary. The direct benefits are augmented by a sense among deployed that AusMAT prioritises their personal and mental well-being with considered and robust support procedures in place.
**Conclusion**: AusMAT has incorporated psychological well-being support as a deployment standard operating procedure. Further efforts will involve the incorporation of identified digital processes, for enhancing timely monitoring and access to psychological support resources. A broader initiative aims to improve selection, and thereby increase resilience of individuals and teams. The AusMAT psychological wellbeing initiative is established and embraced by deployed. Future enhancements will lever technology to bolster existing procedures.

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## Psychological First Aid Training as Public Health Preparedness: Results of a Demonstration Project

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**Study/Objective**: The project goal is to increase dissemination of trainings in Psychological First Aid (PFA) for health care and public health workers who may become involved in the disaster responses. PFA is a universal early intervention and core preparedness competency for response agencies and widespread PFA training can promote workforce and community resiliency.
**Background**: A survey of health care organizations found that only 8% had a PFA-specific training policy. Reported barriers included lacking expertise in training content and online course selection appropriate for their staffs, and lacking subject matter experts to help implement face-to-face, interactive practice sessions.
**Methods**: Program elements include:

- PFA Training Coordinator Guide evaluates 14 online PFA training courses, with recommendations based on each course's audience, skill level, length, and other attributes so a training coordinator can select an appropriate course for their audience.
- Detailed instructions about facilitating interactive sessions so participants can supplement online courses with in-person practice, including 10 different response scenarios (hospital, POD, emergency shelter). Participants rotate through acting as Helper, Client, and Observer.
- Train-the-trainers have been held throughout New York State to equip Training Coordinators to use the guide and facilitate the roleplays, with support available from trained Technical Assistance Providers with a mental health background who can assist with roleplays.

**Results**: Participants' confidence in practicing PFA was measured after they took an online course, and again after they participated in live practice; average confidence increased by 23.7%. The statistical increase was supported by unanimously positive participant comments such as "I liked the on-line course but being able to have the interactive learning was beneficial."
**Conclusion**: Results support our belief that strictly didactic training in PFA is less-effective than incorporating practice opportunities. While the project is ongoing, we hope to disseminate early results as a model for building community resilience by encouraging widespread training in Psychological First Aid.

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## Victorian Compendium of Community-Based Resilience Building Case Studies

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**Study/Objective**: The 'Victorian compendium of community-based resilience building case studies' represents an Australian first in compiling a comprehensive resource for promoting resilience building activities to strengthen capacity, should unexpected events occur. A key Compendium tenant enables people to share examples and expertise by explaining how they overcame challenges or discovered unexpected findings.
**Background**: The Compendium complements several Victorian resilience initiatives. The Rockefeller funded, Resilient Melbourne Strategy incorporates the Compendium to bring together people from across sectors, council boundaries and community groups to deliver a series of distinct, yet connected actions that help make Melbourne a more viable, sustainable, liveable and prosperous city, today and long into the future. Sharing resilience case studies reduces program duplication and saves valuable resources.
**Methods**: From 2012-2016, community groups received Expressions of Interest (EOIs), requesting presentations about community-based resilience building activity for the 'Advancing Community Resilience Forum'. Each year, fifteen activities were selected for presentation and authors were invited to submit their presentation for consideration into the Compendium, using a standard template. A steering committee selected quality resilience building activities for inclusion into the Compendium.
**Results**: There were 123 EOIs received and 72 were accepted and invited for presentation. All 72 authors accepted invitations to present and subsequently received another invitation to submit their activity for consideration into the Compendium. Thirty-five accepted; of these, 15 have been accepted for inclusion into the Compendium, 5 are under consideration by the steering committee and 15 authors are preparing for submission
**Conclusion**: While projects revealed uniqueness and valuable learnings, authors were often surprised that their projects embodied these qualities. Authors expressed concerns over sharing information, identified challenges when using the Compendium template which resulted in significant modifications. Lastly, authors voiced difficulty reflecting on their challenges and critical factors for success. This model provides an exemplar to replication in other countries.

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## The Trauma Signature of 2016 Hurricane Matthew and the Psychosocial Impact on Haiti

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**Study/Objective**: Examine the mental health and psychosocial dimensions of Hurricane Matthew's impact on Haiti using Trauma Signature (TSIG) analysis.
**Background**: Hurricane Matthew was the most powerful tropical cyclone of the 2016 Atlantic Basin season, bringing severe impacts to multiple nations including direct landfalls in Cuba, Haiti, Bahamas, and the United States. Haiti experienced the greatest loss of life and population disruption.
**Methods**: Trauma Signature (TSIG) analysis was used to examine the psychological consequences of Hurricane Matthew in relation to the distinguishing features of this event. TSIG analysis described the exposures of Haitian citizens to the unique constellation of hazards associated with this tropical cyclone. A hazard profile, a matrix of psychological stressors, and a "trauma signature" summary for the affected population

of Haiti - in terms of exposure to hazards, losses, and life changes - were created specifically for this natural disaster (with salient anthropogenic elements).
**Results**: Psychological risk characteristics of this event included compounding exposures to: deluging rains that triggered mudslides along steep, deforested terrain; battering hurricane winds (Category 4 winds in the "eyewall" at landfall) converting the built environment into projectile debris; flooding "storm surge" moving ashore and submerging areas along the Tiburon peninsula; and piling wave action destroying infrastructure along the coastline. Many coastal residents were left defenseless to face the ravages of the storm. Hurricane Matthew's slow forward progress as it remained over superheated ocean waters added to the duration and degree of the devastation. As an overlay to the havoc of the storm itself, the risks for infectious disease transmission were exacerbated, particularly in relation to the ongoing epidemics of cholera and Zika.
**Conclusion**: Hurricane Matthew was a ferocious tropical cyclone whose meteorological characteristics amplified the system's destructive force during the storm's encounter with Haiti. TSIG analysis facilitates an accounting of the prominent risks to Haiti's mental health.
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## Training Community Health Workers to Promote Psychosocial Health and Resilience among Children in Haiti

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**Study/Objective**: The purpose of this project was to train community health workers in Haiti to facilitate psychoeducational groups with children exposed to trauma. Twenty undergraduate students were trained in group facilitation techniques and worked in collaboration with the author to develop a group counseling model to be implemented in elementary schools. Teachers in these schools were trained to recognize signs of trauma in children in their classroom and to identify and refer children who could use the additional support offered by the groups.
**Background**: Trauma exposure among children is common in Haiti due to multiple natural disasters, political violence, abuse, and domestic servitude. At the same time, there is a lack of available resources to provide children the psychosocial support they need. This project was designed to address that need by training a cadre of community health workers to design and implement group counseling intervention for traumatized children. The specific goals of the group counseling intervention were to assist children to: (1) cope effectively with symptoms associated with past traumatic experiences, (2) developed efficacy and skills for dealing with barriers that impede their success, and (3) develop a safe and supportive peer network for managing present and future challenges.
**Methods**: Evaluation has been built into each phase of the project. The variables being evaluated include: (1) effectiveness of the training in group facilitation skills for the community health workers, (2) effectiveness of the teacher training, (3) process issues related to implementing the group intervention in schools, and (4) outcomes of the three goals of the group intervention itself.
**Results**: Initial evaluation results, both qualitative and quantitative, will be presented for each variable. Lessons learned from the implementation of the project will also be discussed.
**Conclusion**: The results of this project can be used to inform others of the development of locally-based projects to train community workers as first-line service providers.
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## Disaster after September 11, 2001: the Long-term Impact on Responding Medics

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**Study/Objective**: To explore the long-term physical and psychosocial health impacts of September 11th on responding medics 15 years after the terrorist attacks.
**Background**: One of the painful legacies of September 11th (9/11) is the lasting impact on the physical and psychosocial health of thousands of individuals who survived the attacks - including the first responders. The 15th anniversary marked an important milestone in our collective remembrance of 9/11. First responders and their families reflected on the unique impacts experienced by this group. This research explores the ongoing consequences of responding to the terrorist attacks amongst medics at the 15th anniversary, a critical data-gathering milestone.
**Methods**: This research employed qualitative methods to compile and review 54 first-person accounts from 9/11 medics, and their families, who recounted their experiences of 9/11 on the 15th anniversary.
**Results**: Fifteen years after 9/11, responding medics continue to be plagued by nightmares, vivid recollections of Ground Zero, posttraumatic stress disorder, anxiety, depression, problems sleeping, negative impacts on relationships, addictive behaviors, and suicidal thoughts. They are experiencing a range of health issues such as respiratory disorders, eye problems, and cancers. Medics reported having access to a range of peer-support services, but most delayed in seeking help. Of note, medics and their family members identified considerable negative follow-up consequences for their families; they highlighted that partners, spouses, and children of medics should have access to the same support services as the responders. The ongoing impact of 9/11 has shattered families and destroyed lives in a never-ending reverberation of pain and suffering.
**Conclusion**: These findings suggest that 9/11 medics and their family members need ongoing monitoring to protect their physical and mental health. The testimony of this research is to ensure that an important voice is not lost, and that the deeply personal and richly descriptive experiences of the 9/11 medics and their families are not forgotten.
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## Level of Individual Preparedness for an Earthquake among Voluntary Medical Rescuers in Turkey

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**Study/Objective**: Our aim was to assess how prepared the UMKE (Ulusal Medikal Kurtarama Ekibi – National Medical Rescue Team) members and their families were for the next disaster.
**Background**: Turkey is a land of earthquakes and a major earthquake in the Marmara region is expected in the near future. Despite this fact, people, including volunteer disaster workers, have low levels of awareness regarding risks and have limited interest in preparedness.
**Methods**: This is a descriptive cross-sectional study, and the study participants were the UMKE (Ulusal Medikal Kurtarama Ekibi – National Medical Rescue Team) members working in the Marmara region. UMKEs are volunteer medical rescue teams. Data collection tools were a questionnaire involving socio-demographic information, and a Disaster Preparedness Checklist (Tezgider et al, 2013).
**Results**: A total of 105 volunteers participated in the study. Of them 53 (50,5%) were women and 52 were (49,5%) men. The mean age was $32\,29 \pm 7\,19$; 55 (52,4%) of the participants had personally experienced a disaster, and 62 (59%) worked actively in a disaster. The most common preparedness activities that the participants have taken were; learning the phone numbers of emergency services (N = 96, 91,4%), knowing local institutions providing information about disaster preparedness (N = 95, 90,5%), having information about residential usage license of current residence (N = 95, 90,5%). The least common preparedness activities were; obtaining information on disaster preparedness activities of neighborhood units (N = 82, 78,1), obtaining information on disaster preparedness activities of district governorship (N = 82, 78,1), obtaining information regarding disaster preparedness activities of the municipality (N = 78, 74,3%).
**Conclusion**: These findings indicate that, although volunteers are highly motivated to engage in rescue activities as a 'saver', neither them, or their families are interested in disaster risk reduction in pre-disaster period.

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## An Exploration of the Effects that Frequent Exposure to Life-threatening Events may have on a Critical Care Paramedic's Psychological Wellbeing

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**Study/Objective**: To explore if Critical Care Paramedics (CCPs) feel their role impacts on their psychological wellbeing.
**Background**: UK Critical Care Paramedics (CCPs) are a specialty of experienced paramedics who have received higher education to deliver extended clinical care. Due to their specialist skills, they are dispatched to the most critically ill and injured patients to deliver advanced care. Internationally, CCPs are recognized within the USA and Canada as Advanced Care Paramedics and as Mobile Intensive Care Ambulance Paramedic (MICA) in Australia.
**Methods**: The CCPs who studied within this UK Ambulance Trust have all received post-graduate training, achieving a certificate, diploma, or MSc in Advanced Paramedic Practice or Critical Care. Eight qualified CCPs with at least one years' experience as a CCP were recruited from one UK Ambulance Service. Face to face, semi structured interviews were conducted. Descriptive phenomenology and Colizzi's framework for data analysis was used to discover the personal perspectives and experiences of CCPs.
**Results**: CCPs see a range of highly emotive incidents daily specifically cardiac arrests and traumatically injured patients. They identified with symptoms suggestive of a heightened emotional response. The negativity of trauma identified within the studies literature review was not comparable with the responses from the majority of CCPs. The CCPs demonstrate resilience and adopt a diverse range of conscious coping strategies. The following factors were appraised by the CCPs to enhance their coping strategies: their ability to perform advanced clinical interventions and perceived positive patient outcomes; organized debriefings and improved clinical reflection; enhanced inter-professional relationships; and a regular crewmate for support.
**Conclusion**: CCPs felt that their role caused slight disruption to their health and wellbeing. They implied improvements to the ambulance services' counseling. Further research focussing on larger populations adopting CCP and advanced paramedic groups would be recommended.

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## Psychological Correlates of Preparedness Behavior of Civilian Populations to Armed Conflicts

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**Study/Objective**: The purpose of this study was to expand our understanding of the behavioral psychological indicators related to preparedness behavior. We hypothesized that correlations would be found between psychological constructs examined in this study and reported preparedness.
**Background**: Preparedness to emergency and disaster situation is imperative to public resilience. Prepared populations are better adapt to cope with emergencies, endure less of their adverse consequences, and recuperate more quickly. Previous studies revealed only a medium level of preparedness

(of the Israeli public) to the threat of armed conflicts, despite it being a major threat in Israel. In particular, studies performed thus far suggest that Israeli preparedness behavior does not adhere to classical correlates of preparedness behavior, such as perception of likelihood or severity. This makes behavioral prediction models inapt in describing preparedness patterns among the Israeli population.

**Methods**: A cross-sectional study based on an Internet survey was performed in 2016. The sample included 385 participants from a diverse socio-demographic background representing the different sectors of Israeli society. The questionnaire included a preparedness index, measurement of the sense of preparedness, Trait Anxiety Inventory, Life Orientation Test, Behavioral Inhibition System (BIS) & Behavioral Activation System (BAS) Scales, and ego defenses.

**Results**: The results suggest that optimistic and rational individuals report significantly greater levels of preparedness, whereas people scoring high on the trait anxiety scale, and those with a tendency to use denial coping mechanisms, report significantly lower levels of preparedness. In addition, the BIS was found to be significantly, negatively associated with reported preparedness. See Table 1.

**Conclusion**: The results of the current study suggest that trait anxiety and optimism appear to be substantially associated with preparedness behavior, and the latter can serve as a predictor of said behavior. Motivating preparedness behavior could draw inspiration from the results of our study.

| | PI | Sense of prep. | Anxiety | Optimism | BIB | BAS | Denial |
|---|---|---|---|---|---|---|---|
| Sense of prep. | .418** | | | | | | |
| Anxiety | -.256** | -.315** | | | | | |
| Optimism | .231** | .132* | -.596** | | | | |
| BIS | .167** | -.184** | .406** | -.175** | | | |
| BAS | .013 | -.028 | .021 | .209** | .347** | | |
| Denial | .111* | .147** | .272** | -.035 | .253** | .146** | |
| Rationalism | .113* | .132* | -.036 | .051 | .091 | .200** | .079 |

**Table 1.** Spearman correlations of preparedness indices and psychological constructs. (N = 3S5).

* - Correlation is significant on the 0.05 level (2-tailed)

** - Correlation is significant on the 0.01 level (2-tailed)

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## A Media Analysis of Canadian Disasters: How are Capability and Vulnerability Framed?

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**Study/Objective**: The purpose of this study is to present a media analysis of articles related to 12 Canadian disasters. The specific research question is: What are the dominant discourses related to capability and vulnerability in mainstream media surrounding Canadian disasters? Our objective is to explore how persons in the general population and those living with functional limitations are portrayed in the media in all phases of disaster.

**Background**: Extreme weather events are becoming more frequent and severe, disproportionately affecting people living with functional limitations. The Sendai Framework emphasizes the need for an all-of-society approach to promote engagement of those disproportionately affected by disasters (UN Office for Disaster Risk Reduction UNISDR, 2015). To do this, community assets must be identified and developed to promote inclusive social participation. The lives of persons living with functional limitations are represented through mainstream media. It is therefore important to explore the language used in the media to provide insight into societal perceptions of capability and vulnerability, to develop strategies for inclusive practice.

**Methods**: A multiple case study design (Yin, 1998) was used to perform a media analysis of 12 Canadian disasters (eg. Fort McMurray wildfire). Cases were chosen to represent different types of events across Canada, between 2009 to 2016. The dataset was analyzed using discourse and sentiment analysis.

**Results**: The results of this study provide an interpretation of how capability and vulnerability are portrayed in mainstream media, and how the consideration of language and power relations influences implementation of an all-of-society approach to disaster risk reduction.

**Conclusion**: Potential contributions of this study include raising awareness of the role of discourse in promoting social participation in disaster risk reduction strategies; including the need for a balanced approach in discussing assets and gaps that make up community contexts that support resilience. These findings will also contribute important knowledge for the application of an equity lens in disaster risk reduction.

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## Preparedness Promoting and Delaying - What Factors Influence Civilian Preparedness to Armed Conflicts?

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**Study/Objective**: The purpose of this study was to explore the promotion and inhibition effects of several socio-psychological factors on households' preparedness to armed conflicts in Israel.

**Background**: Emergency preparedness is a key factor in public resilience when facing adversities. The most prominent emergency threat for the Israeli population is the risk of an armed conflict. Yet, most Israelis tend to ignore the civil defense authorities recommendations for household adjustment to war. Other studies suggest that classical socio-psychological mechanisms of preparedness are irrelevant when tested in Israeli context, making promotion of preparedness behavior a challenging task.

**Methods**: An online survey of 502 participants representing the adult Jewish population in Israel was conducted. A novel visual tool measuring personally salient appraisals and attitudes, called PRISM, and a set of questionnaires designed to assess public perception of preparedness-delaying and promoting factors were used.
**Results**: We observed a correlation between the appraisal of the concept of preparedness and actual reported preparedness, but did not observe similar correlation between the latter and appraisal of the threat itself. In addition, we report that the leading factors for procrastination of preparedness behavior are low prioritization and ignoring of authorities' instruction during routine times (Table 1). The overwhelming majority of the sample indicated that they will engage in preparedness behavior, only when the threat becomes real and imminent. The results of the public-wide survey closely match those assessed by an experts' panel performed prior to this survey.
**Conclusion**: The findings of this study demonstrate the complexity of the socio-psychological perspective of preparedness behavior in Israel. Further studies are needed in order to promote readiness and make resilience plans more effective in achieving their goals.

| Factor | Mean ± SD | 95%CI for mean | % of top scale responses[a] | Spearman correlation (r) with Preparedness Index |
|---|---|---|---|---|
| Low prioritization - people do not prioritize preparedness during routine times and/or assume they will have sufficient time to prepare right before the crisis; | 4.26 ± 1.57 | 4.12-4.40 | 47.0% | -.021 |
| Ignoring instructions - people tend to overlook the emergency preparedness recommendations and/or discard of personal responsibility; | 4.10 ± 1.55 | 3.96-4.23 | 43.2% | -.134** |
| Lack of information - the public is missing information about the threat and how to prepare for it; | 3.77 ± l.63 | 3.36-3.92 | 33.9% | -.097* |
| Misunderstanding the threat - the public does not understand the extent and severity of the threat; | 3.49 ± 1.64 | 3.35-3.64 | 26.7% | -.133** |
| Fear - the concept of war is intimidating and people prefer to avoid dealing with it | 3.48 ± 1.71 | 3.33-3.63 | 28.7% | -.090* |
| Resources limit - people do not have the necessary resources (e.g., money) to prepare for war; | 3.46 ± 1.87 | 3.30-3.63 | 29.7% | -.114** |
| Time limit — people do not have time to prepare for war during their daily routine; | 3.32 ± 1.76 | 3.17-3.48 | 25.9% | -.123** |
| Faith - people believe they will not be affected by the emergency situation and/ or leave it up to fate: | 3.28 ± 1.86 | 3.12-3.45 | 25.4% | -.070 |
| Misunderstanding the instructions — the public misunderstands the recommendations for war preparedness; | 3.21 ± 1.79 | 3.05-3.36 | 24.6% | -.078 |
| Lack of trust - the public does not trust the authorities and/ or their recommendations; | 3.12 ± 1.75 | 2.96-3.27 | 23.3% | -.065 |
| Low self-efficacy — people perceive their self-efficacy to execute the recommendation as low. | 3.03 ± 1.76 | 2.87-3.18 | 22.0% | -.020 |

**Table 1**. Endorsement of preparedness-delaying factors by the Israeli Jewish public - descriptive statistics and correlation with reported preparedness (N = 502) *(continued)*

**Table 1.** Endorsement of preparedness-delaying factors by the Israeli Jewish public - descriptive statistics and correlation with reported preparedness (N = 502).

*Note:* a. Top three options on a 7-point Likert scale (5, 6, & **7**)

* - significant at the 0.05 level (two-tailed) (non-significant in multiple comparison analysis):

** - significant at the 0.01 level (two-tailed)

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## Enhancing Community Resilience in the Context of an Earthquake among Residents of a Peripheral City in Israel

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**Study/Objective**: To identify personal characteristics associated with low levels of community resilience; and factors that may affect resilience in the context of seismic threats.
**Background**: Community resilience is perceived as a core element in the field of emergency management, since it enhances the community members' ability to effectively cope with different adversities. Following a destructive earthquake, local communities, especially those located in the periphery, may have to cope alone with significant challenges such as coordinating rescue efforts, providing shelter and primary care for casualties. Thus, strengthening community resilience among these communities is of utmost importance.
**Methods**: A designated survey was conducted among residents of a major city in the northern periphery of Israel, subjected to significant seismic threats. The survey utilized a validated tool for measuring community resilience (CCRAM), and related elements such as personal characteristics; risk perception; and earthquake preparedness. A quantile regression model was employed to examine the association between the study variables across various quantiles of resilience scores, identifying significant associations among subjects with various resilience levels. A sensitivity analysis was performed by comparing the results to those of a standard linear model.
**Results**: The study included 306 adults (Mean age 35, 18-73 years). The results demonstrated that increased

preparedness and having children residing in the household were positively associated with community resilience in lower resilience quantiles (Q10, Q25). Age was negatively associated with community resilience in a low quantile (Q25). The results of the linear model failed to reveal the association between the preparedness measure and community resilience, and demonstrated only the association with age and having children in the household.

**Conclusion**: Encouragement to take actions to increase preparedness, could also help raise resilience in an earthquake scenario. Efforts to enhance community resilience should focus on specific population groups such as childless households (often the elderly).

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## Anticipating the Psychosocial Impact of Disasters and Crises: The Need for an Interdisciplinary Social Science Framework

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**Study/Objective**: An interdisciplinary social science framework is presented to answer the question: how to anticipate the psychosocial impact of disasters and crises?

**Background**: The scientific knowledge on health effects, and the quality of aftercare in a disaster context is strongly rooted in epidemiology and mental health care research. Although this knowledge base is sufficient to understand the psychosocial impact, conceptualizing an adequate reaction requires a broader approach incorporating less traditional disciplines such as public administration, organization studies, implementation science, sociology and disaster risk reduction.

**Methods**: The starting point for the development of the framework was a model proposed by Alexander (2012), in which the combination of exposure, cultural and historical factors influences the vulnerability of human socio-economic systems. This "plexus of context and consequences" determines the human consequences of disaster. Recent research findings from different disciplines were combined into a framework focusing on the psychosocial dimension of disasters and crises.

**Results**: The framework contains three domains. Exposure has a direct impact on the well-being, functioning and health of affected people ("health"). Exposure, history and culture directly influence interrelated sets of capacities at the individual, community and society level ("capacity"). Capacity is linked to health, partly in a paradoxical way – as well as, a third domain: psychosocial support provided by professionals and comprehensive inter-organizational programs ("psychosocial support"). The relationship between psychosocial support and health is amply understood. Theoretically, psychosocial support is most effective when capacity is strengthened and utilized.

**Conclusion**: The framework emphasizes two complicated causal attribution issues, and encourages interdisciplinary research into mechanisms linking domains that generally have been studied as isolated topics.

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## Mindfulness in Disaster Response

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**Study/Objective**: To review the literature of pre-deployment Mindfulness Based Stress Reduction (MBSR) interventions for disaster responders, to minimize acute stress response, depression and Post Traumatic Stress Disorder (PTSD).

**Background**: 'Mindfulness' is derived from Buddhist meditation practice. Mindfulness programs have been shown to improve clinicians' perceived stress, anxiety and performance in medical practice. Mindfulness, specifically MBSR, an evidence based approach that uses mindfulness meditation, is successfully used for treatment of PTSD in populations such as veterans. Disaster responders, like the military, are a population potentially vulnerable to adverse psychological effects given the nature of disaster response: unexpected, sudden, devastating events. A quarter to one third of disaster responders report symptoms of anxiety, depression and PTSD, secondary to exposure to stressors of disaster response. Teaching MBSR practice to disaster responders, prior to deployment, has potential to decrease the psychological consequences of disaster response.

**Methods**: The authors performed a systematic review of peer reviewed literature indexed in PubMed, Web of Science and Google Scholar. Abstracts were limited to human studies, in English, and search terms MBSR, disaster responders, pre-deployment, acute stress response, depression and PTSD. Articles were also found by searching citations of retrieved articles.

**Results**: Literature exists showing that pre-deployment mindfulness training in military personnel improves perceived stress and stress response, but no similar research was found for disaster responders. A limitation encountered was that, few high quality Randomized Clinical Trials (RCTs) and studies exist, as conceptual mindfulness has limitations of its study within rigorous, scientific research methodology.

**Conclusion**: More research is needed to explore the potential of mindfulness training on disaster medicine clinicians, prior to deployment. It is a tool that may prevent the detrimental psychological consequences of disaster response work.

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## Dialogue in Emergencies - Interpreters of Sign Language in Israel

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**Study/Objective**: To identify obstacles in the area of translating emergency information into sign language.

**Background**: Deaf people constitute a minority group; most deaf people use sign language, which is not universal. In emergencies and disasters, conditions are created that can affect their lives. The role of a sign language interpreter in emergencies can be vital. In Israel, there are no regulations concerning the work of the interpreters in emergency situations. Despite that there are about 250 registered interpreters of Israel Sign Language, only around 120 professional interpreters work.
**Methods**: A cross-sectional survey of 84 interpreters of sign language in Israel was carried out. A self-administered questionnaire was developed, inquiring into various aspects of willingness to work in emergency situations, including translator-client interactions and translators' work characteristics.
**Results**: The majority of respondents live in the central region of Israel (79%), 83% of them are women. Only 45% of interpreters work full-time. Thirty-seven percent of the respondents are hearing children of deaf parents. Half of them stated that in emergency situations, they need to help a relative before working as an interpreter.
**Conclusion**: Significance of the findings: In an emergency, there might not be enough sign language interpreters. Most interpreters are women who do not work full time, and are committed to care for their family first. Most emergency situations in Israel have occurred in periphery areas of the country, where a small number of interpreters live. These findings point to inequities in emergency situations, not only towards the deaf community, but also among different groups in the deaf community. Recommendations: Encourage interpreters of sign language to study and work in periphery areas, granting financial incentives to study professional interpretation, and to work during emergencies.

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## Pandemic Preparedness in the Homeless Sector: Reports from Homeless People

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**Study/Objective**: To determine the extent to which homeless people were aware of, and able to prepare for, the possibility of a pandemic influenza outbreak.
**Background**: The health of homeless people is precarious, with rates of chronic illness reported at three and four times that of the general population. One overarching issue is how they can cope with related health, shelter, and food issues in the event of a pandemic outbreak. This presentation reports on a nationwide study of pandemic preparedness, from the viewpoint of homeless people. The time-frame in which the data were collected included an outbreak of H1N1 influenza. Thus, the respondents had real-time experiences in effective and non-helpful approaches to dealing with a possible pandemic.
**Methods**: In four Canadian cities, Toronto, Regina, Calgary, and Victoria, 351 homeless individuals participated in extensive interviews that covered a range of housing, health, and coping behaviors. The content of the interviews specifically dealt with experiences during the threat of a pandemic outbreak of H1N1, experiences with health and shelter staff, and recommendations for further preparation in the event of an outbreak. Data were coded and analyzed using SPSS-22. Analysis examined both national and between-city differences in responses.
**Results**: Consistent across all sites were reports of lack of training and preparedness by staff in shelters and day programs. Homeless people also reported that they were most likely to get reliable information from health care workers, but their most frequent source of information was the media. A majority would also try to avoid shelters and day programs in the event of a pandemic, but many could not identify where they would go.
**Conclusion**: Shelters and day programs are ill-prepared to handle the consequences of a pandemic outbreak. Resources for recuperation from illness, especially in the event of a pandemic outbreak, is a significant concern for homeless people.

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## Capability and Vulnerability: A Discourse Analysis of Multi-Jurisdictional Emergency Planning Documents

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**Study/Objective**: The purpose of this study is to explore dominant language in emergency planning, to understand how perceptions of capability and vulnerability are communicated. Research Question: What are the discourses across different levels of disaster and emergency management plans and planning frameworks, related to persons in the general population and those who live with functional limitations? Objective: To explain how discourse symbolizes perceptions of capability and vulnerability in multi-jurisdictional preparedness planning.
**Background**: Disaster management is an example of a complex system. Some individuals, such as persons living with functional limitations, tend to be more negatively affected by disasters than others. Different strategies such as policy development, communication and analysis of dominant discourses used in practice must be considered to facilitate empowerment among high risk populations (O'Sullivan, Kuziemsky, Corneil, Lemyre, & Franco, 2014). It is also important to facilitate empowerment and social participation by incorporating an all-of-society approach in emergency planning (UNISDR, 2015). The lives of persons living with functional limitations are represented through written, spoken, and social practices of government and politics. Discourse analysis provides insight into the social construction of society by interpreting the meanings and social implications of language.
**Methods**: A document analysis of Canadian government emergency planning documents and emergency management

frameworks from global governance organizations (eg. UNISDR Sendai Framework) was undertaken. The dataset was analyzed using discourse analysis (Rose, 2012).
**Results**: The results of this study explore capability and vulnerability among high risk populations and will contribute to policy development, with the aim that it manifests in inclusive practice.
**Conclusion**: Potential contributions of this study include increased awareness and public discussion, about how capability and vulnerability are communicated through discourse in planning documents. This in turn could impact policy development and training across different jurisdictions and sectors involved in disaster management, thereby supporting inclusive practice and an all-of-society approach to disaster management strategies.

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## Evaluating the Experiences with an Information and Referral Center (IRC) following a Large Air Crash Disaster

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**Study/Objective**: To evaluate the use of, and experiences with a 'one-stop-shop' website for information and referral for bereaved people following an air crash disaster.
**Background**: On July 17, 2014 the disaster of Flight MH17 (Malaysia Airlines) took place above Eastern Ukraine. None of the 298 passengers and crew survived the flight, of which 196 were of Dutch nationality. Within 26 hours, an Information and Referral Center (IRC) was set up.
**Methods**: A total of 128 bereaved persons filled out a questionnaire, and 22 bereaved persons joined in to 5 focus groups to discuss their experiences. In addition, data was gathered via a pop-up questionnaire on the IRC itself, as well as statistics of website use. Finally, in a series of 16 interviews, representatives from all the agencies involved with the IRC, were asked about their expectations and experiences in the development of the IRC.
**Results**: Three main goals of the IRC were tested. (1) Dependable information: The IRC is seen as a dependable source of information. Specifically appreciated was the availability of news before it appeared in the media, and its function as a news-archive. (2) Peer-to-peer contact: Results on this goal were more ambiguous. Some of the bereaved used the IRC for personal contact, most however, had difficulties sharing via an open forum, and preferred real-life contact. (3) Collection of meaningful data on specific needs: It proved difficult to generate data on specific needs for additional care.
**Conclusion**: Systematic evaluations, including experiences from bereaved persons, as well as the organizations facilitating online communities as the IRC are scarce, and underlying assumptions are rarely made explicit or tested. Based on a more elaborate presentation of the results in the presentation, assumptions on what an IRC should constitute will be further discussed.

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## The Aging Population During Emergencies: A Vulnerable Population or a Community Resource?

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**Study/Objective**: To present trends in community resilience scores throughout the lifespan.
**Background**: There is an increase in civilian population exposure to emergencies. The local population has an importance role in providing lifesaving care. Therefore, there is a need to prepare and enhance the communities to handle those situations. In this context, the elderly are traditionally treated as a susceptible population with special needs. Community resilience is a core element in coping with emergencies.
**Methods**: Fifteen small and mid-size towns in Israel were surveyed using the Conjoint Community Resilience Assessment Measure (CCRAM) tool. The study was conducted using two methods: 1) randomly selected address surveys, and 2) distributing web-based surveys to electronic mailing lists of small communities. Correlation analysis examined the relationship between the CCRAM scores and age. Linear regression modeled the dependent variable: CCRAM score with background variables.
**Results**: The study included 1,052 adults (mean age 44.65, SD = 15, range 18-86 years), from midsize towns (n = 490, 46.6%) and small communities (n = 562, 53.4%). Correlation between age and CCRAM score was positive (1044) = 0.128, $p < 0.001$. A multiple linear regression (F = 19.5, $p < 0.001$) explored the age of 61-75 with significant positive association (B = .181, p = .006, 95%CI = .053-.310) to CCRAM score, in comparison to the reference group of 31-45 years.
**Conclusion**: The study reveals an increase in community resilience scores among aging populations living in the community. Thus, the elders may be a resource to their community. Based on this, the unique input of this group to the general community is considered an advantage.

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## Community Adherence to Emergency Public Health Measures During Bio-Events

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**Study/Objective**: To assess the predictive role of health behavior theory on adherence to emergency public health measures needed during "bio events" (ie, outbreaks, epidemics, and pandemics).

**Background**: Climate change is leading to a wide range of adverse impacts on the environment, which in turn are adversely impacting human health. One of the well-documented impacts is the increased occurrence and severity of natural disaster events, including bio events. In the early stages of bio events, prior to the availability of effective pharmacologic countermeasures, the swift mobilization of the public health and health care sectors is critical to stem the spread of disease. The general public also plays a crucial role – their cooperation is needed with respect to adherence with emergency public health measures that might be recommended or even required. However, in the US, the public is largely unfamiliar with the measures (eg, social distancing, quarantine, etc.) that might be needed during a bio event. Most of our information on this comes from limited public opinion polls and descriptive studies conducted in non-US samples (mainly Asian). Further, our knowledge of the factors that influence adherence in US community members remains largely unknown.
**Methods**: We recently conducted a literature review of published US studies to assess the role of psychosocial and other factors on adherence to emergency public health measures.
**Results**: Findings indicate that most studies examined only one (typically vaccination) adherence behavior and few assessed the relationship between adherence behaviors and psychosocial influences. Testing of disaster preparedness and response theory for predicting behavior of the general public was not rigorous and only focused on one or two behavioral constructs, most typically, risk perception.
**Conclusion**: Theoretically driven studies on adherence in the US would increase our understanding on this issue and improve our ability to implement effective public health and risk communication strategies.

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## Patterns of Victimization in the Perception of Threat and Preparedness of the Israeli Public to Armed Conflicts

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**Study/Objective**: We hypothesized that, concerning the threat of armed conflicts, the Israeli public demonstrate unique patterns of threat perception, characteristic of a victimized population (ie, populations that are chronically exposed to a given threat).
**Background**: Emergency preparedness is a key factor in generating public resilience. Scholars agree that civilian populations that are more prepared for emergencies also react better in the face of one, and are therefore less vulnerable to their adverse effects. However, according to a nation-wide survey, more than 50% of the Israeli population have complied with one-half or less of the civil defense recommendations for household adjustment to armed conflicts. Almost no correlation was found between preparedness behavior and its reported correlates in the literature, such as perception of likelihood or severity of the threat.
**Methods**: We analyzed the results of several studies that we performed over the course of 2013-2016 for indications of victimization in the Israeli public's perception of the threat of armed conflicts. The analysis was done in comparison to the literature description of the victimization phenomenon.
**Results**: The findings suggest that the characteristics of the Israeli preparedness behavior resemble that of a victimized population. The specific characteristics of a victimized population with regards to preparedness to armed conflicts, as manifested in the Israeli population, are: (a) distorted perception of the threat, (b) reduced threat intrusiveness despite (perhaps due to) the chronic exposure to the threat, and (c) prevalence of denial-based coping mechanisms, procrastination in preparedness behavior, and habituation effect to the threat.
**Conclusion**: The data obtained thus far support our hypothesis of victimization. Under such circumstances, most known behavioral models become null and changing behavior proves difficult. Further studies are needed in order to promote readiness and make resilience plans more effective in achieving their goals.

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## Immediate Behavioral Response During an Earthquake and the Risk of Injury and Death: A Simulation Based Study

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**Study/Objective**: The aim of this study was to acquire insights into the relationship between human behavior and earthquake vulnerability, in terms of the risk of injury and death.
**Background**: The use of casualty modeling in order to estimate the number of expected casualties in future earthquakes for planning and management purposes is well established. Despite its great importance, casualty modeling is currently based exclusively on damage to the built environment and fails to consider additional factors that may influence the number of casualties in a given event. The immediate behavioral responses of residents during an earthquake, for example, evacuating a collapsing building, may have a crucial role in this regard.
**Methods**: In an innovative approach, the present study has integrated behavioral traits of residents in a high-risk area in northern Israel into a well-known casualty estimation model. The expected behavioral characteristics of residents during an earthquake (namely fleeing collapsing buildings) in city sectors with different socioeconomic rankings were assessed using a designated survey and were applied into the casualty estimation process. In order to test the sensitivity of the behavioral factor, 12 synthetic earthquake scenarios were designed.
**Results**: The simulation results demonstrated a clear link between expected behavior and casualty projections. Taking into account behavioral traits of residents altered both the total number of expected casualties and the composition of injuries. Households with low socioeconomic status were found to be more vulnerable, in terms of risk of injury and death, compared with those ranked higher.

**Conclusion**: The results suggest that loss-estimation models that do not take behavioral factors into account may overestimate projected casualty numbers. The present study shows the importance of raising public awareness regarding proper behavior prior to and during the event, which can help increase resilience of communities, mitigate risks and losses, and ultimately save lives.

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### Development of a Disaster Mental Health Service Model and Expert Survey

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**Study/Objective**: The study objective is to understand the adequate development of a disaster mental health service model, and to find out the adequate relationship between disaster mental health services and disaster medical services.

**Background**: A disaster mental health service and organization system were activated after Sewol ferry ship sinking disaster in 2014 in Korea, the vision and planning for continuing development of disaster mental health supporting systems are still inadequate and lacking. So it is required to develop the method of connecting disaster mental health services and disaster medical services.

**Methods**: Researchers made and distributed the questionnaires for experts, including disaster mental health experts and disaster health medical experts. The answers to questionnaires were collected. Additionally, expert interviews were done for searching out the methods of a maturing disaster health medical system, and activating the connection between disaster mental health services and disaster medical services. Delphi analysis and AHP (Analytic Hierarchy Process) were used for questionnaire analysis.

**Results**: According to the questionnaire answers, developing a DPAT (Disaster Psychiatric Assistant Team), increased the number of existing certificates, and regularly, repeated training programs are necessary. The role should be stabilization and counseling in acute stages. The most important part of a multiple professional network was disaster medical experts.

**Conclusion**: According to the experts' opinions, DPAT should be prepared, the number of disaster health supporting personnel should be increased, and regular repeated training should be done for them.

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### Forced Internal Displacement during Colombia's Five Decades of Armed Conflict: Trauma, Loss, and Psychopathology

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**Study/Objective**: Examine the high prevalence rates of symptom elevations for common mental disorders, by phase of displacement for Internally Displaced Persons (IDPs) in Colombia.

**Background**: Colombia is currently transitioning to post-conflict status, following 52 years of continuous armed conflict and widespread population exposure to violence from multiple sources. This insurgency is one of the world's most prolonged humanitarian emergencies. As officially designated "victims of the armed conflict," Colombia's 6.3 million IDPs have been exposed to trauma and loss throughout all phases of forced migration. The Outreach, Screening, and Intervention for Trauma (OSITA) pilot project used a three-tiered, stepped-care mental health intervention model for women IDPs who reside in Bogotá.

**Methods**: At baseline, the OSITA intervention assessed the study participants for exposures to 12 pre-, 18 peri-, and 13 post-displacement trauma and loss stressors. Using internationally standardized scales, the women were screened for three Common Mental Disorders (CMDs): Major Depressive Disorder (MDD), Generalized Anxiety Disorder (GAD), and Post Traumatic Stress Disorder (PTSD). Participants with symptom elevations were referred to Interpersonal Psychotherapy/Counseling (IPT/IPC).

**Results**: Data analysis examined baseline CMD symptom elevations in relation to exposures for 279 participants. On average, women IDPs endorsed 24 of 43 trauma and loss exposures. At enrollment, 51% had clinically significant symptom elevations for MDD; 41% for GAD; and 39% for PTSD. Fully 63% had at least one elevated scale including 26% who had elevations on all three clinical measures. Furthermore, 25% expressed thought or intention to self-harm ("suicidal risk"). Preliminary analysis of intervention effectiveness is underway and appear to demonstrate sharp declines in symptom levels.

**Conclusion**: In this highly-traumatized population, exposures to violence, armed conflict, and forced migration were universally experienced and strongly related to high prevalence rates of psychopathology. IPT/IPC results suggest that this intervention is effective and efficacious for this population.

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### Disaster Management and Farm Family Mental Health: The BSE Crisis as a Case Study

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**Study/Objective**: To examine the evidence of depression among farmers four years after the bovine spongiform encephalopathy (BSE) disaster in Canada and report on implications for future disaster management strategies.

**Background**: As we approach the 14th anniversary of the 2003 BSE outbreak, evidence regarding its implications on the health of farmers is lacking. With disasters often linked to poor mental health, the BSE outbreak can be conceptualized as a disaster in slow motion. Systemic factors impacting farmer mental health are different from those affecting their non-farming rural neighbors. Therefore, disaster management strategies must

respond to the unique pace and culturally distinct factors influencing this disaster.

**Methods**: A non-probability sample of 273 farmers was identified and surveyed in 2007. The survey included standardized assessments of health status: the Brief Patient Health Questionnaire (Brief PHQ), the Short Form (SF)-36 Health Survey, the Psychological Stress Measure, and the Medical Outcomes Study (MOS) Social Support Survey.

**Results**: Sixty (23.3%, 95% CI 18.1 – 28.4) of the 258 respondents who provided Brief PHQ ratings exceeded the traditional cut-point of 10 + on the scale indicating presence of depression. As many men as women reported depression. An inverse relationship between financial comfort scores and depression was highly significant. Depression was significantly related to poor health status and to a decline in health in the last year. In linear regression, poor financial comfort, poor health status, and a decline in health in the last year were related to higher rates of depression even when age and sex were controlled.

**Conclusion**: The results support the contention that a major disaster was created for farmers by the BSE outbreak and that it had long-term mental health consequences. These results also highlight the need for disaster management building on resilience and tailored to the unique needs of this population.

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## Understanding the Psychological Impacts of Disasters on First Responders and Health Care Professionals in Magway, Myanmar

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**Study/Objective**: To determine the psychological impacts of disasters on first responders and health care professionals in Magway, Myanmar.

**Background**: According to the UN Risk Model, Myanmar ranks as the "most at-risk" country for natural disasters. Past events, including Cyclone Komen of 2015, have resulted in progress in disaster management, processes, and law. They have also resulted in recommendations, including strengthening coordination, engaging in disaster response drills, and enhancing communication. While the number of victims and survivors of disasters have been well recorded by local clinics, a lack of evidence remains surrounding the psychological impacts of disasters on first responders and health care professionals in Myanmar.

**Methods**: An epidemiological study was conducted in July 2016 using a written survey in the local Burmese Language with 119 items that assessed demographics, type of disaster response, and psychological status. A total of 234 participants, 48 (21%) health care professionals, 45 (19%) firefighters, and 141 (60%) disaster volunteers, completed the survey. 160 were male, 73 were female, and the average age was 33 years. The data were organized using Excel and analyzed using SPSS and the Depression, Anxiety, and Stress Scale.

**Results**: The psychological health of first responders in Magway was determined as follows: no depression (18%), no anxiety (19%), no stress (48%), mild depression (10%), mild anxiety (4%), mild stress (15%), moderate depression (15%), moderate anxiety (16%), moderate stress (16%), severe depression (22%), severe anxiety (14%), severe stress (16%), extremely severe depression (29%), extremely severe anxiety (48%), and extremely severe stress (5%).

**Conclusion**: The psychological health status of disaster responders in Magway, Myanmar include high incidences of depression, anxiety, and stress. Further studies are needed to explore the causation and potential interventions to improve the psychological well being of disaster responders in Myanmar.

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## Enhancing Community Resilience during Emergencies by Building Organizational Resilience in Routine Times

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**Study/Objective**: To examine the influence of support groups utilizing an integrative model of coping and resiliency (BASIC-PH) on the resilience of senior decision makers. To help the participants develop coping mechanisms for daily stressors and extreme situations, in order to enhance their personal and organizational resilience.

**Background**: The impact of resilient organizations on community resilience during emergencies has been established. Organizations provide social, occupational and economic frameworks for community members. Senior decision makers play an essential role in society while being exposed to extreme pressure, loneliness and conflicts. Management of their day-to-day challenges and extreme scenarios can benefit from improving their coping strategies.

**Methods**: A program was devised to strengthen the preparedness of the participants by developing and enhancing their stress coping skills. The BASIC PH resilience model, which was developed in Israel and has been in use for 35 years in various types of organizations, was applied to four support groups of senior decision makers routinely experiencing high

level of stress, 36 participants in total. The components of the BASIC PH model were put into practice using cognitive, emotional and creative supporting tools. The sessions culminated in the creation of a teamwork plan designed to preserve the program's achievements.
**Results**: The act of sharing difficulties within the support group generated cohesion and hope, which are components of resilience. The relationships within the group became more open, and the participants were more easily able to communicate their difficulties and felt more connected (also factor of resilience). The intervention provided the participants with a support framework, and enhanced their ability to cope with stressful situations.
**Conclusion**: Organizational support based on a resiliency model can strengthen the individual's ability to cope with daily stressful situations and enhance cohesion, that in turn may have a positive influence on the organization's ability to handle changes and crisis.
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## First Official Disaster Relief Activities of the Japan DMORT Association in Collaboration with Police Department in the 2016 Kumamoto Earthquakes, Japan

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**Study/Objective**: To report the first disaster relief activities of the Japan DMORT association officially collaborating with the police department of a disaster stricken area.
**Background**: The 2016 Kumamoto Earthquakes are a series of earthquakes, including a magnitude 7.0 main shock on April 16, 2016 and a magnitude 6.2 foreshock on April 14th, which struck Kumamoto and Oita prefectures, Japan. Fifty people were killed and about 3,000 people were injured. The Japan DMORT Association is a private society which consists of physicians, nurses, forensic pathologists, and social workers. We had planned to support disaster victims' families, but had been frustrated by the police's systematic barriers because, in Japan, disaster victims' identification and care of their families had been monopolized by police.
**Methods**: On April 15th, a nurse and a driver/secretary were dispatched to the disaster area after quick negotiation by DMORT administrator with Kumamoto prefectural police, through the police department of our own prefecture. On April 16th, we were advised to work in the makeshift morgue in the police school.
**Results**: On April 16th and 17th, we assisted families of 17 victims when they saw the corpses and listened to their grieving stories showing sympathy. We also provided makeup for the victims. Some of the families showed appreciation to us. These activities helped the members of the police's victim supporting section, to concentrate on victim's identification and paperwork. We paid attention to the police through conversation and provided them the manuals for caregivers' stress.
**Conclusion**: Activities of Japan DMORT as specialists of grief care in collaboration with police, are supportive for both victims' families and caregivers in early phases of disasters.
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## Optimal Protection of Networks in Social Media while Counteracting Disasters and Emergencies

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**Study/Objective**: The study is devoted to optimal protection investment for networks, to withstand diverse threats and improve efficiency of social media in emergency management.
**Background**: Some recent works have offered formal models that reveal features and importance of balanced security expenses. However, best security practices in networks are not thoroughly presented.
**Methods**: To clarify the issue we have stratified social media systems into three components: device (computer, iPad, IPhone), software communication environment (Facebook, LinkedIn, etc.) and social (interpersonal) ones. A structurally dependent security model for each strata is developed using consideration of threats, vulnerabilities and countermeasures for individual nodes. Original program tools are designed for estimations of topological risks for the networks, which element 'nodes' are provided with protection and 'links' are inserted for the component consolidation in whole. Both processes depend on the financing volumes.
**Results**: Several representatives of real networks, which are of different nature and synthetic ones that reflect social relations, have been selected to simulate their exposition to structural threats. Two different financial strategies are taken into consideration. The first strategy corresponds to a uniform distribution of expenses among all the elements. Another one implies dividing the budget proportionally to 'node' connectivity. The calculations demonstrate the latter as the more effective option for protection and consolidation. We show that among social networking components, device networks manifest their greatest sensitivities to coordinated threats of disintegration and robustness to random ones. The metric of a network security level is proposed, and it's found that optimal investment does not demand the value of this metric to

exceed ~1/e for both strategies of network protection and network consolidation.

**Conclusion**: The proposed model and its tools cover effectively, the topological problems of security economics within the modern disaster management systems in a more complex environment.

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## "It's What Binds Us Together": An Inside Perspective on the Benefits of Social Connection among Survivors, 5 Years after a Bus Crash, Sweden

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**Study/Objective**: To explore social connections among survivors, five years after a major bus crash.

**Background**: Consequences and recovery for survivors after transport disasters or mass-casualty incidents are being studied to a great extent. Receiving sufficient social and psychosocial support from family, friends, and others has been presented as a factor that can mitigate negative consequences, and facilitate survivors' recovery. However, it is rarely studied in a holistic and long-term perspective. There is a need to further explore the survivors' perceptions on ways in which social connections can be beneficial for long-term recovery.

**Methods**: Fifty-four out of 56 surviving passengers were interviewed five years after a major bus crash in Sweden. Interviews were recorded and transcribed verbatim. For this study, only text on social connections was extracted and analyzed with qualitative content analysis.

**Results**: The analysis resulted in the category Connectedness, and three subcategories: Safety, Kinship, and Friendship. When exploring social connections among survivors, connectedness seemed to be a beneficial and important aspect of their long-term recovery. The connectedness offered a feeling of safety when travelling together, a sense of kinship, and lasting friendships. When going by bus together after the crash, survivors felt safer knowing there was a mutual understanding among them if something went wrong during a bus ride. The sense of kinship was experienced as feeling comforted and connected when meeting fellow survivors. Friendships generated positivity and a long-lasting source of support.

**Conclusion**: Facilitating a sense of connectedness among survivors early on, and offering ways for them to maintain the connection throughout the years could strengthen and advance their long-term recovery.

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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## Cardiac Arrest Survival Post-Electrocution – Management in a Low-Resource Emergency Department in Ghana

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**Study/Objective**: To highlight the necessity of Basic-Life-Support trainings and availability of defibrillators in improving outcomes in post-electrocution cardiac arrest in low-resource settings.
**Background**: Since commercial electricity became available, the potential danger of injury has continued to increase. Degrees of electrical injuries range from minor burns, to cardiac arrest, and death. Electrocution is cardiac arrest resulting from an electric shock. In Ghana, many cases of electrocution are declared dead with little or no resuscitative measures. The recently established Emergency Department (ED) of Komfo Anokye Teaching Hospital (KATH) now receives and resuscitates these patients.
**Methods**: There is currently no documented literature on successful management and survival of cardiac arrest patients post-electrocution in Ghana. Therefore, we sought to describe the management of three patients, two adult males and a female child, who presented to KATH-ED in a space of nine months with cardiac arrest following electric shock.
**Results**: The electrocution of the two adult patients occurred at work, and the children at home by naked-wire. None of them had any form of cardiopulmonary-resuscitation (CPR) at the scene, or enroute to the hospital. They all presented in cardiac arrest and rushed to the resuscitation zone of the ED. They all had CPR initiated on arrival; all had shockable rhythms - one with pulseless ventricular tachycardia (torsades des pointes), and the other two patients with ventricular fibrillation. They were defibrillated with at least two shocks, delivered with resultant return of spontaneous circulation; successfully intubated and managed for other injuries. They were all discharged home after a few days, regaining full consciousness and scheduled for outpatient follow up.
**Conclusion**: Early recognition of cardiac arrest, immediate initiation of CPR, and availability of defibrillators improve outcomes in cardiac arrest post-electrocution. Although the outcomes were favorable in these cases (with no by-stander initiated CPR), they highlight the necessity of Basic-Life-Support training for the general population.

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## A Complex Systems Analysis of the Lac-Mégantic Runaway Train Derailment

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**Study/Objective**: To bring a complex system analysis to a Canadian anthropogenic disaster/public health emergency.
**Background**: On July 6, 2013, an unmanned (runaway) freight train with 5 locomotives and 72 oil tank cars descended 11 km (7 mi.) on a downhill grade, accelerating to 101 km (63 mi.) as it entered the town of Lac-Mégantic, Quebec, Canada. Encountering a sharp curve, 63 tank cars derailed, ruptured, deformed, exploded, and burned in a 2-day conflagration. Dozens of buildings were razed, 2,000 persons were displaced, and 47 citizens were killed in the raging fires. Hazardous materials contamination affected the air and water quality, and created an ecological catastrophe. The public health, medical, and psychological consequences, as well as community strengths and indicators of resilience were actively monitored.
**Methods**: A complex system analysis of the derailment was conducted drawing upon multidisciplinary expertise in train crash engineering, public health, medical crash trauma, mental health and psychosocial support, disaster health, and complexity sciences. A synthesis of key components of the event was developed by blending direct on-scene response experience with in-depth review of investigative reports, news stories, and websites of agencies involved in disaster response and railway safety. A complexity science "lens" was applied to the analysis to connect the causal sequence to the public health and environmental consequences.
**Results**: For this non-intentional, human-generated (anthropogenic), technological/transportation disaster, distinguishing features included a complex web of causation, revealing failures of governance and management on the part of Transport Canada and the MMA Railway; unrepaired mechanical defects, a compounding sequence of human errors, and flagrantly dangerous train securement, leading to a preventable runaway derailment with loss of life and property, and massive ecological harm.
**Conclusion**: Two-thirds of the Lac-Mégantic area population sustained human and/or material losses in this highly impactful disaster. Data from ongoing studies of the environmental, behavioral, and psychological impacts demonstrate a high degree of community resilience.

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## Physical Activity and Sport Competitions Under Severe Air Pollution Conditions

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**Study/Objective**: This study aims to understand the relationships between physical activity and air pollution, and recommend standards for canceling or postponing outdoor physical activities and sport competitions during severe air pollution events.
**Background**: Exposure to ambient air pollution may cause health problems and can lead to development of pulmonary diseases (such as COPD and asthma), cardiovascular diseases and even diabetes. Physical activity under air pollution conditions can cause a higher exposure to pollutants and therefore, may cause damage to individuals, especially to young children, but even to professional athletes. Guidelines for developing recommended intervention during severe air pollution conditions are required.
**Methods**: We searched for studies and publications (published between February 2002 and March 2016) that focused on the association between ambient air pollution and different levels of physical activity. We looked for studies regarding athletes, the public population, children and older adults. Based on our findings, we developed recommended threshold levels.
**Results**: Physical activity under conditions of air pollution may cause short-term and long-term health damage to the public and specifically to athletes. It decreases lung function, may increase the immune system activity and may diminish exercise performance. However, specific thresholds for cancelling outdoor sports events were not developed. We therefore suggest the following threshold values, per age group:
**Conclusion**: It is recommended both for the public and athletes, to completely avoid any physical activity under severe air pollution conditions, including professional and semi-professional sport competitions. In this paper we suggest recommended air pollution levels for avoiding physical activity and standards for cancelling professional and semi-professional games accordingly.

| Age Group | Suggested $PM_{2.5}$ threshold value for canceling adult outdoor sport activities |
|---|---|
| Adults | 1300 μg/m$^3$ per 24 hours |
| Older youth (ages 16-18) | 1300 μg/m$^3$ per 24 hours |
| Younger youth (ages 14-16) | 650 μg/m$^3$ per 24 hours |
| Children (ages below 14) | 300 μg/m$^3$ per 24 hours |

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## Rapid Urbanization is Linked to Flood Lethality in the Small Island Developing States (SIDS): A Modeling Study

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**Study/Objective**: We sought to investigate the risk factors for flood lethality in the SIDS in the last 30 years (1985–2014).
**Background**: The low-lying Small Island Developing States (SIDS) are at a constant risk of floods. They are also acutely affected by climate change, in particular from rising sea levels, temperature, and rainfall increases, which further increase flood risk. Yet, no quantitative studies have addressed how development and urbanization, upstream distal factors, are linked to mortality from floods.
**Methods**: In this ecological study, flood lethality was defined by any flood deaths versus no deaths. Plausible risk factors for flood lethality were explored using a literature search. World Bank Development Indicators were used as proxies for the risk factors and EMDAT data for disaster-related variables. A multivariate analysis was conducted using logistic regression with a quasi-binomial distribution, removal of multicollinear variables, and backward elimination. Robustness was checked through a subset analysis on data from last decade, excluding Haiti.
**Results**: Significant positive associations were found among flood lethality, urban population (odds ratio [OR] 1.023; 95% CI 1.007–1.040), and urban population growth (OR, 1.225; 95% CI 1.024–1.476). The effect of urban population growth was 10 times that of the total urban population (coefficients 0.202 and 0.023, respectively). Robustness checks revealed similar coefficients and directions of associations.
**Conclusion**: More urbanization and rapid urbanization in particular were connected to a higher likelihood of lethal floods in the SIDS. Future studies should investigate poor and unplanned urbanization as mediators of these associations. Our study provides initial evidence on the collateral human impacts of current human development strategies in the SIDS accumulated during the last three decades.

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## The One Health Approach for Communicating Risk with a Community during the Crisis of the Rift Valley Fever Outbreak in East Africa

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**Study/Objective**: In the present study, we aimed to identify the risk factors practiced by local communities where Rift Valley Fever (RVF) outbreaks occur, and characterize the source of information that shaped the awareness during the 2007 RVF outbreak crisis.
**Background**: Rift Valley fever virus (RVFV) causes outbreaks in Africa and the Arabian Peninsula with catastrophic consequences. It results in severe disease in humans with high case fatality, as well

as abortion storms and 100% mortality in newborn livestock, resulting in trade-bans which devastates the local and national economy. RVF is transmitted by direct contact with infected livestock and through mosquito bites, and has potential for global expansion. RVF has the "One Health" dimension where humans, animals, and the environment interact in spreading the disease. This needs special strategy to communicate the risk of RVF during outbreaks.

**Methods**: A cross-sectional community-based study was conducted in Sudan in 2013. A special One Health questionnaire was developed to compile data from 235 households. Face-to-face interviews were conducted in an area that was exposed to the RVF outbreak.

**Results**: The community practiced risk factors such as handling sick animals, helping animals to deliver without protection measures, was only partially using mosquito bed nets, and usually not impregnated. Information about the RVF outbreak was mainly gained through social networks, while the health system or veterinarians were not used as an information source. This increases the possibility of rumors, wrong information and consequently disease dispersal.

**Conclusion**: We found that formulating the One Health approach team from different disciplines would be the best strategy to communicate the countermeasures to control RVF zoonotic outbreak. This is particularly useful when resources are limited and resilience is needed. The communication should consider the social cultural practices of the community, and highlight the different dimensions of zoonotic transmission to avoid spread of further RVF outbreak.

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## Innovative Technological Approaches for Community Resilience

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**Study/Objective**: This proposal is a practical, solution-oriented research which, in a way, challenges the conventional public health surveillance systems - which require real-time or near real-time, population-based, statistical alarms to alert to unusual activity - through innovative ongoing surveillance that will incorporate geospatial assessment as well as behavioral and self-reported information.

**Background**: The Conjoint Community Resilience Assessment Measure (CCRAM) was developed by a multidisciplinary group of Israeli experts in order to offer a standard tool that will provide reliable information that can be useful when attempting to maintain or enhance community resilience.

**Methods**: Frequent and broadly distributed data collection using the CCRAM, on a cellular device, will be utilized for establishing and continuously supporting a society that is more resilient and literate in the field of disaster risk reduction. Smartphones and Internet cloud services will be used for data collection and management. The research program comprises of both System development of the mobile and cloud service and Experimental operation of the developed system, with Information and Communication Technology (ICT) trainings for community participants and health care providers.

**Results**: One of the added values of the project is to develop the next methodological model of health monitoring, offering a strong interactive network which crosses cultural and societal differences, geographies, and generations.

**Conclusion**: The potential of this research is not only to produce innovative research outcomes involving the improvement or optimization of services utilizing ICT, but also to promote research knowledge and idea exchange regarding social issues and challenges in the field of emergency preparedness and response.

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## Barriers and Opportunities for Early Detection of Breast Cancer in Gaza

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**Study/Objective**: Assessment of the landscape of barriers and opportunities of early detection of breast cancer, including women's and healthcare providers' awareness, knowledge, attitude, practice and access to breast health care in Gaza.

**Background**: Breast cancer is the most common malignancy and leading cause of cancer mortality among females in Gaza. Most cases are diagnosed at late stages. Survival rates are persistently low in contrast to improved rates worldwide.

**Methods**: In May and June 2014, using convenience and representative sampling, 100 healthcare providers completed surveys on knowledge of breast cancer, attitudes and practices. Structured interviews conducted for 100 women, 30 years and older across all districts and socio-economic backgrounds. Women were interviewed for knowledge of breast cancer, self-exam, attitude and practice when a breast problem encountered, access, and barriers. Data was analyzed using excel to find frequency distributions.

**Results**: Healthcare providers surveys: Only 15% offer breast exam to their patients, 13% believe mammography can cause cancer, 48% do not know that radiotherapy is not available in Gaza, and 4% believe breast cancer is contagious. About 59% of healthcare providers believe breast cancer is a fatal disease. Almost half of healthcare providers do not get opportunities to attend national or international medical conferences addressing breast cancer; and only 8% agreed for the need for accreditation with quality assurance program. Only 25% of surveyed women reported practice of self-examination, 87% had never had a mammogram or had been offered a breast examination, however 80% agreed to seeking a breast work-up when needed.

**Conclusion**: Knowledge gaps in breast health awareness and practice exist among healthcare providers and women in Gaza, with several identified opportunities for improvement. Most surveyed

women never had a mammogram or clinical breast examination, however they are willing to have a breast work-up when needed.

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## Prehospital Bio-event Detection: An Assessment of Syndromic Surveillance Systems in Australian Ambulance Services

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**Study/Objective**: The objective of this research is to assess disease surveillance methods, used by Australian ambulance services, and provide a current picture of Australia's prehospital disease surveillance capability.
**Background**: The threat of bio-events, such as disease or bioterrorism, requires innovative surveillance methods to rapidly recognize novel and obscure threats, permitting early implementation of measures to limit the spread of disease. Ambulance call and dispatch data are enticing, due to their immediacy, geographic specificity, and reach into the community. However, implementing the data into functioning surveillance systems has proven problematic, due to the broad, non-specific nature of ambulance call categorization.
**Methods**: Each of the eight emergency ambulance services in Australia were invited to participate in an interview to establish the history, utility, and learnings from the use of call data for disease surveillance. Qualitative analysis sought to identify common issues and themes across the country.
**Results**: One Australian ambulance service, the Ambulance Service of New South Wales, uses its data for background surveillance within a surveillance system run by the New South Wales Ministry of Health, which encompasses several different data sources. All ambulance services participating in this research have identified the ability to undertake active surveillance during known emergencies. However, many inconsistencies were noted as to whether screening should be implemented, which callers should be screened, and what questions should be asked.
**Conclusion**: The potential for real-time, ambulance-based disease surveillance in Australia exists. However, at this point in time, none of the Australian ambulance services involved in this research currently conduct real-time surveillance. With one exception, no services routinely perform surveillance at all; nor were any plans identified to start doing so. All services have the ability to undertake disease screening during known emergencies; but how can these be made more consistent and reliable as an "all-hazards" early warning system?

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## The Burden of Matatu Bus Crashes in Kenya

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**Study/Objective**: To describe the burden of Matatu Crashes in Kenya using multi-site injury surveillance data.
**Background**: Road Traffic Crashes (RTCs) are estimated to cause 1.3 million deaths worldwide each year. In Kenya, this problem is particularly significant and matatus are thought to be frequently involved. Matatus are 14-seater mini-buses responsible for transporting 12 million commuters daily in Kenya.
**Methods**: Electronic-based trauma registries were established at five referral hospitals in Kenya: Kenyatta National, Thika Level 5, Naivasha District, Machakos Level 5 and Meru Level 5. Information on the mechanism of injury, injury severity, patient outcomes, and patterns of care (prehospital and hospital-based) was collected.
**Results**: The total number of presenting trauma patients was 24,014. Road traffic injuries accounted for 41.7% of all presenting trauma patients. Matatus accounted for 20.4% of all RTCs. Despite the high occurrence, the injury severity of matatu crash victims was significantly less than other road traffic injuries ($p < 0.001$). 68.7% of matatu crash victims were discharged directly from the Accident & Emergency Ward, which is significantly higher than the overall patient discharge rate ($p < 0.001$). Of admitted patients, 56.7% suffered from a lower extremity injury. Seat belt use was significantly lower among matatu crash victims, when compared to other RTCs where seatbelt use was possible ($p < 0.001$).
**Conclusion**: Matatus are already highly regulated and continue to be the focus of many road safety policies in Kenya. Accident & Emergency wards are burdened with minor injuries of matatu victims, predominantly involving lower extremities. Safe road practices among drivers and passengers can reduce this burden.

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## Influenza-Like Illness and Gastrointestinal Illness: Surveillance Using a Novel Online Bio Surveillance System in Child Care Centers

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**Study/Objective**: To describe the capability of a novel, online, child care center bio surveillance system (*sickchildcare.org*) to report pediatric Influenza-Like Illness (ILI) and Gastrointestinal (GI) illness outbreaks compared to the state surveillance system.
**Background**: Bio surveillance is critical for early detection of disease outbreaks and resource mobilization. Children in child care centers are frequently sick and first to become ill. We created a free, web-based surveillance system (*sickchildcare.org* – SCC) for child care centers to report sick children. In comparison, the state's surveillance system (Michigan Care Improvement Registry (MCIR)) uses traditional grade school and hospital system reports. Data from *sickchildcare.org* has not been compared to the state's surveillance system.

**Methods**: ILI and GI cases were collected from SCC and MCIR. The proportion of ILI and GI cases by week, across all three study years, were calculated, and epidemic curves for ILI and GI illness were compared: Year 1: (12/2013 – 9/2014 - four centers); Year 2: (10/2014 – 9/2015 – 10 centers); Year 3: (10/2015 – 8/2016 – 11 centers). Data were summarized using descriptive statistics.

**Results**: In three years, 5,737 cases (2,104 of ILI and 1,486 of GI illness) were reported to SCC. Epidemiologic curves comparing SCC and MCIR data by year for GI illness: (Figures 1,2,3) and ILI: (Figures 4,5,6). For GI illness, SCC and MCIR rates peaked at the same time in Years 1 and 2. In Year 3, SCC GI cases preceded peak MCIR GI cases by approximately one week. For ILI, SCC rates peaked one to two weeks before MCIR rates in Years 2 and 3, but not in Year 1.

**Conclusion**: Web-based bio surveillance in child care centers is a feasible method for identification of ILI and GI outbreaks, and has potential for earlier identification when compared to traditional state surveillance reporting.

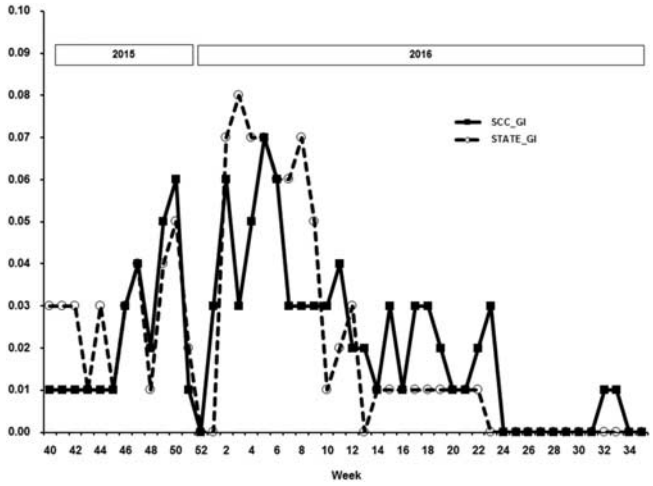


**Figure 3.** Epidemic Curves for Proportion of GI Cases for State of Michigan and Sick Child Care: Year 3, 2015-2016.

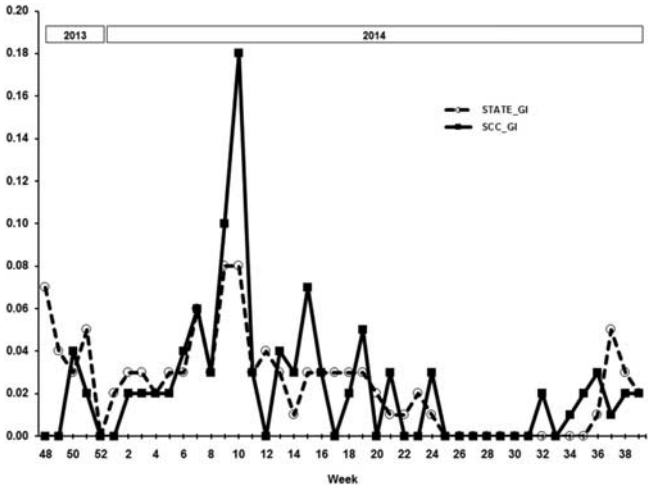


**Figure 1.** Epidemic Curves for Proportion of GI Cases for State of Michigan and Sick Child Care: Year 1, 2013-2014.

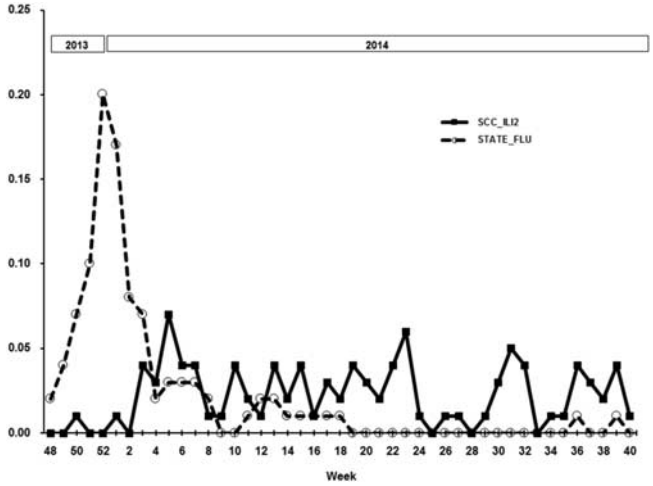


**Figure 4.** Epidemic Curves for Proportion of Flu Cases for State of Michigan and Sick Child Care: Year 1, 2013-2014.

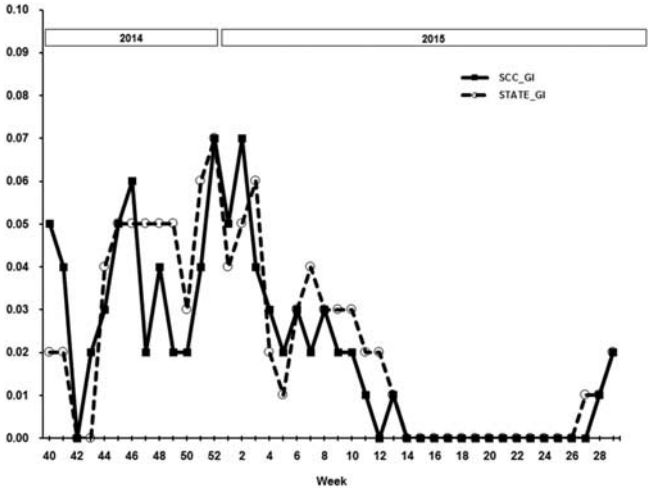


**Figure 2.** Epidemic Curves for Proportion of GI Cases for State of Michigan and Sick Child Care: Year 2, 2014-2015.

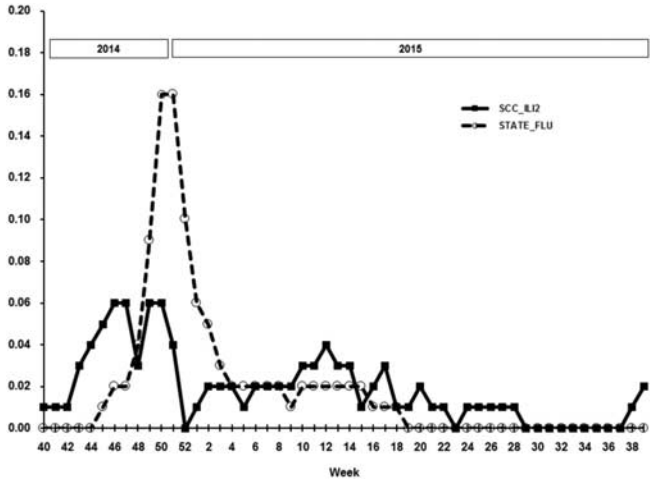


**Figure 5.** Epidemic Curves for Proportion of Flu Cases for State of Michigan and Sick Child Care: Year 2, 2014-2015.

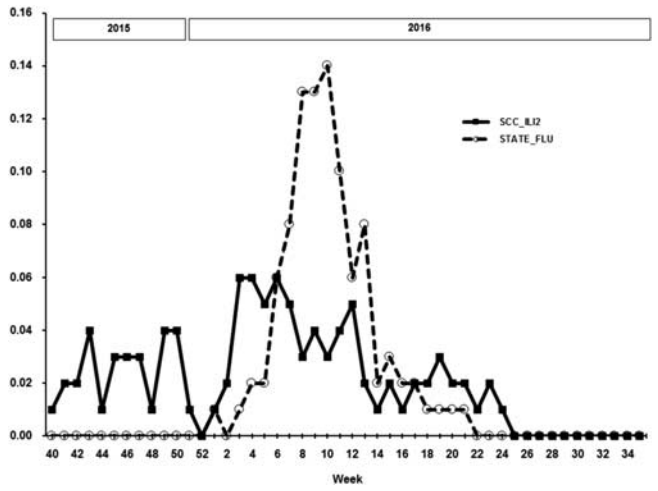


**Figure 6.** Epidemic Curves for Proportion of Flu Cases for State of Michigan and Sick Child Care: Year 3, 2015-2016.

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## Vulnerable Population Study of Household Injuries: A Case Study in Hong Kong

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**Study/Objective**: This study is primarily aimed to investigate the relationship among different types of household injuries with socio-demographic attributes in Hong Kong (an urban Chinese setting).
**Background**: Injury is a major global disease burden for the 21st century. However, there is little research about unintentional household injury, especially in Asian urban areas.
**Methods**: A cross-sectional retrospective recall study was conducted in 2009 using a random telephone survey with a modified Chinese version of the World Health Organization Injury and Violence instrument. Ethics approval and participant's verbal consent were sought. The study samples included 6,570 non-institutionalized Cantonese-speaking Hong Kong residents of all ages and genders. Descriptive analysis and incidence rates were calculated for seven specific injuries, including dislocation and sprain, fracture, external injury, bruise, poisoning, burn and scald, and animal bites.
**Results**: In the previous 12 months upon the time of survey, 2,577 out of 6,570 respondents experienced household injuries. Among the seven types of injuries, bruise was reported with the highest incidence rate (25.3%). Moreover, the probability of household injuries generally decreases with the increasing age from 40 years old. Gender was also confirmed to have influence in the household injuries. Females have a 17.1% higher rate than males when household injuries occur. There were district disparities of the household injury occurrence pattern.
**Conclusion**: Age, gender, and geographical location had strong relation with the incidence rate of household injuries. Further studies with a prospective longitudinal design should include injuries that happen outside of a household setting.
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## The Disaster Risk Landscape for Small Island Developing States (SIDS)

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**Study/Objective**: To examine disaster vulnerability of Small Island Developing States through a public health/socio-ecological lens.
**Background**: In contrast to continental nations, the world's 52 Small Island Developing States (SIDS) form a collective of countries that experience disproportionate challenges for sustainable development related their geography, small size, and physical isolation. SIDS also face elevated risks for disaster incidence and consequences, particularly in the realms of climate change, sea level rise, natural disasters (tropical cyclones, earthquakes, tsunamis, volcanoes), and marine hazardous materials spills. Cyclone Winston's impact on Fiji in 2016 and Cyclone Pam's landfall over Vanuatu in 2015 illustrate the special vulnerabilities of the SIDS.
**Methods**: The novel Disaster Risk Reduction (DRR) and Disaster Risk Management (DRM); challenges faced by SIDS were reviewed in light of United Nations guidance, the Sendai Framework, and the Sustainable Development Goals.
**Results**: For SIDS, the disaster risk landscape is shaped by several unique features: 1) small size and correspondingly limited resources; 2) elevated disaster frequency and severity based on geography (tropical latitude/longitude), geophysics (seismicity, volcanic activity, proximity to tectonic plate boundaries), and topography (sea level elevation, 360° coastal perimeter, steep terrain on some islands); and 3) physical isolation from other nations - precisely because SIDS are individual islands or clusters of islands. For SIDS, the trifecta of natural disaster vulnerability, climate change, and rising ocean levels act synergistically to exacerbate disaster risks.
**Conclusion**: Dispersed broadly throughout the oceans of the world, the SIDS act inadvertently as an early warning network for detecting the initial signs of insidious global threats. Given these realities, DRR and DRM strategies must be tailored to the unique constellation of disaster hazards, and vulnerabilities that characterize the SIDS. The ability of SIDS to form robust alliances among counterpart island nations, is an urgent imperative as is the need for infusion of international support to enhance disaster resilience.
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## Reducing Non-communicable Disease Exacerbation after a Disaster

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**Study/Objective**: To develop a framework for reducing the risk of Non-Communicable Disease (NCD) exacerbation after a disaster.
**Background**: Worldwide, there has been a "disease transition" to NCDs, creating challenges for governments, health care, and service providers. Prominent NCDs are cardiovascular diseases, cancers, diabetes, respiratory conditions, and renal diseases. NCD treatment and care is reliant on Public Health Infrastructure (PHI), such as medications, equipment, housing, water, and sanitation. A breakdown of PHI places people with NCDs at increased risk of disease exacerbation or death.
**Methods**: Qualitative and quantitative research methods were used to complete the research. Participants included people with a NCD, environmental health professionals, and disaster service providers in Queensland, Australia. The qualitative component included six focus groups and 42 interviews with 105 participants. A thematic analysis was conducted to analyze the data. A modified Delphi process was then completed, which included a consultative forum and a survey. Descriptive statistics, bivariate, and logistic regression modelling were used to analyze survey data.
**Results**: A breakdown of PHI can result in an exacerbation of NCDs after a disaster. Mitigation strategies include: tailoring advice to the most vulnerable, maintaining a register of people at risk, providing patients with disaster packs, locating health services in disaster resilient locations, early evacuation, and providing health services at shelters and evacuation centers. These findings were integrated into a framework for reducing the risk of NCD exacerbation following a disaster.
**Conclusion**: This framework allows disaster service providers to prepare people with NCDs for a disaster. Implementation will require a multidisciplinary and inter-sectoral approach. The framework shifts the focus to prevention and preparedness activities and, most importantly, provides a sustainable approach for protecting the health and well-being of people with NCDs before, during, and after a disaster.

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## Knowledge and Awareness of HIV/AIDS Infection among Patients with Sexually Transmitted Infections (STIs) at the Komfo Anokye Teaching Hospital (KATH) Polyclinic

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**Study/Objective**: To determine the level of knowledge on HIV/AIDS among patients with STIs. To determine measures taken by patients with STI's against HIV/AIDS. To determine views on HIV/AIDS against pregnancy.
**Background**: Ghana has an overall HIV prevalence of 1.3%. Like other developing countries, it is still considered a high-risk country for several reasons: the presence of covert multi-partner sexual activity, a low level of knowledge and low condom use, unsafe professional blood donation, high incidence of self-reported sexually transmitted infections (STIs) among vulnerable groups, infected expatriates who infect their sexual partners when they return to Ghana, and high levels of HIV/AIDS in the bordering countries - all contribute to the spread. This study was conducted to describe the knowledge and awareness of HIV/AIDS among patients with sexually transmitted infections at KATH.
**Methods**: A cross-sectional study was carried out at the Family Medicine Directorate of KATH for three months. We interviewed participants using a structured questionnaire. Patient consent was obtained before being interviewed. After the interview, patients were then educated on HIV/AIDS and its relatedness to other STIs, using educational material that was developed by investigators. Analysis was done using SPSS16.0.
**Results**: A total of 112 participants were recruited, (4 participants refused to consent), therefore, 108 were interviewed over the study period. The average age at which participants became sexually active was 19 years. Two-thirds of the participants had had up to 4 lifetime sexual partners, and 16% had had between 5 and 25 lifetime partners. Males had more lifetime partners compared to females. Participants were generally aware of HIV/AIDS and admitted that HIV/AIDS more than pregnancy and other STIs was going to significantly change their lives, change their career goals and affect their social lives.
**Conclusion**: Most participants had knowledge about STIs and HIV/AIDS but exhibited risky sexual behaviour and practices. Frequent education for this high risk group will be useful in changing behavior and reducing the transmission of STIs and HIV/AIDs.

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## Designing a County-wide Crisis Care Plan

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**Study/Objective**: To create a practical, stakeholder-approved, crisis care plan for a county health care system.
**Background**: Riverside County, California is the state's 4th largest county with a population of 2.3 million. Although the county had pre-existing medical surge plans, no plan existed for managing the allocation of critical medical supplies and pharmaceuticals during a large-scale, county-wide crisis.
**Methods**: A plan was needed to formalize the distribution of limited, centrally controlled medical resources in a multi-site, county-wide disaster. To that end, the county's public health and emergency management departments partnered to review prevailing best practices, develop an ethical framework for decision making with respect to limited resource allocation during crises,

formalize the plan's lifecycle, identify the decision making team, and determine a deliberative process for decisions during the event . After an initial draft of the plan was prepared, a first stakeholders meeting was held with local law enforcement, the local emergency services agency, and physician and hospital professional organization representatives, who provided valuable feedback. A revised plan is being circulated to county physicians in preparation for the second round of stakeholder review. Following this round, the plan will be finalized and made publicly available.

**Results**: To date, the plan has been well received; most stakeholders are well aware of the need for such a plan. Recognizing the sensitivity regarding reallocation of limited resources during times of crisis, key stakeholders were involved at multiple levels, which we believe has added to its general acceptance. We are confident the plan will launch successfully after the second round, once clinical decision makers have had an opportunity to provide input.

**Conclusion**: Detailed crisis care planning is feasible at the local jurisdictional level, even with a large population base. Stakeholder involvement and public transparency is essential for the development and implementation of a crisis care plan at the county level.

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## Women and Children at Risk for Disasters and ZIKV Victims in Brazil

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**Study/Objective**: To identify health conditions and care for women and children at risk in disasters, and ZIKV victims in selected Brazilian municipalities.

**Background**: Since the International Health Regulations were re-edited in 2007, four Public Health Emergencies of International Concern (PHEIC) were declared. The most recent was due to the ZIKV outbreak in Brazil. This proposal is based on the assumption that poverty-stricken populations are most vulnerable and especially susceptible to different disasters (epidemics, floods, mud slides etc). Women and children constitute the most vulnerable among the vulnerable, and need close attention and care. PHEICs indicate a need for measures to enhance national preparedness and response capacities, including risk detection and prevention.

**Methods**: Women in disaster-prone areas or recently affected by disasters, will be identified through their status as beneficiaries of social programs. Each woman will be interviewed as to the nature, possible determinants and consequences of the disaster they experienced, ongoing risks and difficulties faced by them and by children under their care.

**Results**: We hope to collect relevant information for development and implementation of measures for disaster preparedness and response, regarding these vulnerable groups and especially in relation to PHEIC. This proposal is in line with the perspectives of social inclusion and access to essential rights, thus contributing to reduction of vulnerabilities.

**Conclusion**: This proposal aims at detecting health care measures for affected and vulnerable groups at-risk for disasters in Brazil, and may establish a benchmark for preparedness and necessary response measures in order to react to present and future PHEIC.

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## The Effect of Earthquake Hazards Induced by Natural Gas Mining on Medically Unexplained Physical Symptoms and Psychosocial Problems: A Longitudinal Analysis

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**Study/Objective**: To determine whether the chronic threat of exposure to mining-induced earthquakes in the northern part of the Netherlands, is accompanied by a higher prevalence of medically Unexplained Physical Symptoms (MUPS) and psychosocial problems.

**Background**: The Groningen natural gas field is among the largest in the world and uniquely located in a populated area. Decades of mining activities burdened the region with increased earthquake hazards, several times higher than 3.0 on the Richter scale (one 3.6, in 2012). Inhabitants were confronted with ground shaking, damaged houses, loss of livelihood, social unrest, and public anger towards the mining company and authorities. In 2013 future earthquakes with a magnitude over 5.0 were considered likely, contributing to lack of positive prospects and chronic stress: factors that are not beneficial from a public health perspective.

**Methods**: Data covering a five-year period (2011-2015), was extracted from electronic patient records of general practitioners. Two dependent variables were constructed: MUPS (physical symptoms clustered per organ system) and psychological and social problems (mood and anxiety disorders, suicide and problems in personal relations or work). Statistical analysis was conducted in steps to test differences in prevalence in health issues in the earthquake region and a comparison group; and to determine the predictive value of gender, age, socioeconomic status, and earthquake magnitude and depth, considering the cross-classified data structure with patients nested in general practices and postal codes.

**Results**: Results: The results indicate whether the prevalence of MUPS and psychosocial problems was significantly higher in the earthquake region regardless of gender and age, after controlling for socio-economic status and earthquake magnitude and depth.

**Conclusion**: The health impact of chronic stress linked to earthquake-threat could be determined apart from other relevant explanatory factors.

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## Evaluating the Health Impact of Disaster Inquiries in Australia

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**Study/Objective**: The aim is to evaluate contemporary Australian disaster practice.
**Background**: The evolution of disaster practice has displayed that the management of disasters extends beyond immediate response needs, and that effective recovery from these events requires a broad, coordinated capacity building perspective, rather than a traditional short term response effort. The concept and practice of reducing disaster risk can be achieved through systematic efforts to analyse and manage the causal factors of disasters, rather than apply current, operational, response designed risk management actions. It is therefore timely to assess the relationship of proposed strategies, and the social determinants of health as a holistic approach to disaster practice.
**Methods**: Contemporary Australian disasters inquiries were to determine what, if any recommendations support action on the causal factors of health and wellbeing as described by the World Health Organization (WHO), using the Social determinants of health as a reference standard. The intent was to examine whether the recommendations undertook action on improving public health, and thus improved community resilience and reduced vulnerability.
**Results**:

- Seven post disaster inquiries were reviewed.
- Although the scope and Terms of Reference of reports were broad enough to be inclusive of risk, risk factors and resilience, the recommendations focused primarily on emergency management structure and practice, and demonstrated low engagement in health, health equity, and/or health protection as drivers or outputs.

**Conclusion**: The National Strategy for Disaster Resilience has also identified that disasters are increasing in their complexity and frequency. Priorities of prevention and mitigation have been firmly embedded within this strategy, to mitigate the effects of disasters upon the community. There is an opportunity to further engage public health practice with disaster management professions and examine:

- what role does disaster health practice play in shaping the social environment in ways conducive to better health and,
- how interventions can assume wider responsibility for creating more healthy, resilient societies

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## The Expert Group Health Research and Care after Disasters and Environmental Crises: An Analysis of Research Questions Formulated by Dutch Health Authorities for the Expert Group between 2006 and 2016

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**Study/Objective**: The aim of this study is (1) to examine developments in the research questions, submitted to the Expert Group Health Research and Care after Disasters and Environmental Crises between 2006 and 2016, and (2) to explore implications of the research questions for the nature of advice given to national and local health authorities.
**Background**: After the Bijlmermeer plane crash (1992) and the Enschede fireworks disaster (2000), the need to rapidly enclose available knowledge on disaster health research and psychosocial support in crisis situations was broadly recognized in the Netherlands. A decade ago the Dutch ministry of health installed the Expert Group to assist health authorities in addressing complex issues raised by (potential) public health crises.
**Methods**: Questions submitted to the Expert Group were categorized along their possible knowledge objectives: (1) health care provision in practice, (2) policy-making, (3) public interest, and (4) scientific interest. Stakeholders were interviewed to gain a better understanding of the advice and its implementation in relation to the crisis context.
**Results**: Despite notable variation in cases and type of questions, most of the 24 questions were aimed at practical health care provision, policy-making and public interest. In practice, the Expert Group recommended approaches that could be more passive or active. Regardless of the proposed attitude, a safety valve should be embedded in the process to guard public health interests. For instance, a possible lesson to verify (learned from a long-lasting soil remediation of a former tarmac construction site), is that a more proactive attitude by the Expert Group in future cases might prevent unnecessary hiccups in addressing health hazards (i.e. reduce exposure of citizens to stressful circumstances).
**Conclusion**: Discussion: Several practical recommendations were formulated based on the material. Evaluation of advice and its implementation is important for quality improvement.

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## Conceptualizing the Essential Elements of Public Health Emergency Preparedness in Canada

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**Study/Objective**: This research aims to conceptualize the essential elements of public health emergency preparedness in Canada.

**Background**: While emergency preparedness is a core public health function in Canada, public health emergency preparedness activities operate largely in the background until an event of concern raises their profile, as was observed during the Severe Acute Respiratory Syndrome (SARS) outbreak and recently, with Ebola Virus Disease. Despite the lessons learned from SARS, a persistent challenge for public health practitioners is defining what it means to be prepared for the Canadian public health system.
**Methods**: This research used a qualitative study design. Six focus groups were conducted across Canada, employing the Structured Interview Matrix technique. The purposive sample consisted of inter-disciplinary professionals with roles in or relevant to public health emergency preparedness. Rich qualitative data was analyzed using content analysis. Emergent themes were identified by incorporating empirical data from each phase of the Structured Interview Matrix. Integrated knowledge translation was incorporated throughout the study design and involved knowledge users in study design and analysis.
**Results**: will be presented for the essential elements of public health emergency preparedness across all-hazards emergencies. Emergent themes include the consideration of structures important to preparedness for emergencies, and the processes and resources found to be essential to preparedness in Canada. Detailed examination of elements will explore practice and experience; collaboration; communication; learning and recovery; and ethical considerations in planning and decision-making.
**Conclusion**: This study presents findings on the essential elements of public health emergency preparedness in Canada. These elements can guide practice in informing preparedness activities. Countries with health systems similar to Canada may use the findings in conceptualizing preparedness within public health systems globally.
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## Improving Maternal, Newborn and Women's Reproductive Health in Crisis Settings: A Cochrane Systematic Review

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**Study/Objective**: To identify, synthesize and evaluate the effects of a health system and other interventions aimed at improving Maternal, Newborn and Women's Reproductive Health (MNWRH) in crisis settings.
**Background**: Maternal, newborn and reproductive health is a major problem in humanitarian/crisis settings mainly due to disrupted health service delivery, with substantially higher levels of morbidity and mortality compared to stable settings. Improving maternal, newborn and reproductive health in crisis settings is a global priority, especially in the context of the UN sustainable development goals.
**Methods**: A Cochrane-based systematic review was carried out using the guidelines for Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA). We systematic searched seven databases, two trial registries, three specialized grey literature sources, hand-searching, reference lists and contact with expects in the field.
**Results**: Out of 10,998 records (10,391 from databases and 607 from other sources), only three studies met our strict inclusion criteria, including one study in-progress. An additional 17 'near miss' excluded studies were also explored in the analysis. The two included studies are part of a randomized trial involving female survivors of sexual violence with of high levels of post-traumatic stress disorder (PTSD) symptoms, and combined depression and anxiety symptoms in a post-conflict setting. The first study assessed the impact of cognitive processing therapy (a mental health intervention) provided by trained community-based paraprofessionals, compared to individual support on mental health outcomes. The second investigated the impact of Village Savings and Loans Associations (a group-based economic intervention) on economic, social and psychological functioning outcomes. The in-progress study is investigating the effect of an intervention package on the frequency of facility based births and perinatal mortality.
**Conclusion**: The evidence base for improving MNWRH in crisis setting remains relatively weak. More robust and well-designed studies are needed.
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## The Progress from the Acute Phase to Subacute Phase in Disaster Medical Assistance at the Kumamoto Earthquake on April, 2016

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**Study/Objective**: We are going to investigate and review the smooth disaster medical relief activity to the Kumamoto earthquake on April, 2016; for the future, through this precedent, the acute phase to sub-acute phase.
**Background**: The Kumamoto earthquake occurred on April 14th and 16th, 2016. Based on Japanese the disaster medical relief system, DMAT (Disaster Medical Assistant Team) had dispatched under the Ministry of Health and Labor. After one week from the earthquake in the Aso area, we had initiated the medical coordination center, which was named Aso Disaster Recovery Organization (ADRO).
**Methods**: Investigate and review the process of establishment ADRO and its operations.

**Results**: We have concluded the DMAT operation office placed in ASO Medical Center Hospital, subsequently, the Aso area disaster health care revival liaison conference, had inaugurated officially - which was named ADRO [Aso Disaster Recovery Organization]. We have estimated, and expected to be proceeded by the next phase of disaster medical relief coordination. We also had been establishing relationships with the local relevant sector or institute. We received permission from the Kumamoto authorized institutes, and attempted to share the concept of this organization's establishment among us, through out the activities follows: 1) we established an outline, including goals, structure, and contents of the functions of this organization; enrolled institutions/organizations, and 2) we created the operation manual of ADRO, to clarify the detail of operation such as meeting schedules, places, handout documents, and manuals of the Minutes.
**Conclusion**: We are deeply considering that this process has a high potential to be a model case of the procedures, from an acute phase to subacute phase, to handle the disaster medical relief activity in the affected area. It is indispensable and an essential element to establish the coordination or conference body in a disaster affected area for handling effective medical relief activity.

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## Efficacy of Mass Graves for Management of the Dead in Mass Disasters - A Retrospective Multi-Center Study

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**Study/Objective**: To reassess the effectiveness of mass graves in managing the dead during post Asian tsunami period in Sri Lanka and India, to identify minimum standards and best practices for conduct of such graves.
**Background**: The unexpected high numbers of deceased, witnessed during a mass disaster, lead to the critical question of management of the dead including finding effective ways of disposal within a short period.
**Methods**: The data available for five selected mass gravesites located in tsunami affected southern Sri Lanka and south India, were perused and geographical locations of them were observed periodically since mid-2005, to assess the nature of the site and associated human action. The data was gathered on the criteria for selecting mass grave sites, burial procedure, members of the mass grave team, identification and documentation of deceased, involvement of first responders, strategies for maintenance of the mass grave, etc. The directions for locations and translators for interviews in south India were provided by the ICRC regional delegation in India and local Red Cross societies.
**Results**: The criteria for selecting mass burial sites were not uniform throughout the selected areas. Some were located just opposite the community habitats. The depths of these sites were also varied, and some burials were just few feet deep. The boundaries of most of the mass burial sites were indistinct. Many burial sites were utilized for reburials, and some burials were done during the evening or in the night. The services of untrained personnel were obtained to dispose of the dead, and the deceased were not tagged with permanent identification codes prior to disposal in almost all the sites.
**Conclusion**: Although the disposal method can be differed according to the disaster situation, mass gravesites are a potentially safe and appropriate method for disposing of the dead in developing countries, if followed with the proper guidelines.

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## Post-Disaster Recovery, Mental Health and Resiliency: The Role of Public Health Organizations

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**Study/Objective**: This case study aims to describe the role of public health in the long-term recovery of communities heavily affected by a disaster.
**Background**: In 2013, a train carrying 72 cars of oil derailed in Lac-Mégantic in the Estrie region (Québec, Canada), provoking a major conflagration and explosions. This disaster caused 47 deaths, the destruction of 44 buildings, the evacuation of 2,000 citizens (ie, one-third of local population), and an unparalleled oil spill.
**Methods**: The Public Health Department of the Estrie region examined the mental health consequences in the years following the disaster, using repeated cross-sectional studies (T1:2014; T2:2015) among large random samples of adults. Results from these two studies served as a powerful lever for community mobilization.
**Results**: Overall, seven in 10 adults living in Lac-Mégantic and surrounding areas reported human (eg, loss of a loved one) or material losses (eg, home damage) related to the train derailment. Two years after the event (T2), three-quarters of these "direct victims" showed moderate to severe signs of posttraumatic stress. Following the publication of these results, a multi-sectoral action plan, funded by the Québec health and social services ministry, was developed with community partners and citizens in order to increase resiliency. Through a wide range of actions, this plan pursued several objectives: to maintain and adapt psychosocial services (bringing them closer to people), to stay connected with the

community (creation of a space for citizens), and to foster resident involvement.

**Conclusion**: As supported by a large body of literature, the population burden of psychopathology in the aftermath of the Lac-Mégantic disaster is substantial and persistent. Public health organizations facing such disasters should: (a) establish a long-term monitoring system of psychological consequences; (b) advocate for social measures and psychosocial support; (c) collaborate closely with the community; and (d) build on the knowledge gained responding to previous disasters.

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## Impact of the 2011 Triple Disaster in Fukushima, Japan - An Earthquake, Tsunamis, and a Nuclear Power Plant Accident - Physical Performance of the Children: A Retrospective Cohort Study in Soma City, Fukushima

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**Study/Objective**: The study objectives were twofold: (1) to assess the post-disaster versus pre-disaster physical performance among school children in Fukushima; and (2) to evaluate which types of performance were the most affected.

**Background**: The 2011 triple disaster in Fukushima posed a lot of public health challenges in the affected areas. As people tended to stay indoors from fear of radiation, there was an increasing concern about decline in physical performance among the residents, especially children, who were more likely to stay indoors because several schools restricted the time of outdoor exercise to reduce external radiation exposure.

**Methods**: In Japan, the School Health Examination Survey is performed annually. Data of these examinations among the elementary school children at the 10 elementary schools in Soma City, Fukushima were collected. The data obtained included height, body weight, and scores of grip strength, time of the 50m run, the 20m shuttle-run test, a softball throwing test, a side-step test, and sit-up test. The results of each test were scored from 1-10 according to the national standards. For each physical performance test, absolute values, as well as scores, were compared between 2010 (pre-disaster), 2012, and 2015 (post-disaster). The data were also compared with national average scores.

**Results**: Data were obtained from 3,663 school children. After controlling for height and weight, scores of 20m shuttle run and side-step test significantly decreased in the post-disaster period compared with the pre-disaster period. Comparison with national averages also showed the trend might be specific in Fukushima. Grip strength and handball throwing did not show a statistically significant difference.

**Conclusion**: This research suggests that school restrictions on outdoor activities after the Fukushima disaster had an effect. As physical performance among children may affect their life-long health status, as well as academic achievement, a future disaster mitigation plan needs to include plans to maintain physical activities among children.

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## Knowledge, Attitude and Practices of Tuberculosis (TB) Management Among Health Workers at the Emergency Department (ED) of Komfo Anokye Teaching Hospital (KATH), in a Low Emergency Resource Setting in West Africa

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**Study/Objective**: To assess the knowledge, attitude and practices of health care workers at the ED of KATH towards TB management.

**Background**: Tuberculosis (TB) has long been known as an occupational hazard among Health Care Workers (HCWs). Previous research in Africa found that HCWs often lack knowledge about TB and its infection control. Key factors facilitating nosocomial TB transmission include: delayed diagnosis, ineffective treatment of patients, and lack or inadequate TB Infection Control (TBIC) measures.

In Ghana, many TB infected patients present late to the hospitals with various complications. Initial diagnosis of TB is usually delayed due to insufficient resources, lack of diagnostic tests and inadequate isolation units. This usually leads to long boarding hours of these patients, which facilitates health worker associated TB. Poor infection control practices by health workers also contribute to their increased risk of TB infection.

There is little literature in Ghana on the assessment of the knowledge, attitude and practices of HCWs in the ED regarding TB management. This research seeks to assess these amongst HCWs who are the frontline in TB management in the ED.

**Methods**: A cross-sectional descriptive study will be conducted among the HCWs, and all 200 health workers in the ED will be included. A structured based, self-administered questionnaire will be used to assess the knowledge, attitudes and practices of TB management among HCWs, which will include whether they are willing to screen for TB.

**Results**: The study will identify previously unknown gaps in TB treatment among health workers. Poor attitude of HCW towards TB management may be highlighted. Inadequate TBIC measures may also be identified.

**Conclusion**: These findings will help provide the needed support, resources and training in order to reduce health worker associated TB. It will also necessitate further studies to determine the TB burden among health workers in the ED.

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## Barodontalgia Among Sri Lankan Air Force, Air Crew

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**Study/Objective**: The purpose of this study was to assess the current in-flight incidence of barodontalgia, and to identify the associated dental pathologies and etiologic factors.
**Background**: Barodontalgia, a dental pain evoked by a change in barometric pressure in an otherwise asymptomatic tooth, may be severe enough to cause in-flight vertigo, incapacitation, and premature cessation of flights and altitude-chamber simulations.
**Methods**: A total of 40 questionnaires were e-mailed to fighter, helicopter, and transport aircrews of the Sri Lankan Air Force. They were asked to report whether they had ever suffered from a toothache during flight. If a positive answer was reported, the subject was interviewed and his dental file was reviewed to obtain details about the incidence.
**Results**: There were 31 (77.5%) aircrew members who responded. Out of those, 4 (12.9%) reported at least 1 case of barodontalgia; their mean age ± SD was 29.7 ± 7.3 yr and the occurrence by aircraft platform were 6.45% of fighter, 3.2% of helicopter, and 3.2% of transport respondents. Many of the cases originated from vital and/or inflamed pulp (40.7%), whereas the other cases were due to pulp necrosis or periapical periodontitis (18.5%) and barosinusitis (18.5%). None of the patients reported premature mission termination due to dental pain.
**Conclusion**: Even with modern dental care, military aircrews from all the flight platforms may occasionally experience barodontalgia. Flight surgeons and dentists should be aware of this phenomenon and use preventive measures to minimize its incidence and severity.

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## Occupational Health Issues among Non-traditional Response Workers following Hurricane Sandy

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**Study/Objective**: Characterize the specific distribution and determinants of illness and injury among laypersons and volunteers assisting in the remediation of homes flooded and damaged during Superstorm Sandy.
**Background**: In New York City, mold damage and other flood-related contamination has been a significant concern among the public, homeowners, and public health agencies following Hurricane Sandy. Following the storm, lay persons who had no previous experience remediating homes with damage from environmental hazards began ad hoc reparations to residential buildings and were exposed to mold, asbestos, and other environmental contaminants.
**Methods**: A field survey of 544 homeowners and volunteers who performed mold remediation activities and participated in NYC Department of Health worker safety training programs was conducted to determine possible exposures and health effects. A non-trained control group was also surveyed and physical and mental health outcomes were compared.
**Results**: Although symptom prevalence was moderate, rates of diagnosed illness in the cohort were low. The illness that affected the highest number of respondents was depression (6.5%). There were few significant differences in rates of illness between the trained and untrained groups; however, safe work practices were slightly better in the trained group.
**Conclusion**: The findings of this research are consistent with previous studies following Hurricanes Katrina and Rita. Effective just-in-time worker safety training programs for non-traditional responders to disasters, including "do-it-yourself" homeowners and volunteers, may reduce the rates of occupational illness and injury in this population. Health departments should create materials for occupational health and safety just-in-time training programs prior to disasters that involve widespread exposure to environmental stressors.

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## Impact of Health Department Worker Safety Training on Health Outcomes after Hurricane Sandy in New York City

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**Study/Objective**: Characterize the specific distribution and determinants of illness and injury among laypersons and volunteers assisting in the remediation of homes flooded and damaged during Superstorm Sandy. Evaluate the effectiveness of worker safety training sponsored by the Department of Health to lay persons and volunteers in reducing the incidence of illness and injury due to exposure to environmental hazards.
**Background**: In New York City following Hurricane Sandy, lay persons and volunteers began ad hoc preparations to residential buildings and were exposed to mold, asbestos, and other contaminants. The New York City Department of Health and Mental Hygiene saw the need for worker safety training in this population. It is essential to the practice of public health to understand how a health-department-sponsored worker safety training program could serve as a prevention strategy for occupational illness following a disaster.
**Methods**: A field survey of 544 homeowners and volunteers who performed mold remediation activities, and participated in NYC Department of Health worker safety training programs, was conducted to determine possible exposures and health effects. A non-trained control group was also surveyed, and physical and mental health outcomes were compared to evaluate the effectiveness of training as a public health intervention.
**Results**: Although symptom prevalence was moderate, rates of diagnosed illness in the cohort were low. The illness that affected the highest number of respondents was depression (6.5%). There were few significant differences in rates of illness between the trained and untrained groups; however, safe work practices were slightly better in the trained group.

**Conclusion**: The findings of this research are consistent with previous studies following Hurricanes Katrina and Rita. In order to design a public health intervention to minimize occupational-related illness following a disaster, health departments should understand the most susceptible populations for the development of mold-related illness and implement strategies that specifically target the high-risk exposures in these populations.

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## The Occupational Health and Safety of First Responders and Health Care Professionals in Magway, Myanmar

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**Study/Objective**: To examine the occupational health and safety (OHS) of first responders and health care professionals in Magway, Myanmar.

**Background**: Myanmar has had a long-standing commitment to the OHS of its workforce. There are data supporting the OHS standards across the country. However, there are limited data on the comparison of OHS among first responders including firefighters, volunteers, and health care professionals in times of disaster versus their daily occupation.

**Methods**: An epidemiological study was conducted in Magway, Myanmar in July 2016, using a written survey in the local Burmese language with 119 items that assessed demographics, occupational and physical health, and type of disaster response with associated illness and injury. 234 participants, 48 (21%) health care professionals, 45 (19%) firefighters, and 141 (60%) volunteers including NGO workers and farmers, completed the survey. 160 were male, 73 were female, and the average age was 33 years. The data were organized using Excel and analyzed using SPSS.

**Results**: The study revealed that the highest incidence of injuries and illness during a disaster occurred during floods (63.7%) as compared to cyclones (18.9%) and landslides (16%). There was no significant difference with respect to the incidence of cuts, burns, sprains, broken bones, and diarrhea in farmers, firefighters, and health care professionals in the regular setting versus a disaster setting. However, the incidence of heat stroke in farmers (17% and 24%, respectively), vomiting in firefighters (0% and 16%, respectively), and coughing for both farmers (17% and 21%, respectively) and firefighters (18% and 37%, respectively) was significantly higher than that of health care workers.

**Conclusion**: The results of this study revealed that first responders, including firefighters and farmers, have a higher risk of injury and illness than health care workers both during the course of their regular employment and during times of disaster.

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## Implementation of Tabletop Exercises and Simulations to Improve Practical Skills in a Public Health Disaster Curricula

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**Study/Objective**: To enhance understanding of disaster management by adding "hands on" practical training to a public health training curricula.

**Background**: Feedback from emergency managers in our region indicates a lack of practical skills in individuals seeking disaster relief employment. The Colorado School of Public Health offers a Certificate in Public Health Preparedness & Disaster Response Methods. This program is a blended online and in person curricula. As part of designing this certificate we sought to provide practical skills for individuals interested in emergency management.

**Methods**: To enhance the ability of students to function in disaster response, practical disaster exercises were added to the curricula. We chose typical disaster training formats, both to solidify learning as well as directly train to disaster management. These elements were integrated into a more typical curricula. This included both drills and exercises. Drills involved hands on training such as communication with radios and decontamination. Exercises were carried out in both a tabletop format as well as full scale simulation events.

**Results**: The new curricula was successfully implemented over two cycles of domestic and international response course training. Course evaluations showed very high engagement of students with a clear understanding of principles taught.

**Conclusion**: Introduction of practical training, typical of disaster responders into public health curricula, enhances student engagement and learning.

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## An Analysis of Student Engagement Patterns and Course Outcomes in a Public Health and Disaster Online Course

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**Study/Objective**: To reveal the pattern of student engagement (the amount of time a student logged in) in Public Health Principles in Disaster and Medical Humanitarian Response (PHPID) online course, and to examine whether the pattern is associated with the course outcome (the probability of certificate attainment).
**Background**: Student enrollment in online courses has increased in the past decade and continues to grow. Online courses become an effective platform to teach students globally in public health and disaster. However, how students engage in, and how the engagement pattern is associated within the course outcomes, was unknown.
**Methods**: This research collected registration information and time-stamped Model login data from four completed cohorts of PHPID online courses (2014-2016). Descriptive analysis, chi-square test, and multiple logistic regression were conducted via SPSS.
**Results**: In total, 3,457 participants, from 150+ different countries registered, and 20.6% had passed the examination and obtained certificates. On average, each student spent 4.3 hours, 15.7 hours for certificate obtainers, and 1.3 hours for non-certificate obtainers. Males invested 18.3% more time than females. The participants with qualification in public health or medicine spent 30.7% more time than others. The student engagement was confirmed to have a significant and strong effect on their course completion, and in obtaining certificates, with adjusting gender, age, and education level (AOR = 1.401; 95%CI, 1.367-1.436).
**Conclusion**: The patterns of student engagement in PHPID online courses were varied, associated with socio-demographic variables. Spent more hours in able to increase the probability of course completion and certification obtainment. Further research should be conducted to meet the needs of online course training in disaster and public health education.
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## A Public Health Emergency Simulation Tool for Enhanced Training in Emergency Preparedness and Response

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**Study/Objective**: This workshop will introduce an innovative emergency preparedness and response simulation tool for training public health professionals. The tool, developed by KFL&A Public Health, enhances the traditional emergency preparedness exercise with simulated "real-time" surveillance data using two tools, the Acute Care Enhanced Surveillance system (ACES) and Public Health Information Management System (PHIMS). Through group role-play, workshop attendees will actively participate in managing a simulated public health incident in a local public health agency setting involving different health system roles and collaboration. Participants will gain knowledge and skills in core emergency management competencies such as risk assessment, risk communication, and the incident management system; and in using ACES and PHIMS to inform action in a public health emergency. Participants will reflect on the activity and provide feedback on the simulation tool to facilitators. This workshop will develop skills and knowledge that can be applied to future training and planning for public health emergencies.
**Background**: In the absence of a real-life public health incident or emergency, residents are best trained and assessed for the related EPAs through simulation activity. Currently used, table top simulation methods are insufficient.
**Methods**: Through this workshop, Emergency Managers and Public health physicians will have experience with a scenario which allows them to use real-time surveillance tools for improved situational awareness and improved decision making. The two main tools will be ACES and PHIMS.
**Results**: This workshop will enable improved training and decision making by Public Health officials during a public health emergency.
**Conclusion**: This workshop will explore simulation training for improved outcomes for public health emergencies.
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## The Development of a Bioterrorism Response, A Guideline for Citizens in Korea

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**Study/Objective**: The study objective is to understand the adequate development of a bioterrorism response guideline for citizens.
**Background**: Although the possibility of bioterrorism occurrence exists, the citizen awareness and knowledge of bioterrorism is inadequate and lacking. Furthermore, the threat of bioterrorism still exists with changing international sociopolitical situations and advantages of bioterrorism for terrorists, so the behavioral bioterrorism response guideline for citizen was needed.
**Methods**: The terrorism and disaster response guidelines and recommendations for citizens were collected and examined, and then the parts for bioterrorism response were extracted and revised for citizen understanding and access. Researchers used a 3-step approach to develop the guidelines; (1) collecting data (2) organizing data as a guideline (3) revision of the guideline for level control adequate for citizens. The result was evaluated by sampled citizens.
**Results**: The guidelines and recommendations are composed of (1) basic; (2) individual diseases and syndromes; (3) situation/target person/location related contents. They are organized for various types of printable material. Initially, 3 types of public relations material were developed; a manual book, a leaflet, and a small poster. Also, the forms of information type are related and matched to individual methods of public relation access.
**Conclusion**: Because of the inadequate citizen awareness and knowledge of bioterrorism, it is necessary to develop the educational content on bioterrorism for citizens, especially based on the contents and levels related to individual settings.
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## Tuberculosis in Southwestern Ontario Emergency Departments: A Missed Opportunity?

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**Study/Objective**: The primary objective is to determine the clinical presentation of emergency department patients with Tuberculosis (TB) in southwestern Ontario, and to evaluate their pre-diagnosis emergency department utilization. Patterns and clinical findings will be used to develop a center-specific TB educational resource for ED physicians, to aid in the recognition and diagnosis of high risk patients which could be used at other large Canadian, urban tertiary care hospitals. Broadly, this study aims to increase awareness of TB in local EDs.
**Background**: The Middlesex-London Health Unit (MLHU) reports on average 10 cases of active tuberculosis (TB) per year, with 99 cases between January 2005 and December 2015. Most patients with TB heavily utilize the emergency department (ED) prior to diagnosis. Patients with TB seeking care in the ED are often unrecognized as having TB, as risk factors and symptoms are frequently missed. Delays in diagnosis of TB worsen morbidity/mortality and increases disease transmission. The emergency department may present an opportunity for earlier diagnosis and intervention. To date, no studies have been undertaken to examine TB diagnosis and burden of care in Ontario EDs.
**Methods**: A hospital-based retrospective review of adult and paediatric patients (n = 99) identified by Middlesex-London Health Unit as having active TB between January 1st 2005 and December 31st 2015 will be performed. Health records will be reviewed 1 year prior to and 6 months after the formal TB diagnosis to determine the clinical presentation of ED patients with TB.
**Results**: This is a proposed study.
**Conclusion**: This is a proposed study.

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## Health Emergency and Disaster Risk Management (H-EDRM): Developing the Research Field within the Sendai Framework Paradigm

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**Study/Objective**: To review research trends and evidence in the field of Health Emergency and Disaster Risk Management (H-EDRM), and to provide recommendations for the field moving forward.
**Background**: Health is recognized as an outcome and a goal of disaster risk reduction activities, which is acknowledged in international agreements such as the International Health Regulations (2005) and Sendai Framework for Disaster Risk Reduction (2015). H-EDRM has emerged as an umbrella field which encompasses emergency and disaster medicine, Disaster Risk Reduction (DRR), humanitarian response and health systems strengthening amongst other topics. The Thematic Platform on Emergency and Disaster Risk Management for Health was established by the World Health Organization (WHO) and the United Nations International Strategy for Disaster Reduction (UNISDR) in 2009 as an international, multi-agency platform to advocate, share information and catalyse action for H-EDRM.
**Methods**: On September 23, 2016 a workshop entitled "Emergency and Disaster Risk Management for Health: New Frontiers for Public Health Science" was held at The Chinese University of Hong Kong. Five presentations from international H-EDRM scholars and practitioners aimed to review emerging trends, identify gaps and provide recommendations for the strategic development of the H-EDRM research field. Subsequent closed-door roundtable discussions provided concrete action points.
**Results**: The H-EDRM research field remains underdeveloped and fragmented. Key challenges include overlap in research activities, lack of strategic research agenda, non-consensus regarding terminology, limited inter-stakeholder coordination, limited ability to develop multi-sectoral and inter-disciplinary approaches, and lack of resources. Despite this, effort is being made to bridge the science-policy-practice nexus, learn from past experiences, and explore previously under-studied areas such as post-disaster psychosocial health. The Sendai Framework provides a strong impetus and robust framework to guide the strategic development of this research paradigm.
**Conclusion**: A WHO Research Group has been established to coordinate activities, promote information-sharing, develop partnerships toward H-EDRM and provide technical advice to the WHO Thematic Platform for EDRM-H, health sector and other related stakeholders.

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## Strengthening Health Disaster Risk Management in Africa: Multi-Sectoral and People-Centered Approaches are Required in the Post-Hyogo Framework of Action Era

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**Study/Objective**: The objectives were to evaluate the progress in achievement of the nine targets, of the 10-year African regional strategy for health disaster risk management.
**Background**: In November 2012, the 62nd session of the Regional Committee for Africa of the World Health Organization adopted a comprehensive 10-year regional strategy for health Disaster Risk Management (DRM). This was intended to operationalize the World Health Organization's core commitments to health DRM and the Hyogo Framework for Action 2005–2015, in the health sectors of the 47 African member states. This study reported the formative evaluation of the strategy, including evaluation of the progress in achieving nine targets (expected to be achieved incrementally by 2014, 2017, and 2022).
**Methods**: This study used a mixed methods design. A cross-sectional quantitative survey was conducted along with a review of available reports and information on the implementation of the strategy. A review meeting to discuss and finalize the study findings was also conducted.
**Results**: In total, 58 % of the countries assessed had established DRM coordination units within their Ministry of Health (MOH). Most had dedicated MOH DRM staff (88 %) and national-level DRM committees (71 %). Only 14 (58 %) of the countries had health DRM subcommittees using a multi-sectoral disaster risk reduction platform. Less than 40 % had conducted surveys such as disaster risk analysis, hospital safety index, and mapping of health resources availability. Key challenges in implementing the strategy were inadequate political will and commitment resulting in poor funding for health DRM, weak health systems, and a dearth of scientific evidence on mainstreaming DRM.
**Conclusion**: Implementation of the strategy was behind anticipated targets despite some positive outcomes. Health system-based, multi-sectoral, and people-centred approaches are proposed to accelerate implementation of the strategy in the post-Hyogo Framework of Action era.
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## Integrating the Sendai Framework into Primary Health Networks: An Australian Experience

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**Study/Objective**: To explore the feasibility of integrating the Sendai Framework into primary health networks in Australia.
**Background**: Over the past 20 years, the exposure of the population to weather-related disasters in Australia and across the world has increased faster than vulnerability decreased. This highlights the need to focus disaster risk reduction strategies on the elderly, people with disabilities and those with chronic diseases. To help address this challenge, the Northern Queensland Primary Health Network, Australia, partnered with UNISDR's Global Education and Training Institute (UNISDR-GETI) to explore the feasibility of integrating the Sendai Framework into primary health networks.
**Methods**: The research was conducted using qualitative and quantitative research methods. Participants included general practitioners, pharmacists and other disaster management stakeholders. The workshop methodology was based on the private sector materials used by UNISDR-GETI (United Nations International Strategy for Disaster Reduction (UNISDR), Global Education and Training Institute (UNISDR-GETI). Qualitative data was collected during the workshops in Cairns, Townsville and Mackay, Queensland, Australia. The quantitative data was collected through a survey of participants after the workshop. A thematic analysis was conducted to analyze the workshop data. Descriptive statistics was used to analyze survey data.
**Results**: The workshops increased the knowledge of how and why the primary health networks should have an active role in disaster risk reduction activities. Participants indicated that they are now confident they can help integrate primary health into the disaster system by developing and implementing contingency plans. A consistent theme was the need to clearly define the role and function of the primary health network within the Australian disaster system. This should be complemented by access to accredited training.
**Conclusion**: The workshops identified that the Sendai Framework can be integrated into primary health networks in Australia. This can be sustainably achieved by strengthening partnerships with the academic and government sectors to research roles of primary health professionals, health service providers and the capacity of disaster systems to support local needs.
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## The Centrality of Communities and Civil Society in Epidemic and Pandemic Prevention: A Framework for Improved Preparedness and Response

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**Study/Objective**: Large-scale epidemics and pandemics pose a serious threat, not only to global health security but also to countries, communities and individuals in their efforts to achieve resilience. The threat of emerging infectious diseases, including those of zoonotic origin, and the increasing prevalence of diseases previously controlled by antimicrobials and vaccination efforts, is a cause for concern to the global health community. Communities play an important role in prevention, early detection and early response regarding this threat. Communities can support the containment and control of infectious disease threats, limiting geographic spread, saving lives, and mitigating negative impacts.
**Background**: Recent outbreaks have demonstrated that without community-driven efforts to prevent, detect and respond to infectious disease threats, government efforts can be delayed and negatively impacted. However, communities cannot

manage risk alone. They form an integral part of a coordinated and collaborative effort between civil society, the private sector and government that works best where there are established structures and systems in place, and partnerships built on trust that have been forged before a crisis strikes.
**Methods**: Case study.
**Results**: Communities are central to epidemic and pandemic preparedness.
**Conclusion**: Global and national public health expertise must recognize this role and work toward how engagement with communities and civil society, can become central to their preparedness and response efforts. Through the presentation of several case studies from the Red Cross and Red Crescent movement, best practice and opportunities for improvement will be showcased. Case studies from a variety of contexts will show how it is possible to include joint planning and implementation, moving beyond risk communication to effective two-way participation, ensuring public health response is understood by, and designed for, the communities they serve in acute and recovery phases.
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## The National Health Security Strategy and Implementation Plan: An Overview

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**Study/Objective**: The purpose of this presentation is to provide an overview of the US Department of Health and Human Services' National Health Security Strategy (NHSS). The NHSS is a congressional mandate to achieve a health-secure and resilient nation by minimizing the health consequences of large-scale emergencies. The NHSS Implementation Plan (IP) which elaborates on activities that stakeholders might undertake to address the priorities of the NHSS will also be discussed.
**Background**: The 2015-2018 NHSS is a national strategy that envisions a nation that is secure and resilient in the face of diverse incidents with health consequences. The goal of the NHSS is to strengthen and sustain communities' abilities to prevent, protect against, mitigate the effects of, respond to, and recover from incidents with negative health consequences. The IP serves as a framework to help guide the nation and facilitate collaboration and coordination among stakeholders to advance national health security.
**Methods**: The presentation will provide an overview of the NHSS and the accompanying IP. The five objectives of the NHSS include: (1) build and sustain healthy, resilient communities; (2) enhance the national capability to produce and effectively use both medical countermeasures and non-pharmaceutical interventions; (3) ensure comprehensive health situational awareness to support decision making before incidents and during response and recovery operations; (4) enhance the integration and effectiveness of the public health, health care, and emergency management systems; and (5) strengthen global health security.
**Results**: Strategic outreach and engagement like this will play a major role in socializing national health security and motivating stakeholders to take actions that address NHSS objectives.
**Conclusion**: Achieving the goal of preparing for, and responding to, large-scale health consequences will require a willingness to engage a broad array of stakeholders in an ongoing collective ability to recognize, confront, and resolve existing and emerging threats to domestic health.
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## Feasibility of the Novel Combination of Influenza Vaccinations and Child Passenger Safety Seat Fittings in the Drive-Thru Clinic Setting

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**Study/Objective**: We hypothesized that combining influenza vaccinations and child passenger seat fittings (CPSF) in a drive-thru clinic (DTC) format will be both feasible and desired by the community.
**Background**: Disaster medicine is an ever-evolving area of medicine with the purpose of helping the masses quickly and efficiently. The drive-thru clinic (DTC) model is a disaster tool that allows distribution of supplies or services while participants remain in their automobiles. Influenza vaccination is the most commonly utilized form of the DTC and has been utilized in metropolitan areas successfully as a single service.
**Methods**: Each automobile's driver was verbally surveyed at each station of the DTC. The survey content involved satisfaction and background health habits.
**Results**: In our inaugural combined service, five hour-long DTC there were 86 automobiles served that contained 161 children, of which 28 also participated in CPSF. Each CPSF station required one extra worker in comparison to the traditional DTC influenza model. The median total clinic time was 9:00 (IQR 6:00, 14:00) minutes. For those who only received influenza vaccines, the median total clinic time was 7:30 (IQR 6:00, 10:00) minutes. For those who received both services, the median total clinic time was 27:00 (IQR 22:20, 33:30) minutes with an average of 1.75 CPSFs per automobile.
**Conclusion**: This was a pilot study involving multiple services in the DTC model and is the first of its kind in the literature. Our clinic was successful in executing both services without sacrificing speed, convenience, or patient satisfaction. Additional studies are needed to further evaluate the efficacy of the multiple service DTC.
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## Epidemiology of Poisoning Patients Presenting to the Emergency Center of Princess Marina Hospital in Gaborone, Botswana

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**Study/Objective**: The objective of this study was to conduct a retrospective observational audit of medical toxicologic cases presenting to Princess Marina Hospital (PMH) in Gaborone, Botswana.
**Background**: The burden of disease, secondary to toxicologic insults in Africa is difficult to assess. No reliable epidemiological data exists due to poor documentation, scarce resources for reporting, and diagnostic challenges. Only 10 of 58 African countries have Poison Control Centers to direct care and compile epidemiologic data. Botswana currently does not have a poison control center.
**Methods**: A database was created to record anonymous data on all patients with toxicologic insults presenting to the Emergency Department (ED) at PMH from January 1, 2016 to June 30, 2016. The de-identified variables extracted from patient files included age, date of presentation, sex, comorbidities, vital signs, treatment received, disposition, HIV status, and severity assessment using the Acute Physiologic and Chronic Health Evaluation II (APACHE II) and Poisons Severity Score (PSS).
**Results**: In total, toxicologic complaints comprised about 2% of patients presenting to the ED at PMH during this time period. The most common complaints were paraffin, paracetamol, ibuprofen poisonings, scorpion and snake bites. The percentage of female toxicology patients varied proportionately with age with 38% female from age 0-15 to 67% from age 16-55. The percentage of poisonings that were intentional also increased with age with 6% intentional between ages 0-15 to 83% between ages 16-55. The route of exposure was overwhelming oral (86%) and approximately 60% of patients were admitted to the hospital for further monitoring.
**Conclusion**: This descriptive study is important for directing the allocation of resources towards medical toxicology, prevention campaigns, patient and medical education, and clinical guideline development, with the goal of ultimately improving patient outcomes. This study is also important in furthering the field of clinical toxicology research.

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## Integral Care to Ground Transportation Accident Victims Attributed by Hospital Emergency Nurses

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**Study/Objective**: Qualitative research Objective: Understanding, from the nurses' perspective, the meaning of the integral care to the ground transportation accident victims.
**Background**: The integral care to the ground transportation accident victims does not restrict itself to the usage of therapeutic resources, it involves social and technical conditions. Presents deep roots in the social, economic and political structures.
**Methods**: It's a qualitative research supported on the presupposed of the Grounded Theory was adopted and as a theoretical reference to the Integrality in Health. The data were collected from June to September 2015 through semi-structured interview with 36 health professionals from the emergency sector of a public hospital in Santa Catarina.
**Results**: The analysis of the data has resulted in the central category: Promoting the integrality in the attendance to the ground transportation accident victims. The nurses have expressed the dimension of the integral care in an assistance model centered in the offer of services that attend partially the citizens' necessities. The participants realize that as inerrant difficulties: the non-restrict access; the lack of intersectoral articulation, bad conditions of work, excess of patients; having critical patients next to stable ones; scarcity of resources; overload in the team; young professionals with a few clinical backgrounds and the non-continuity of the care.
**Conclusion**: It's indispensable that the actions of these professionals transcend the hospital environment. For this, there is the necessity of interlocution among the services, visualizing thus the materialization of the Health Attention Nets, which are the primary cares, the specialized attention (outpatient and inpatient) and urgency and emergency care. The study points to the necessity of structural reformulation in the care process and conceptual on the assistance to the victims of these accidents, which will reflect on the way of see and act of these professionals involved in this attendance.

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## Context of the Care to the Ground Transportation Accident Victim in Hospital Emergency

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**Study/Objective**: Qualitative study, supported on the Grounded Theory and in the Health Unique System Integrality principle, which the goal was to understand how the integral care to the ground transportation accident victim is organized in a hospital emergency service.
**Background**: The performing of an integral care to the ground transportation accident victims does not restrict itself only to the usage of therapeutic resources, but it also involves social and technical conditions. This phenomenon presents deep roots in the social, economic, and political structures, as well as in the individual consciousness, in a dynamic relation among the involved people.

**Methods**: Data were collected in a hospital of Florianópolis/Santa Catarina, from June to September 2015, through interviews with 36 health professionals. The analysis of the data was based on a theoretical codification which identified the phenomenon "Promoting the integrality on the attendance to the ground transportation accident victims." This phenomenon has emerged from the integration of five categories and 13 sub-categories, according to Strauss and Corbin's (Grounded Theory) paradigmatic model. The analysis of the category context outlined the scenery of the assistance to these victims.
**Results**: The results revealed that the organization of flux attendance to these aggravations to the integrality light is still incipient. It has been verified that the saturation of the operational limit and lack of inter-sectoring are the factors that impact in this care. It has been evidenced that the necessity of capacitance of the professionals to give the integral care, because a little bit is done in these event prevention fields.
**Conclusion**: We can conclude that the organization of the integral care to the participants of this study is partially comprehended, and the care is not contemplated in its whole magnitude of what it requires improvements on the performed actions.

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## Health: Seeking Behavior of Patients Who Died of Rabies in the Komfo Anokye Teaching Hospital (KATH) Emergency Department in Ghana

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**Study/Objective**: This study seeks to describe cases of human rabies in relation to health seeking behavior of rabies patients who reported to the Emergency Department (ED) in January 2015 to January 2016 in Ghana
**Background**: Human rabies is a neglected preventable tropical disease of the public health interest, with a case fatality rate of almost 100%. There are several interventions available for the control and eradication of human rabies offered by the World Health Organization and its partners. The health seeking behavior of patients bitten by potentially rabid dogs will influence their outcome.
**Methods**: This study is a retrospective chart review of all patients who presented to the Komfo Anokye Teaching Hospital Emergency Department and were diagnosed with Human Rabies based on ICD 10, from January 1, 2015 to January 1, 2016.
**Results**: Nine (9) patients presented with Human rabies and all died off. All bites were from dogs with majority (67%) being stray dogs. Majority of the patients were males (78%). Eighty-nine percent were between the ages of 20 years and 60 years (8 out of 9). Fifty-six percent of the cases did not seek initial medical treatment after the dog bite, 33% went to the hospital, injected with anti-tetanus toxoid and asked to observe the dogs. One case (11.1%) was given no treatment even though initial medical treatment was sought.
**Conclusion**: There is the need to further study factors that will ensure people who get bitten, that they receive prompt and appropriate treatment to reduce the economic burden of human rabies.

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## AAR and IP: Effective Tools to Improve Public Health Preparedness

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**Study/Objective**: Describe the utility of incorporating properties of a public health investigation into an After Action Report.
**Background**: Integrating public health practice into emergency response operations from recommendations in After Action Reviews (AARs), and implementing standardized practices in public health emergencies.
**Methods**: Literature review.
**Results**: Preliminary Findings: - There is a need for a clear, comprehensive, uniformed data system which intersects the Incident Command System (ICS).

- Improved performance measures resulted in group discussion, interactive exercise, and hands-on practices in conjunction with FEMA IS-130 with participants in the healthcare field.
- Drills/exercises should be accompanied by clear performance measures.
- Significant decrease in public health practitioner participation in plans and protocols, communication and incident command and other investigations support (ie. surveillance systems).

**Conclusion**:

- Investigate the utility of incorporating components of a public health investigation into an After-Action Report/Improvement plan.
- Raise awareness of integrating an emergency response planning tool into the public health and healthcare sectors, to enhance response capabilities.
- Develop innovative methods for future collaboration and standardization of emergency preparedness best practices.
- Improve public health emergency preparedness by developing a tool which integrates the emergency management operational objectives, with the public health components of investigating an outbreak.

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## Community Awareness of Stroke, Hypertension and Modifiable Risk Factors for Cardiovascular Disease in Nkonya-Wurupong, Ghana

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**Study/Objective**: To determine community level awareness of risk factors for stroke and cardiovascular disease, in a remote and medically underserved region of Ghana.
**Background**: Hypertension and other non-communicable diseases are growing risk factors for cardiovascular disease and stroke in developing countries. A multi-region survey from a central clinic investigating participants' level of awareness and education surrounding hypertension and stroke, provides important information to guide primary prevention and public health response.
**Methods**: A central clinic in Nkonya-Wurupong, Ghana, evaluated 1,671 patients in July 2016, and a group of 302 adults over the age of 18 provided a convenience sampling. The survey examined three main areas; demographics, medical history and knowledge deficit with respect to stroke and cardiovascular risk factors.
**Results**: Fifty-six participants demonstrated hypertension (BP >139/89), of which 17 were male and 37 female. One-hundred and six believed hypertension was a risk factor for stroke. Twenty-six were medicated for hypertension. The majority of the participants believed that modifiable factors put them at risk for stroke, and that stroke was preventable. Diet, heart disease, smoking, obesity, diabetes, sedentary lifestyle or alcohol were not identified as risk factors. One-sided weakness was consistently associated with stroke. Other symptoms included in the survey were headache, slurred speech, visual changes, dizziness, and facial droop. It was difficult to discern the sources of participants' information. A few respondents did indicate school, internet, radio, TV, medical books, or health professionals.
**Conclusion**: Knowledge of the link between hypertension, cardiovascular disease and stroke varies significantly, along with stroke-symptom identification and sources of medical information. Many participants indicated the belief that stroke can be prevented, however it is unclear what respondents believe modifiable risk factors consist of. This data suggests there are major areas where healthcare education is needed. Discerning baseline health and medical knowledge in remote and developing regions, is essential for disaster preparedness and primary prevention.

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## Telemedicine Consultations in an All-Russian Center Disaster Medicine

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**Study/Objective**: Analyze telemedicine consultations made in the All-Russian Center for Disaster Medicine (ARCDM).
**Background**: The territory of the country is more than 11 billion square miles, and there is no sufficient, medically qualified staff centers.
**Methods**: The structure of the provision of telemedicine consultations (TMC) of Russian disaster medicine service includes center of control crisis situations, having a connection with 21 federal hospitals and regional centers of disaster medicine, and having contact with the republican (regional) hospitals. ARCDM have mobile telemedicine complexes, based mobile satellite communication VSAT-stations, for use in emergency situations, which provides a system to quickly deploy remote support operations for rescuers and medical staff of field hospitals.
**Results**: Analysis of 115 TMCs was performed during the 2015 in ARCDM. Requests for telemedicine consultations came from different regions of the country. Leading experts of the federal medical centers in Moscow conducted TMCs. The most frequent requests were for neurosurgery profile - 26.9%, intensive care (21.7% traumatology, 14.7% neurology, 10.5% pediatrics, 5% cardiovascular surgery and oncology), and other 6.1%. As a result of TMCs, correction of medical care was made in 53.2% of patients, an accurate diagnosis and treatment plan was 32.2%, and 15.6% of patients were evacuated for treatment in specialized centers. The mobile telemedicine complex has been included in equipment of field hospitals, working at Northern Caucasus. In total, 121 telemedicine consultations were performed during 1.5 months (33.3% to children). Ten patients were delivered directly for further treatment to central hospitals; nine patients after TMC diagnostics were specified with a treatment plan in field hospitals.
**Conclusion**: We note the high efficiency use of TMC for an establishment of the diagnosis and medical tactics and operative decision of questions of evacuation of patients. *Keywords*: telemedicine, emergency situations, and mobile telemedicine complex.

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## Evaluating Aviation Accidents in the World from 2003 to 2016

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**Study/Objective**: This study aims to determine some features of aviation accidents and to examine existing statistics on aviation accidents over the past 10 years worldwide.
**Background**: It is important to mitigate losses due to aviation accidents through aviation accident prevention measures in the disaster management cycle.
**Methods**: Data was obtained from the records of *planecrashinfo.com* (an accident database). The data included dates, times, flight number, aircraft type, total aboard (passengers/crew), total fatalities aboard (passengers/crew) locations of accidents and intent of flights. In this descriptive study,

statistical analysis was carried out for features of each incident. The Chi-square test was applied to compare the fatalities and types of flights (domestic or international flights). Grouping of numbers of fatalities and survivors was done according to previous studies.

**Results**: The data reported a total of 619 aviation accidents which occurred within 13-year period. The number of accidents decreased from 2003 to 2016 with the exception of 2008. There were 12,339 lives lost due to aviation accidents which occurred between the study period. While 64.8% (n = 397) of accidents had no survivors only 2.0% (n = 12) of accidents had no fatality. Passenger flights (49.1%) constituted a greater proportion of the accidents. Thirty-one out of 33 accidents resulted in 100 + fatalities, and 18 out of 22 accidents resulted in 50 to 99 fatalities. Aviation accidents occurred in 115 different countries. The number of fatalities which were 100 + and above was significantly higher in international flights (53.1%) as compared to the domestic flights (46.9 %) ($p < 0.001$).

**Conclusion**: Aviation accidents and fatalities related to these accidents were high between 2003 and 2016 years worldwide. Passenger flights were responsible for the majority of fatalities and accidents. More detailed studies and interventions are needed to reduce the rate of aviation accidents.

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## An Evaluation of Records Related to Dwelling Fires in the Central District of Yalova Province, Turkey

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**Study/Objective**: This analysis aims to evaluate the dwelling fires in Central District of Yalova Province between the years from 2010 to 2015.

**Background**: Fires are one of the most common disasters and important cause of accidental death in world and also in Turkey. It is fourth leading cause of death within unintentional injuries with a proportion of *4%*.

**Methods**: A total of 3014 fires were recorded by Yalova Provincial Fire Authority within the study period. Out of them 630 dwelling fires (%20.9) were evaluated. In this descriptive study, permission was obtained from the Provincial Fire Department to analyze the data. The data consisted of the cause, type and year of fire, degree of burning. Losses caused by fire were not recorded.

**Results**: Chimney ignition was the first cause of dwelling fires with percent of 35.2% (n = 222) followed by electricity (33.0%, n = 208) and smokers' materials (2.4%, n = 15). 94.6% (n = 596) of fires was extinguished by firefighters at the beginning phase. The distribution of the fires by year has not shown a steady increase: 19.0% (n = 120) was happened in 2010, 18.5% (n = 116) in 2011, 15.5% (n = 98) in 2012, 16.2% (n = 101) in 2013, 13.5% (n = 85) in 2014, 17.3% (n = 109) in 2015. 99.3% (n = 626) of the construction material was concrete and 0.7% (n = 4) was wooden for all dwelling fires. It was interesting that the losses (human and/or animal) were not recorded.

**Conclusion**: The number of dwelling fires consisted of one-fifth of total fires and the number was not decreased by years. All dwelling fires should be regarded as potentially preventable events, effective and intensive public training activities should be carried on the reasons of fires and prevention.

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## Was Internet Usage Effective on Radiation Protection After the Nuclear Disasters among General Workers in Fukushima?

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**Study/Objective**: To clarify radiation knowledge and preventive behaviors between those who got the information on the Fukushima Dai-ichi Nuclear Power Plants' Accidents (FDNPPAs) mainly by the Internet, and those who didn't among general workers in Fukushima, 3-5 months after a nuclear disaster.

**Background**: The FDNPPAs were the second nuclear power plant accidents in the world. On the other hand, there is a widespread diffusion of the Internet all over the world. No studies have been done regarding the relationship between using the Internet and radiation knowledge, and preventive behaviors after a nuclear disaster.

**Methods**: A descriptive study of preventive behaviors among general workers in Fukushima, 3 to 5 months following the nuclear accidents. The subjects were 1,394 regular workers who took part in health seminars produced by the Fukushima Occupational Health Promotion Center between July and September, 2011. Of the 1,282 responses, 1,119 eligible responses participated in this study. This anonymous questionnaire survey was asking for characteristics and questions on main information sources following the nuclear accidents. Those who chose the Internet on main information sources were defined as Internet users. We also asked 10 questions of radiation knowledge (hair loss, cancer, malformation etc.) and 10 questions of preventive behaviors (washing hands, wearing a mask, refraining from going outside etc.).

**Results**: Workers who got the information on the FDNPPAs mainly by the Internet, had more radiation knowledge among general workers in Fukushima after a nuclear disaster. Plus, the Internet users had more preventive behaviors against radiation than non-users.

**Conclusion**: The Internet was one of useful tools for having knowledge and preventive behaviors in emergency settings such as nuclear disasters. Our research will contribute to determine a way of distributing information to average citizens if a nuclear accident occurs in the future.

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### Continuous Healthcare Support for People Living in Temporary Housings by Local Hospital Teams; Challenges After Earthquake, Tsunami and Fukushima Nuclear Disaster in 2011

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**Study/Objective**: To assess the roles of local hospital teams, of continuous community healthcare support, during the recovery phase from disaster.
**Background**: In March 2011, Minamisoma City had severe damages from the Great East Japan Earthquake and the Fukushima Daiichi Nuclear Power Plant Accident. Over 5 years have passed since then. According to the statistics from Minamisoma City, 14,563 people have been (still) living as refugees, and 2,453 people have been living in the temporary housings (as of November 2016). Because of the rising concerns with healthcare problems, our hospital volunteer teams have provided continuous healthcare support programs to refugees in the temporary housings since 2013. Our teams have consisted of medical doctors, residents, as well as medical students and paramedicals. We have provided them a series of free evening lecture courses (ie. metabolic syndrome, locomotive syndrome, dementia and stroke) and personal health consultations every other month. Here, we assess how the programs have influenced the community health in the affected areas.
**Methods**: In March 2016, a self-entry style questionnaire was performed by each participant, prior to informed consent by the volunteer staff at 8 (out of 33) meeting places of temporary housings. The questionnaire included their basic information, impressions of our programs (ie. interest, achievement, satisfaction, etc.) and their health concerns.
**Results**: Seventy-seven participants (21 males and 56 females) answered the questionnaire. The average age of participants was $73.7 \pm 9.9$ years old. Eighty-eight percent answered their reason for participation was 'Interest'. Ninety-seven percent answered they felt 'Very familiar' or 'Familiar' to our staff. The average subjective level of achievement was 3.5/5. The average degree of satisfaction was 9.3/10. Seventy-one percent have taken a personal health consultation.
**Conclusion**: We found that participants were mostly elderly people. Continuous healthcare support by local hospital teams has been considered to be effective at recovery phase. It is essential for healthcare professionals to take care of a community.

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### Occupational Health Risks of Health Workers at Komfo Anokye Teaching Hospital

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**Study/Objective**: This study sought to identify the occupational health risks that clinical/non-clinical staff at KATH are exposed to.
**Background**: Occupational Health Assessment is the identification, evaluation, and control of risks merging from workplace hazards that affect workers' physical, mental, and social well-being. Mostly, employers look out for the positive end products of the work done and ignore the safety measures put in place to protect employees from health risks they are exposed to. Health workers are exposed to different hazards due to the nature of their work. This study sought to identify the occupational health risks that clinical/non-clinical staff at KATH are exposed to.
**Methods**: A cross-sectional study was adopted for the study, and the study site was chosen to be KATH. The sample was chosen by stratified random sampling. Data were entered in EPI-info software and analysis was done using SPSS. Logistic regression assesses relations and significance.
**Results**: Out of 178 respondents, 129 (72.47%) reported exposure to hazards at various departments of work. The study revealed that airborne diseases were the most widespread hazard reported (72.87%), followed by sharps (62.79%), chemicals (42.64%), and burns (10.85%). The majority of all respondents 165 (92.70%) had knowledge on occupational health risk, of which 60% were clinical staff. There were 86 (48%) of respondents reporting exposure to hazards, indicated having been provided with protective equipment to ensure safety; 83 (47%) indicated no protective equipment; nine (5%) were unsure of the availability of any such equipment. Awareness of occupational health policies was associated with training given at recruitment. Also, there was an association between health problems developed and category of staff, exposure to hazards in the working environment, protective equipment provided, and number of years worked at KATH.
**Conclusion**: The health workers (clinical/non- clinical) are exposed mostly to airborne diseases and pricking by sharps, but most were not adequately protected.

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### Helping Health Information Go Viral: Building a Disaster Information Specialist Network

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**Study/Objective**: A program was developed to create a network of disaster health information specialists across the country who could be responsive to disasters by providing timely, accurate, disaster health information throughout all phases of a disaster to the public health and disaster response workforce.
**Background**: The program consists of a three-pronged approach: 1. A series of freely-available, online training courses that provide a foundation to build capacity for public health personnel, librarians, emergency workforce, and others. 2. Monthly webinars provide the opportunity to hear from experts on the latest issues in disaster medicine and public health. 3. A community of practice functions through an online discussion forum, email updates, and social media.

**Methods**: Online training courses were developed as part of a curriculum which offers continuing education credits to earn Basic and an Advanced level certifications. The courses introduce disaster health information, its uses, and potential roles for those interested in participating in disaster health information-related activities. Monthly webinars are offered to supplement these courses and provide an opportunity to host subject matter experts to speak on health information for specific events, or to present new or updated tools and resources that can assist disaster information specialists in their daily work. The community of practice helps information specialists develop relationships with others trained in searching and evaluation of disaster health information. The knowledge gained through these interactions, and from the training opportunities, provides them with tools and information to help their own communities in preparedness, response, and recovery activities.
**Results**: As of October 2016, 66 people in 20 states and three internationally-based persons have earned a Disaster Information Specialization certificate from the Medical Library Association.
**Conclusion**: The program has been instrumental in providing a cadre of responsive individuals, across the United States and beyond, who are involved in preparing and providing health information before, during, and after disasters.

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## Evaluation of Disaster Education from a Pedagogical and Andragogical (Adult Learning Theory) Perspective and Recommendations

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**Study/Objective**: This study aims to evaluate disaster education programs, highlighting the basic differences between pedagogical and andragogical approaches (adult learning theory) with examples.
**Background**: Disaster education could be defined as an ongoing strategy aimed at alerting the public to the consequence of a hazard impact on an unprotected community. Effective disaster education is possible with approaches of extended-to-community and systematic education. These disaster education models should have pedagogıcal and androgogıcal approaches.
**Methods**: The pedagogical approach is based on teacher-directed-learning theory while the andragogıcal approach is the based on self-directed-learning theory. The differences between approaches can be explained as follows: Sense of self, Experiences, Readiness to learn, Orientation to learning. The differences between models were evaluated under these topics.
**Results**: Table 1. Available actions about effective disaster education for pedagogical and andragogical approach.
**Conclusion**: When disaster education programs are being made, differences between a pedagogical approach and an andragogıcal approach should be taken into consideration.

| About | Pedagogical | Andragogical |
|---|---|---|
| *Sense of self* | • Comprise didactic instructions or images<br>• Prepare classroom activities such as role-play<br>• Produce an awareness of at least the possibility of crisis | • Ask questions<br>• Take ideas<br>• Do brainstorming/ discussion<br>• Interactive education |
| *Experiences* | • Teach cognitive processes, behavioral skills necessary for protection, and especially emotional labor<br>• Be accepting of the reality of what has happened | • Make it feel precious<br>• Make it feel as unique as individuals<br>• Join all activities<br>• Be respectful<br>• Provide a setting of information exchange |
| *Readiness to learn* | • Facilitate learning<br>• Perform applications as dramatization, models, and demonstration | • Be motivated<br>• Constitute a reliable, encouraging, positive, and taking-into- account an individual needs setting<br>• Constitute a "real" setting<br>• Put emphasis on requirements of disaster education<br>• Draw attention with disaster scenarios |
| *Orientation to learning* | • Perceived information as precious<br>• Adopt disasters as a important event in their life | • Correlate with their real life<br>• Give clear and explanatory information<br>• Adopt solution-oriented approach for problems |

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## Granting the First Aid Event on the Spot, the Opinion of Team Members in the Medical Rescue Units in the Capital City of Warsaw

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**Study/Objective**: The aim of the study was to know the reviews of team members of the emergency medical provincial Ambulance and Emergency "Meditrans" in Warsaw, as people react in situation of real threat to life or health of the injured

person. What is witness event doing? What are the main causes of absence of first aid?
**Background**: The ability of carrying out first aid should be one of basic skills in each of us.
**Methods**: The study was conducted in the third quarter of 2015, on 335 members of emergency medical teams: doctors, paramedics, nurses and drivers, who provided medical rescue activities in the Provincial Ambulance and Health Transport "Meditrans" in Warsaw. The research tool was an anonymous questionnaire.
**Results**: The straight majority of respondents encountered granting first aid at the event on the spot, however, the frequency of appearing of such proceedings isn't too high. First aid has most often been given on the street and in houses. Middle-aged persons constituted the most numerous group that first aid was administered to. The important element is the reason not to provide first aid by bystanders, in the opinion of members of the ambulance. The most common answers were: fear, lack of knowledge and skills, reluctance, indifference, lack of training, lack of experience and fear of doing harm.
**Conclusion**: By far the majority of respondents meets with the carrying of first aid, but respondents assessed the low incidence of such situations. Placing the victim in the recovery position is the simplest and most common form of the provision of first aid. Organized training in first aid should be extended to activities carried out in other situations, other than cardiac arrest. Only continuous education and in particular the practical training, will help people to overcome the barrier of their limitation in order to help others.
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### Healthy Lifestyle Behaviors of University Students

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**Study/Objective**: This study aims to examine the Healthy Lifestyle (HL) behaviors and certain factors which have an influence on such behaviors, of the students in the Department of Emergency Aid and Disaster Management (EADM) at a university.
**Background**: HL is to control all of the behaviors influencing his/her life and to adapt daily activities to their health condition. For this reason, it is important to improve HL of EADM students, who are expected to carry out emergency services at a desk, and to perform medical intervention to the scene in cases of disasters and emergencies in the future.
**Methods**: Three of four (n = 268) of the students was reached in this descriptive study. The data was obtained through a survey form, including the scale of Health-Promoting Lifestyle Profile (HPLP-II), as well as socio-demographic characteristics. An index where certain characteristics of the participants were scored on a scale of 0-10, was formed for the study (low score regarded as positive in terms of HL behaviors). A written consent from the ethical committee and the administration was obtained, and a verbal consent was obtained from the students.
**Results**: Two of three of the participants were male and 60,3% have a job. The average age (SD) was 21,3 (±1,6) and scores were 131,3 (±17,5) for SYBD-II and 3,3 (±1,7) for the index. The results of the logistic regression analysis indicated that having a regular family life (OR = 3,38; $p < 0,05$), being a junior student (OR = 2,11; $p < 0,05$) and good friendships at school (OR = 1,16; $p < 0,05$) have significant impacts on the score of SYBD-II scale.
**Conclusion**: The study concluded that good friendships and a regular family life are important for students to have a Healthy Lifestyle. The students having difficulty in such aspects may be encouraged to benefit from school guidance services. Students are increasing their negative life behavior in advanced classes. The reasons for this situation should be investigated.
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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## Gaming: A Unique Way to Teach Active Shooter Preparedness and Response in Healthcare

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**Study/Objective**: Utilize non-competitive gaming to teach health care providers and students how to prepare and respond to active shootings in clinical settings, and as a prologue to a functional exercise.

**Background**: Active shooter incidents are increasing. Unique to health care settings, staff and professionals must weigh the duty to save themselves with their oath to care for their patients. Delays in decision making could be disastrous. Hospitals have ethical and legal obligations to train personnel, but may not train through simulation. Gaming has been shown to be an effective health care teaching method, yet it's an alien concept for active shooter training. Using this technique, participants can employ comprehensive plans within a simulated environment.

**Methods**: We developed an active shooter board game, using a health care venue as the setting. Upon hearing simulated gunshots, the players, acting as themselves in one game, and a fictional role in the second game, must decide whether to run, hide, and/or fight. They must also determine what actions, if any, to undertake for their patients, and what improvisational tools they have to barricade and fight with. Pre- and post-evaluations were administered to assess game efficacy and utility.

**Results**: After two games, health care students (N = 12) felt they had additional knowledge and training to react quickly and save lives, barricade themselves, develop improvised weapons, and safely escape. Based on their critique, we have improved the reality and chaos that can occur during an active shooter event in a health care facility.

**Conclusion**: Health care professionals must balance ingrained duties to their patients, colleagues, and themselves. Practicing active shooter situations in a no-threat environment is imperative. Gaming is one inexpensive modality facilities can employ to train providers and students – a precursor to a functional exercise. It opens the dialogue for threat assessment and mental health treatment to address the long-term effects to everyone involved.

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## Simulating a Multi-Hazard Response: A Tabletop Exercise with Response Agencies in Belize

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**Study/Objective**: The overall objective of this tabletop exercise (TTX) was to bring together the Ministry of Health (MOH) and National Emergency Management Organization (NEMO) of Belize, in order to test the MOH's recently developed National All-Hazards Response Plan.

**Background**: Belize experiences various natural disasters on an annual basis. Hurricanes, floods, and mudslides are cause for most concern, and often result in large amounts of standing water, structural damage, and an increased burden on the health care system. Additionally, infectious disease outbreaks such as Dengue, Chikungunya, and most recently, Zika have occurred placing even more demand on already limited resources. In 2014-2015, the MOH of Belize, with technical assistance from CDC's Global Response Preparedness Team (GRPT), developed national- and district-level all-hazard response plans. In order to test the quality of those plans, a tabletop exercise was conducted.

**Methods**: The Global Response Preparedness Team used standardized templates from the Homeland Security Exercise and Evaluation Program (HSEEP) in order to develop a TTX based on the scenario of a Category 5 hurricane with a subsequent increase in cases of Dengue and Zika.

**Results**: The outcome of the TTX was largely positive in that MOH and NEMO demonstrated a strong capability to work together in order to address response issues. However, areas for improvement were highlighted including: 1) the need for additional partners, such as private clinics and laboratories, to participate in the exercise process; 2) the need for better sharing of plans across health districts; and 3) the need for response costing tools in order to better budget for emergencies.

**Conclusion**: The TTX was an overall success in demonstrating the functionality of the all-hazards response plan. This allowed for national partners to continue to build necessary relationships, and highlighted clear next steps for action in order to better prepare the nation for a multi-hazard response.

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## Austere Environment Immersion Training for Disaster and Emergency Medical Personnel

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**Study/Objective**: To explore methods of enhancing the self-efficacy of emergency medical responders performing clinical skills in austere environments.
**Background**: Numerous medical organizations descend upon global disasters to offer assistance where the health care and emergency response infrastructure is often fragmented and unreliable. Many civilian clinicians who volunteer to participate on such teams have never provided care in environments with dynamic, unpredictable, or hazardous conditions. The psychological and physiological stressors imposed on these clinicians may affect their ability to render care effectively in these settings.
**Methods**: We created an 8-hour, continuing education course on rendering aid in the austere environment that was piloted twice using paramedics and physicians who were affiliated with law enforcement or military tactical response teams. The course consisted of three hours of didactic instruction and five hours of various training evolutions using hi-fidelity patient simulators and trained medical actors. The training evolutions involved clinical skills, techniques for rendering care in sensory deprivation and overload conditions, and a final training exercise involving realistic situations in which skills were applied and evaluated.
**Results**: The two pilot course audiences' consisted of clinicians who had previous exposure to rendering various types of combat casualty care. In spite of this previous training and real world experience, the participants reported feeling better prepared to act clinically following immersion in simulated training environments that could realistically simulate hazardous environmental conditions.
**Conclusion**: Simulation of severe environmental conditions is an essential component of the education of clinicians who have roles rendering medical care in austere environments. A main feature of this training was the sensitization of the participant to external stressors and the ability of that participant to apply cognitive and psychomotor skills in less time and with more reliability throughout the training. Future training of clinicians deploying to harsh environments should consider the use of these training modalities.

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## A Table Top, Mass Casualty Incident Simulation to Identify Emergency Department Flow and Capacity Issues

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**Study/Objective**: Table-top simulation to identify gaps in a hospital's preparedness and help assess its ability to respond to a Mass-Casualty Incident (MCI).
**Background**: Mass-Casualty Incidents (MCI) occur throughout the country, and hospitals traditionally utilize disaster drills with volunteers as simulated patients, which is a very time-consuming and person-intensive process. The Hospital Surge Evaluation Tool is a table-top simulation designed to identify gaps in a hospital's preparedness and assess its ability to respond to a MCI.
**Methods**: The ASPR/RAND assessment tools were used to simulate a MCI from a bomb explosion. The exercise was designed to test whether the hospital can rapidly shift into disaster mode, clear space in the Emergency Department (ED), create space in the inpatient units or create new spaces, and effectively coordinate with the command center. Based on criteria entered into a generator tool, a random list of patients "presenting" to the ED is created with increasing numbers and acuity "presenting" every 15 minutes for 60 minutes. The ED staff (physician, charge nurse) assessed each patient on the list as red, yellow, or green and determined the appropriate level of care needed. If the patient needed to be transferred to an inpatient floor (med/surg or ICU), the ED called the command center. Using real-time, current census & staffing, the command center (incident command, bed/staff tracking) determined the appropriate destination (floor, ICU, OR) that the patient could be moved to and informed the ED. Incident command also had to determine other resources like staffing & supplies and calling the appropriate departments.
**Results**: The simulation was useful, but there were some assumptions and limitations that would deter it to happen as smoothly or as quickly. Patients would likely be kept in the ED longer. There are some limitations to the tool and manual entry is needed.
**Conclusion**: Table-top simulation exercises simulating MCI helped identify ED flow issues and creative solutions.

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## Challenges in Conducting Disaster Simulations

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**Study/Objective**: The objective of this study is to identify gaps and shortfalls of disaster simulation, in preparedness and coordination of multiple-jurisdictional integrated response, to a national catastrophic event, testing plans, critical response and recovery functions.
**Background**: The emergency management could include Preparation & Protection, Mitigation Respond, and Recovery. While the purpose of disaster simulation are to assess and validate our capabilities and role in the communications, critical resource logistics and distribution, mass care, medical surge, citizen evacuation and shelter-in-place, emergency public

information and warning, Emergency Operations Center (EOC) management, and long term recovery.
**Methods**: We conducted Disaster Simulations in Hospital Preparedness and Community Readiness for Emergency and Disaster (HPCRED) project for (1) Posts Rehearsal, (2) Emergency Medical Team (EMT), and (3) Hospital Disaster Plan (HDP). This was a pilot project, for 3 tertiary hospitals in 3 provinces in Indonesia. We assisted them to set up their HDP including their EMT team.
**Results**: The 3 important challenges in conducting disaster simulation are triage, prerequisite skills, and documentation. Triage in the field is not simple, it is a complex, comprehensive, and controversial procedure. It needs to be immediate and timely, adequate and accurate assessment, decisions based on assessment, intervened according to acuity condition, complete in documentations. A first Responder team should have prerequisite skills to control airway-breathing-circulation, to control external bleeding, to treat shock, to treat wounds, and to splint injuries to stabilize extremities. Documentation should record initial condition of patient, patient's description of injury or illness, initial and later vital signs, treatment given, personnel who took-over care, and any other pertinent information.
**Conclusion**: Good planning and exercising the ED system in daily practice can help maintain hospital disaster preparedness & critical functions. The triage system should be feasible to be implemented during disaster. We need to build capacities in Life Support, First Responder, Triage, and Ambulance Protocol.

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## Conception d'un exercice de type ORSAN AMAVI mobilisant plus de 30 établissements hospitaliers pour le compte de l'ARS de Normandie

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**Study/Objective**: Étudier la capacité organisationnelle du centre 15 zonal et de 30 établissements sanitaires normand face à une attaque terroriste combinée de type fusillade/explosion dans un centre commercial entrainant près de 200 victimes.
**Background**: Les évènements de novembre 2015 et la perspective des competitions sportives internationales devant se dérouler en France durant l'été 2016 on conduit les autorités à vouloir tester la capacité des ARS et des établissements sanitaires de province à concevoir, mettre en œuvre et organiser le RETEX d'un exercice ORSAN AMAVI.
**Methods**: L'ARS de Normandie a fait appel à l'expertise de la Société Française de Médecine de Catastrophe pour l'assister dans la construction et le pilotage de cet exercice stratégique innovant, premier du genre sous l'égide d'une ARS.
**Results**: L'intérêt d'un scénario vraisemblable, avec des plastrons bien conçus, reproduisant les proportions attendues de victimes adultes/gérontologiques/pédiatriques blessées/blastées/brûlées, avec pour cellule d'animation le PMA animé par un expert de la SFMC assisté d'un médecin régulateur détaché du SAMU Zonal, jouant sur les conditions météo du jour, en temps réel, permet une appropriation des points faibles logistiques/informatiques/organisationnels par l'ensemble des participants en évitant l'écueil du Crash Test aux effets démobilisants.
**Conclusion**: Ce type d'exercice basés sur plus de 10 ans d'expertise dans la conception et la mise en œuvre de simulation de crise et de formation au pilotage stratégique de crise permet des RETEX de qualité autorisant une réelle amélioration de la planification et de la réactivité des équipes dans une logique conforme à l'esprit de la roue de Deming.

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## The 2016 International Simulation Drill of an Earthquake Disaster in Columbia: The Development of the Massachusetts General Hospital Emergency Medical Team

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**Study/Objective**: To describe the Massachusetts General Hospital Gobal Disaster response team's experience in an International Disaster Simulation.
**Background**: Disaster response is increasingly professionalized. The United Nations developed an Internet-based mechanism for the certification and registration of emergency medical teams (EMTs) for use in a crisis such as an earthquake. In September 2016, International Search and Rescue Groups (INSARAG) collaborated with Pan American Health Organization (PAHO) organizing the 6th annual Simulation Exercise (SIMEX) this year, for the second time, included EMTs participation. The goal of the 5-day exercise was practice coordination and communication with the international search and rescue teams, regional EMT's, and the government of Colombia to test procedures and policies in place for a response, and to work and learn together.
**Methods**: We describe the simulation exercise.
**Results**: There were 778 participants at the SIMEX, from 14 different countries of South America Groups ranging from the district level in Bogota, to regional teams, and international participants. There are three phases to this SIMEX: familiarization, preparation in the workshops, then simulation. The Coordination and Management Cell (CICOM – EMT), which provides information, coordinates the response, and supports the Health coordination team in decision making, was reviewed. Teams officially registered on Virtual OSOCC (Onsite Operations Coordination Center) as a deployed EMT and set up a location to work, and to coordinate with other teams, and with the overall disaster response key stakeholders. We simulated a team that had x members, with x equipment, and could work in an affected hospital in the disaster zone.

**Conclusion**: Our team deployed as a specialized surgical cell, which plays an important role to support national medical efforts, and critical to function is coordination, communication, and preparation. The Virtual OSOCC site is an important tool to maintain EMT membership, and to monitor for updates information about disasters and effectively communicate with other key stakeholders.

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### Undergraduate Inter-Professional Collaboration in a Simulated Mass Casualty Incident

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**Study/Objective**: Measure undergraduate interprofessional collaboration and teach basic trauma skills in a simulated Mass Casualty Incident (MCI).
**Background**: Recent large scale natural disasters and Mass Casualty Incidents (MCIs), have highlighted the need for staff and hospital emergency preparedness. Disasters and MCI simulations are infrequent, and typically only involve post-graduate level trainees and staff in clinical roles. Trauma training at the undergraduate level has been identified as inadequate in multiple disciplines.
**Methods**: To address these shortfalls, a preclinical course for medical students was redesigned to include one day of trauma and inter-professional content. Curricular alignment was achieved among the Cumming School of Medicine, University of Calgary Faculties of Nursing and Social Work, and the Southern Alberta Institute of Technology (SAIT) Respiratory Therapy and Paramedic programs, to enable three hundred and forty six undergraduate students to participate in an MCI known as Trauma Day. Inter-professional teams of four to six students managed a standardized trauma victim in two separate scenarios, and observed expert modeling of a live trauma simulation between successive scenarios. The student teams were debriefed by co-facilitators from different professions, guided by the Mayo High Performance Teamwork Scale (MHPTS), the Canadian Inter-Professional Health Collaborative (CIHC) National Competency Framework, and the principles of Advanced Trauma Life Support (ATLS). Facilitators and students formally rated the team performance after each scenario using the MHPTS, and students completed a Self Efficacy Assessment at the end of the day.
**Results**: There were statistically significant improvements in team performance ratings as an overall measure, and in four of eight factors of the MHPTS. In the Self Efficacy Assessment survey students rated their confidence significantly higher after the simulations in all eight areas, with significant differences between professions.
**Conclusion**: An interprofessional simulated that MCI provides opportunities to improve team performance and self efficacy, based on the Mayo High Performance Teamwork Scale.

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### The Brooklyn Coalition Exercises Patient Movement in a Burn Mass Casualty Event

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**Study/Objective**: The hospitals of The Brooklyn Coalition (TBC) used a city-wide drill to test various components of the New York City Burn Plan that is under development.
**Background**: The borough of Brooklyn has no burn centers. The secondary transfer of burn victims in a Mass-Casualty Incident (MCI) is a gap identified from annual coalition-wide drills which built on each other.
**Methods**: A full-scale exercise evaluated the secondary transfer of victims in a burn MCI, utilizing the proposed NYC Burn Plan. Fire Department of New York (FDNY) centrally coordinated the transfer of 69 victims using faxed Patient Transfer Request forms. The NYSDOH e-FINDS was utilized for patient tracking. An electronic Situational Assessment Tool (SAT) delivered prompts and collected data.
**Results**: e-FINDS tracked 96% of patients; 100% of hospitals reported the required Patient Transfer Requests forms were too long; 38% of hospital transfer requests required more than two attempts to reach FDNY; 26% of victims were refused transfer; 52% of victims required physician presence during transfer.
**Conclusion**: The NYC Burn Plan was successfully drilled by TBC and e-FINDS was a reliable tool. The method for communication between the hospitals and FDNY failed for multiple facilities, highlighting the need for alternative methods of contact. The required Patient Transfer Request form was too lengthy to utilize during an MCI and is being amended using only the essential information identified by this study. Many transfer requests were denied, leaving facilities to manage burn victims. Many victims needed a physician during transport, limiting the ability to transport victims. These results make it evident that non-burn centers need to develop contingency plans for burn victims of an MCI. These gaps in the NYC Burn Plan, identified by TBC drill, are impacting the current development of the protocol. The use of sequential, coalition-wide drills with increasing inclusivity is useful in identifying capability gaps and exercising existing protocols.

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### Incorporating an Active Shooter Preparedness and Response Program into the Healthcare Students' Simulation Educational Curriculum

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**Study/Objective**: To increase healthcare learners' awareness to active shooter situations via simulation education.
**Background**: Active shooter incidents in San Bernardino, Paris, and Orlando illustrate "soft targets" vulnerabilities.

Healthcare facilities are "soft targets." The "Run-Hide-Fight" mantra can be easily assimilated by the average learner in generic "active shooter" educational programs. However, healthcare professionals, confronting an active shooter situation, must reconcile conflicting goals: personal, staff, and their patient's safety. Indecisiveness may lead to catastrophe. Targeted education addressing these concerns can be explored in medical simulations.

**Methods**: A case-based simulation medical program (four hours weekly) is included within an emergency medical clerkship involving multidisciplinary students and faculty. At the start of their rotation, students receive "active shooter" educational material including the hospital protocol. While managing a typical ED simulated patient (varying levels of criticality), an "active shooter" component is added. Students must reconcile "Run-Hide-Fight" within the context of patient care. Debriefings follow.

**Results**: Sessions are held twice monthly in a no-threat environment with approval and assistance from university police trained in "active shooter" education. Within a span of ninety minutes, students manage a case into which one active shooter scenario is added. Depending on shooter location and patient condition, students must decide to run (with what and whom) or hide (barricade techniques) and fight (improvisational weapons). Debriefing emphasizes no right answer. Each situation is unique. Lifesaving strategies and tactics emphasize the improvised barricades and weapons that are uniquely found in a patient's room. Over 100 students have gone through this program since its inception.

**Conclusion**: Incorporating active shooter scenarios in medical simulations is accomplished in a no-threat, no-consequence environment. Regular training of healthcare and public health students through simulation of typical and atypical scenarios in healthcare facilities provides experience and sharpens mental "muscle memory" – allowing them to make wise decisions quickly during an actual active shooter incident.

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## Research Based to Maximize Effectiveness of Simulation for Hospital Disaster Plan (HDP) Teams in Indonesia

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**Study/Objective**: To evaluate a disaster simulation process in a hospital, and determine the HDP team's awareness in making an operationally HDP document

**Background**: Simulation is a recommended tool to test the functioning of HDP. Nevertheless, it is just a tool. An effective simulation was determined by a training developer. In Indonesia, HDP simulation becomes one of hospital accreditation points. It was biased, if the principle purpose of simulation was just for accreditation. The Center for Health Policy Management (CHPM FoM UGM) who's concern is in assisting hospitals to develop an operationally HDP document and simulation. It was important to evaluate simulations in revising the HDP document, and in increasing the hospital staff's awareness to implementing HDP.

**Methods**: This study used qualitative with pre-post-test design, comparing hospitals using research based simulation and ones that do not. Research based simulation was given in three hospitals. Subjects were HDP teams in 5 hospitals in Java Island, Indonesia who got HDP and simulation assistance by CHPM FoM UGM during 2015-2016. Study instruments were an open questionnaire (scenario conception, job/task identification in normal and disaster situation, gap identification of HDP document), self-evaluation and debriefing documentation.

**Results**: There was no significant difference in scenario conception from the two hospitals. However, they contrasted considerably in job identification and HDP team self-evaluation. In research based simulation, HDP teams could explain their role greatly and found many gaps between disaster simulation and their HDP document. Its impact, revising the HDP document based on disaster simulation gap initiated by HDP teams, was faster (±1 week after simulation) and more correct, especially in disaster SOP and Hospital Incident Command System.

**Conclusion**: Research based simulation could be implemented in the Indonesian hospitals by creating HDP teams, and a more serious and conscious took at the lessons from simulation. It's important for a training developer to establish an educational and research atmosphere during hospital simulations, to maximize the potency as a lesson learned. In order that, hospital disaster simulations becomes a significant test tool for HDP document.

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## Addressing Healthcare Personnel Preparedness in Disasters: An Introduction of a Participatory Design Educational Model in Greece

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**Study/Objective**: Results of a participatory design educational model regarding medical preparedness in disasters, based on simulation exercises, implemented in the framework of the MSc program "International Medicine-Health crisis management" of the Medical School of Athens, Greece.

**Background**: Disaster response and management has been described as one of the most challenging tasks. Although numerous competencies for disaster healthcare personnel have been developed and endorsed by governmental, professional and non-governmental organizations, universal acceptance and application of these competencies is lacking, resulting in

diversities in mass-casualty incident and disaster preparedness and training curricula.
**Methods**: Extensive literature review, quantitative data analysis of the feedback of 50 trainees (medical professionals (55%), paramedics (25%), social scientists (20%)) in two phases, before and after their participation in the simulation exercises; and qualitative analysis of 2 focus group discussions composed by facilitators and 7 expert external evaluators.
**Results**: Expressed concerns and challenges before the simulation exercises were afterwards, characterized as acquired skills and knowledge (increased awareness regarding disaster preparedness, enhancement of non-technical skills such as decision-making, communication, conflict resolution, teamwork and coordination among stakeholders, improvement of technical skills such as identification of critically patients and triage). Furthermore, all parties involved in the study recognized the following innovating elements: -the involvement of public medical professionals, and civil protection officers and their direct interaction with the trainees, -the active contribution of trainees in the simulation scenarios design (ie roles allocation independently their professional background) -the use of fully functional public spaces as training locations for the simulation exercises (hospitals, airport, port, hotels).

Overall, participants described feeling more prepared and confident for disaster response compared to prior the training.
**Conclusion**: Learning by doing, facilitating cross-sectoral and transdisciplinary collaboration, transposing real events into educational processes, enabling actual challenges, are proposed as a remedy to the apparent disconnect between theory and methodology used in disaster preparedness drilling.

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## High Fidelity Simulation With the Use of 360-degree Virtual Reality for Aeromedical Training in Search and Rescue

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**Study/Objective**: Recent experience has demonstrated the benefits of virtual and hybrid simulation training. A successful simulation model should provide customized environments to facilitate skill training and enhance complex contextual learning, especially for disaster scenarios, which may be infrequently met by an individual.
**Background**: The Government Flying Service (GFS) of Hong Kong is responsible for providing 24/7 emergency helicopter and fixed-wing flying support. The GSF and the Hong Kong College of Anaesthesiologists collaborated to organize the Air Crew Resuscitation Simulation Refresher Course for the Aircrew Officers, to enhance their medical skills for search and rescue missions. In order to enhance learning outcomes, this training made use of high fidelity simulation search and rescue scenarios.
**Methods**: The training includes topics such as triage process, pre-hospital and helicopter resuscitation in trauma, amongst other emergency clinical skills. With the support of the Hong Kong Jockey Club Disaster Preparedness and Response Institute, Virtual Reality (VR) aeromedical incident films were produced, which will be displayed using 360 degree goggles and a dome-shaped projection platform. To enhance fidelity of the simulation, sound effects and a mock-up cockpit will be produced. The hybrid training will be established by requiring the participants to carry out first aid and resuscitation procedures on mannequins. A self-administered questionnaire will be distributed to participants for process evaluation.
**Results**: Regular trainings will be conducted throughout two years, reaching a total of 50 participants. The first training is on December 3, 2016. Results of the process evaluation will be ready after data collection and analysis.
**Conclusion**: It is anticipated that the use of VR in search and rescue training will add a more realistic aspect to this area of training, and allow for consistency in trainings and for the ease of evaluation, yet keeping the training in a safe environment and at a low-cost.

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## Use of Virtual Reality in Motorsports Emergency Training

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**Study/Objective**: To explore the benefits of using VR simulation in motorsports medical incidents training.
**Background**: With the increasing popularity of using Virtual Reality (VR) in training, there has been a paucity of studies showing that content retention in memory is better, and compared to other simulations, VR bridges the gap of inconsistency of trainings while allowing participants to be trained in a realistic yet safe environment. In view of the first electric motor race in Hong Kong, the Federation Internationale d'Automobile (FIA) Formula E Hong Kong ePrix held in October 2016, a training for the medical community for such events was thus organized by the Hong Kong Jockey Club Disaster Preparedness and Response Institute. The aim of the course was to enhance command and coordination with different parties, including the marshal team, chief medical officer, first aid team, extrication team, and fire services. In the scene coordination session, participants were immersed in interactive simulated motor accident scenes, created by a VR game-based tool to interact with each other to communicate.
**Methods**: Two levels of assessments were done, including a self-administered course process evaluation questionnaire and a video analysis of performance assessment, which assesses the fidelity of the simulation to the real situation.
**Results**: A total of 80 emergency first responders, who would be on the ground during the event as emergency medical teams, were trained. The evaluation (72 questionnaires returned) showed the

benefits of using VR simulation. Participants commented that compared to table-top exercises, a VR simulation compels the interaction and coordination of different stakeholders on site, and is beneficial in situations where communication between different parties is necessary, such as towards the wider public.
**Conclusion**: VR simulation can be a beneficial method for training for command and coordination in case of emergencies in mass gatherings.
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### Enhancing Disaster Preparedness Exercises with Virtual Reality Simulations

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**Study/Objective**: The National Library of Medicine (NLM) is studying virtual reality simulations as tools to improve the Incident Command System proficiency of professionals playing emergency management roles through scenario-based exercises. Medical facilities identified a number of deficiencies in traditional methods. The NLMs approach aims to improve instructional outcomes by: increasing trainee engagement, promoting more frequent exercising, providing enhanced scenario realism, allowing for objective exercise assessments, reducing the impact of exercises on facilities' day-to-day activities, and improving exercises' cost-benefit ratio. The NLMs approach makes use of computer gaming and instructional design techniques to develop tools that others can use freely to implement scenario-based exercises.
**Background**: Since 2008, NLM collaborates with the Bethesda Hospital's Emergency Preparedness Partnership (BHEPP) in Maryland to enhance the preparedness of this coalition to respond to a crisis that may affect the National Capital Region. Hospital Incident Command System training was identified as an important preparedness component. NLM applies a variety of information, library, and computer science disciplines to support the goals of this coalition.
**Methods**: NLM developed application prototypes and instructional materials, prepared and conducted virtual ICS exercises in a local hospital, and collected participant's input through interviews, limited surveys, and during post-exercise "hot wash" meetings. The outcomes from these field tests guided the development of enhanced prototypes that were tested via additional exercises, some with other entities, including a county and a city Emergency Operations Center.
**Results**: Virtual exercise participants reported benefits in all the intended objectives. Over 90% of participants envision this type of training as a regular part of their preparedness training.
**Conclusion**: Preliminary results suggest that NLMs virtual ICS training can enhance ICS training. Creating the simulation software can be costly, but NLM is developing tools that can reduce adoption costs for organizations that want to try this training method, and the resource can be reused repeatedly at no significant cost.
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### Simulation Exercises as Training and Evaluation Tool in an Ebola Preparedness Project

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**Study/Objective**: Designing a simulation exercise to evaluate a project that aims to prepare Health Care Workers (HCW) to identify and manage patients with highly contagious diseases.
**Background**: HCW were the most vulnerable persons by consulting and treating patients without sufficient protection during the Ebola outbreak in West Africa. In order to strengthen these key persons, the European Forum for OS-9 (EFFO) project with a train-the-trainer-program was initiated in 2014 by the Robert Koch Institute, STAKOB (German permanent working group for highly contagious and life-threatening diseases). The project is financed by the German Federal Ministry of Health. Evaluation and quality control play a crucial role in the train-the-trainer program.
**Methods**: Key aspects for the exercise with a single simulated patient were modified from previous projects for biological event preparedness evaluation. Certain aspects were highlighted as a result of the formative evaluation during the training program. The simulation directions were adapted for the local health care facility in Senegal. The general design, principles, and exact data were discussed with the responsible personnel. A precise debriefing similar to a tabletop exercise was conducted.
**Results**: This simulation exercise allows the identification of strengths and weaknesses. Eg, while the use of Personal Protective Equipment (PPE) was professional, the waste management remained a challenge. The method was highly accepted by the health care facility. The results were used to improve the train-the-trainer program.
**Conclusion**: Simulation exercises play a key role in biological events to prevent nosocomial infection. Training in PPE is essential, as well as practicing the context to achieve a transfer of training knowledge to a real suspected case. In this project, the simulation exercises will be used to evaluate and further adapt the train-the-trainer-program, to improve the preparedness of health care facilities, and to strengthen the network within the project.
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### Pilot Study: Utilization of Simulated Exercises to Teach Healthcare Students the Potential Benefits of Unmanned Aerial Vehicles to Respond to Environmental Health Issues Associated with Disasters

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**Study/Objective**: To develop a simulated disaster scenario to demonstrate the potential benefits of UAVs.

**Background**: Climate change, emerging infectious diseases, global terrorism, and world conflict are increasing the likelihood that disasters in the 21st century will have greater catastrophic consequences than what was experienced in prior epochs. Innovative technologies must be devised and exploited to address these challenges. Unmanned Aerial Vehicles (UAV) have the potential capabilities to be used in preparation for, and response to, disaster situations in an expeditious and safe manner. However, this potential has not been fully explored.
**Methods**: Within a 3-hour semester Environmental Health course, a disaster exercise (floods) was created to explore how temperature changes, water contamination, infectious diseases, and bites and stings impact uniquely vulnerable populations. Within that scenario, students, employing the Incident Command System (ICS), used an UAV to survey that disaster area - searching for stranded victims and then ferrying needed resources (nutritional, cover, communications, etc.) to them. The UAV had visual capabilities to locate "victims" within the classroom (60x50x20), and then returned to base to be outfitted with paper "supplies" for the return trip. A questionnaire was completed by the learners.
**Results**: Within a 3.5-hour Environmental Health class, learners not only explored the severe environmental issues seen with disasters, but became ICS players using the drone to locate victims and to provide life-sustaining resources. The majority of the class indicated simulation training using UAVs was educational and instructive and should be included in global and disaster medicine curricula.
**Conclusion**: UAVs in limited fashion have been deployed in disasters. We have demonstrated that knowledge of this resource can be presented in a classroom setting using innovative simulation techniques. The learners' positive review has reinforced the opinion to expand this simulation to additional students in other related courses.

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## Modeling Fear-Related Behaviors as Vectors of Transmission in the West Africa Ebola Pandemic

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**Study/Objective**: Describe/model Fear-Related Behaviors (FRBs) that exacerbated viral transmission during the Ebola pandemic, and analyze potential for intervention.
**Background**: Diminishing the multinational spread of infectious diseases is an international health priority. The West Africa Ebola Virus Disease (EVD) pandemic was the largest, longest, deadliest, and most geographically expansive ever. Fear-Related Behaviors (FRBs) were drivers of viral transmission. Cascades of escalating risk occurred as EVD provoked fear and associated FRBs that propelled disease spread; rising case counts then triggered more waves of FRBs.
**Methods**: A team of infectious diseases, complexity sciences, and psychiatric experts are modeling the contribution of FRBs to infectious disease spread, based on retrospective analysis of the West Africa outbreak. This is a critical endeavor because behavioral risks for infectious disease transmission may potentially be prevented or mitigated. In the West Africa outbreak, behaviors such as avoiding or fleeing treatment units, caring for patients at home, and performing secret burials facilitated direct contact viral transmission.
**Results**: Preliminary analysis indicate that a high proportion of early cases in the West Africa Ebola outbreak were potentiated by FRBs. The serial nature of person-to-person infectious disease transmission, amplified the effects of FRBs on epidemic dynamics. Modeling results will be presented that estimate the proportion of the 28,600 cases that were either directly or indirectly triggered by FRBs.
**Conclusion**: This multi-disciplinary approach, incorporating spatio-temporal modeling of disease spread, on-scene observation of behavioral contributions to the risk of EVD spread, and the "lens" of complex systems thinking, has enriched the process of explaining the role of FRBs. Infectious diseases generate fear of contagion and associated FRBs that may paradoxically increase transmission risks. The West Africa Ebola outbreak serves as a laboratory for examination of FRBs, in relation to transmission and the potential for prevention and mitigation. These investigations have relevance for healthcare surge and related disaster medicine applications.

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## The Use of Table-Top Simulation for Team Training in Disaster Events

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**Study/Objective**: A pre- and post-intervention study was conducted to find out if a table-top team training program would positively affect perception towards teamwork and their ability to recognize the presence and quality of team skills in disaster events.
**Background**: Since disaster training involves coordination and communication between various units of treatment, training this coordination and communication necessitates involvement of the whole chain of response simultaneously. To do this as a full-scale exercise is expensive and time consuming. Table-top simulation training modules gives us the advantage of a reflective, experiential, repetitive, and safe learning environment. By using the table-top simulation module, we believe we could train teamwork competency for disaster medicine providers.
**Methods**: The educational intervention consisted of a half-day workshop (lecture, table-top simulation, and debriefing) for a selected 48 health care providers from the emergency department. A Teamwork Perceptions Questionnaire (TPQ) was performed using tools developed by the TeamSTEPPS® Project (5-point Likert scale). Team Performance Observation Tool (TPOT) was used to evaluate the performances of the participants. The questionnaire and tool were modified to fit our institutions' culture. All pre-to-post differences within

subjects were analyzed with paired tests. The statistical level of significance was set at 0.05.
**Results**: Pre- and post-intervention differences for the five sections of the TPQ, which consists of team structure, communication, leadership, situation monitoring, and mutual support were 3.1 to 4.2, 3.0 to 4.2, 3.3 to 4.3, 3.1 to 4.1, and 3.2 to 4.1, respectively. Pre- and post-intervention differences for the same five sections of the TPOT were 1.8 to 4.2, 1.4 to 3.9, 1.6 to 4.3, 1.3 to 3.6, and 1.4 to 3.8, respectively. All results were statistically significant.
**Conclusion:** This table-top team training program positively affected perception toward teamwork and their ability to recognize the presence and quality of team skills in disaster events.
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## Burn Disaster Planning and Simulation Event in Quebec, Canada

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**Study/Objective**: The goal of this presentation is to discuss the making of a Burn Disaster Plan at the *Centre Hospitalier Universitaire de Montréal* (CHUM), a university environment that is not part of a trauma center, as well as describe the participation of the Montreal Burn Unit in a major live simulation event.
**Background**: Several burn disasters have occurred in the province of Quebec (Canada) in the last couple of years. These events have triggered a reflection on disaster preparedness among medical and other allied healthcare personnel at the Montreal Burn Unit.
**Methods**: The Montreal Burn Unit disaster plan required two-years of committee meetings and was designed around checklists for all involved personnel. On October 9, 2014, the Montreal health agency coordinated a major "Code Orange" drill to test the responsiveness of the health network to a simulated plane crash. In doing so, it evaluated the efficacy of the Montreal Burn Unit to receive disaster victims. This event was analyzed on site by personnel from Académie CHUM with expertise in simulation exercises.
**Results**: Participants were evaluated using direct observation, online survey, as well as debriefing sessions. The evaluation report from Académie CHUM revealed that the simulation exercise was greatly appreciated by all personnel involved. It helped validate the Montreal Burn Unit Disaster Plan including 1) pre-triage of burn victims in the emergency department, and 2) the designation of a triage physician-leader. Several areas for improvement were identified including 1) patient tracing, and 2) operating room availability.
**Conclusion**: Disaster planning and participation in a large scale, live disaster simulation exercise are demanding. For the CHUM, this investment brought priceless benefits: although not measured, the teams seemed strengthened and the coordination between departments and the culture of continuous improvement and learning appeared reinforced. Simulation of disaster events will continue within the framework of the transformation process towards our new mega hospital NCHUM in 2017-18.
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## Implementing Best Practice to Critical Patients from Disaster Events Through Simulation-Based Learning Program

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**Study/Objective**: To develop a standardized High-Fidelity Medical Simulation (HFMS) training curriculum focusing on specific assessment and treatment of disaster-related severe injuries presenting to the emergency department.
**Background**: Evidence suggests that most prehospital and hospital providers are inadequately prepared to manage a multiple-casualty incident. For hospital health care providers, it is critical for them to develop competency in managing patients injured from disaster events. Unfortunately, some of these patients could be really critical, and understanding the pathophysiology of the injury progress is important for good quality care for the patients. Although existing disaster training systems emphasize non-technical skills, there has not yet been an in-depth analysis in identifying the competency of clinical skills for disaster personnel. HFMS is being used in rare but critical clinical events to enhance the competencies of health care providers.
**Methods**: The educational intervention consisted of a half-day workshop (lecture-HFMS-debriefing) for selected 24 emergency residents (six teams). The objective of the scenario was to develop performance competency in managing critically injured patients in a disaster events, specifically, blast, radiation, and crush injuries. A checklist was developed to assess the performances of the participants. All pre-to-post differences within subjects were analyzed with paired t tests. The statistical level of significance was set at 0.05.
**Results**: The content validity index of performance checklist was 0.9. Pre- and post-intervention differences (percentage) for the six team performances were 67.7 to 84.6, 58.1 to 80.8, 51.6 to 84.6, 61.3 to 80.8, 51.6 to 65.4, 61.3 to 76.9, respectively. All results were statistically significant.
**Conclusion**: HFMS training program focusing on critically injured disaster victims positively affected performances of the participants.
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## Evaluating, Learning and Simulation Exercise for Efficacy, A Course on Advanced Prehospital Trauma Care

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**Study/Objective**: In this study, we aimed to design a questionnaire battery for course and simulation exercise evaluation, and pilot-test the battery by evaluating a course on Advanced Prehospital Trauma Care (APTC).
**Background**: Many course evaluations suffer from simplistic metrics, such as whether the course participants "enjoyed" the course. In contrast, the current study sought to measure (self-estimated) pre- and post-course knowledge, relevant to specific learning objectives, as well as questions pertaining to specific factors of the simulation exercises used in the course (eg, fidelity/realism, learning objective fit, transferability of tools/procedures, usefulness, among others) were selected based on simulation theory and simulation-based training literature.
**Methods**: Data were collected during a course on APTC. Twelve students participated. The mean professional experience was 15.5 years. The participants completed an informed consent form prior to the study. They completed a pre-course questionnaire, a post-course questionnaire, and a course evaluation form.
**Results**: The mean self-estimated improvement in theoretical knowledge pertaining to the course objectives was 8.23 on a 0 to 10 scale, and 8.25 for practical skills. Greatest improvement was in advanced airway management, physiological reactions to hypothermia, pneumothorax interventions, special considerations for patients injured by explosives (eg, blast injuries and burns), and medical decision making during an active shooter scenario. The evaluation of the simulation exercises received high marks (mean rating 4.53 [3.92-4.92] out of 5.0) on all aspects. The participants rated the overall course quality at 4.67 (on a 0 to 5 scale), with the simulations, practical exercises, and the structure of moving from theory to practice being mentioned as particularly positive.
**Conclusion**: Overall, the results showed that the APTC course received high marks on almost all measured factors. Further validation of the questionnaires is needed before general implementation of the battery can be recommended. Such implementation would benefit diverse course development and quality assurance.

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## An Electronic Competency-Based Evaluation Tool for Assessing Humanitarian Competencies in a Simulated Exercise

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**Study/Objective**: To present a novel, competency-based evaluation tool designed for rapid, electronic, offline use in a field-based simulation exercise.
**Background**: A growing number of humanitarian training programs are using simulation exercises in an effort to train and prepare humanitarians for work in the field. However, few field training exercises include methods and tools designed to assess the essential humanitarian competencies that participants must demonstrate in the SimEx and the field.
**Methods**: During a three-day humanitarian simulation event, participants in teams of eight to ten were individually evaluated at multiple injects by trained evaluators. Participants were assessed on five competencies and a global rating scale. Participants evaluated both themselves and their team members using the same tool at the end of the SimEx.
**Results**: All participants (63) were evaluated. A total of 1,008 individual evaluations were completed. There were 90 (9%) missing evaluations. All 63 participants also evaluated themselves and each of their teammates using the same tool. Self-evaluation scores were significantly lower than peer-evaluations, which were significantly lower than evaluators' assessments. Participants with a medical degree, and those with humanitarian work experience of one month or more, scored significantly higher on all competencies assessed by evaluators compared to other participants. Participants with prior humanitarian experience scored higher on competencies regarding operating safely and working effectively as a team member.
**Conclusion**: This study presents a novel electronic evaluation tool to assess individual performance in five of six globally recognized humanitarian competency domains in a 3-day humanitarian SimEx. When combined with testing knowledge-based competencies, this presents an approach to a comprehensive competency-based assessment that provides an objective measurement of competency. There is an opportunity to advance the use of this tool in future humanitarian training exercises, and potentially in real time, in the field. This could impact the efficiency and effectiveness of humanitarian operations.

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## A Social Network Analysis of the Emergency Medical Command During a Live CBRNE Exercise

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**Study/Objective**: During major incidents, it is crucial that all actors in the emergency medical command have correct and

current information. However, communication and situational awareness are often "named" problems at major incidents. This study used Social Network Analysis (SNA) to analyze emergency medical organizations' communication during a large-scale, mass-casualty Chemical, Biological, Radiological, and Nuclear (CBRN) exercise.

**Background**: Social Network Analysis (SNA) focuses on the relationship and resource (eg, information) sharing between actors in a given system. SNA can provide graphs of information transferred between actors and measure aspects such as sociometric status (how much "activity" an actor has in relation to others) and betweenness (how much interaction one actor has with all other actors).

**Methods**: The exercise scenario was a collision between a train carrying acrylonitrile and an excavator at a railroad crossing. Audio data were collected through microphones worn by the Ambulance Incident Commander (AIC) and the Medical Incident Commander (MIC), and also through radio recordings. The audio was transcribed, and meaningful utterances were entered into a social network matrix to produce social network statistics and graphical networks.

**Results**: The SNA showed that the four actors with the highest sociometric status were the MIC (11.83), AIC (9.97), RSC1 (4.66), and IC (2.59). The actors with highest betweenness were MIC (534.67), AIC (195.75), RSIC1 (47.25), and the train company representative from Veolia (5.00). A graphical representation is shown in Figure 1.

**Conclusion**: The SNA showed that the MIC and AIC had high information-sharing activity and interactions with other actors, as expected, given the organizational command structure. In Figure 1, it indicates several information-sharing structures, including pathways from higher command (DDO and Emergency Dispatch) to AIC, into a mostly interconnected network (bottom right) and several peripheral actors such as police officers. Overall, SNA appears to be a useful tool to analyze communication during major CBRNE incidents.

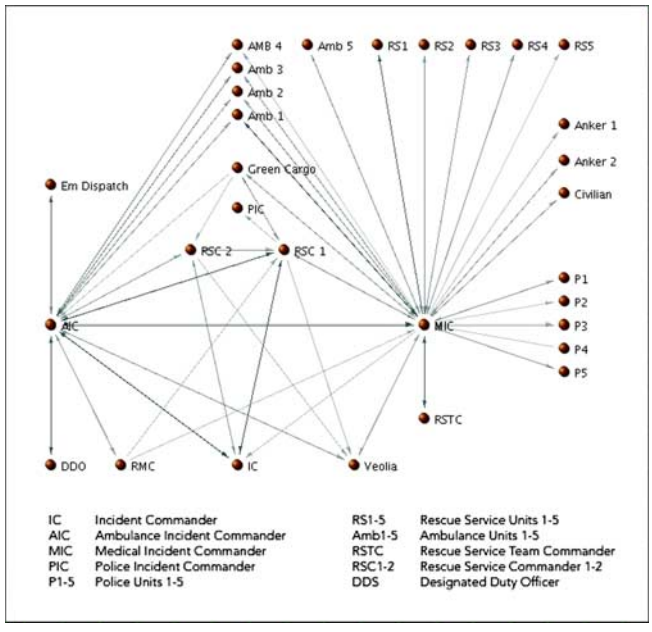


**Figure 1.** Communication flow.

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## System Dynamic Simulation for Medical Needs in the Great East Japan Earthquake

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**Study/Objective**: The aim of this study is to create a system-dynamics model simulating the medical needs in a disaster for the assessment of medical needs and decision making.

**Background**: In the Great East Japan Earthquake (GEJE) of 2011, the medical response team faced less patients with injury than expected, but an excess of patients with non-communicable disease (NCD), infectious disease, rehabilitation, mother and child health, and mental health needs in different time courses. It is crucial for the medical response team to predict the needs according to type of hazard, vulnerability, and capacity of the community. Besides precise analysis of real data, system dynamic simulation will enable us to postulate the dynamic change of inter-related medical needs in disaster.

**Methods**: Using Stella Architect software (Isee Systems, NH USA), the system dynamics model was built to represent each module of different medical needs. Japanese national average values of a crude birth rate (8.8/1,000), inpatient (1,090/100,000), outpatient (5,376/100,000), and mental health problems (8.8/100) were used in a model of a given community (+65-old ratio is 32%). Time-dependent ratio of injuries, locomotive syndromes, rehabilitation, mental health problems, NCD, and infectious disease were assumed according to the experience of the GEJE. Time starts from 30 days before onset and goes through 365 days after onset.

**Results**: The model successfully simulated the time course of the total medical needs in a town devastated by GEJE, where all the health facilities were destroyed by a Tsunami. The simulation model does not include the relief capacities; the time-dependent occurrence ratio was manually set. However, the total outcome became realistic and the relationship of various aspects of health needs in the time frame were visualized. Validation using the real medical needs data is necessary.

**Conclusion**: System dynamics model of medical needs in a disaster gives us a new insight in assessment and decision making.

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## A Comparison of PC Screen Based vs High Fidelity Simulation Supported Instruction in terms of Learning Outcomes and Cost

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**Study/Objective**: Test a model that was developed to compare PC screen-based vs high-fidelity simulation supported training for basic trauma skills in terms of learning and cost outcomes.
**Background**: As disasters increase in numbers and intensity, more attention is being paid to trauma skills training for health workers. There is a wide spectrum of simulation types, and while high-fidelity simulation is known to be effective, it is also very costly.
**Methods**: The Nursing Education Simulation Framework guided the development of a model to compare the two simulation methods in terms of confidence, knowledge, skills, and cost outcomes. Participants (N = 70) were nurses and EMT's from the civilian and military sectors. All underwent pre-testing, random assignment to PC screen-based or high-fidelity simulation training groups, trauma skills training, immediate post and then post-post (6-12-weeks) evaluation. The evaluator was blinded to the simulation training type for each participant.
**Results**: There were no differences in the learning outcomes between the PC screen-based vs high-fidelity groups. Both groups increased their confidence, knowledge, and skills. However, the cost of high-fidelity simulation was ten times that of PC screen-based instruction per unit.
**Conclusion**: For basic trauma nursing skills, a less costly method of instruction can achieve the same learning outcome results.
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## Self-Assessment of Intensive Care Nurses' Team Performance Compared with Intensive Care Nursing Students

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**Study/Objective**: The study aims to explore whether there are differences between intensive care nurses' (ICN) team performance and ICN-students, measured by a validated instrument.
**Background**: Due to lack of ICN-students working experiences, a joint high-fidelity, simulator-based training can bridge the gap between nursing school and appropriate hospital practice. Data originated from a training project in Norway. ICNs from a hospital intensive care unit collaborated with educators from a nearby university to improve ICN-students team performance, to make those students better prepared for practice.
**Methods**: The study used an explorative design. Thirty registered nurses, who were allocated into five teams representing intensive care specialty, participated in a high-fidelity, simulation-based pneumonia with acute respiratory failure setting. Each team consists of five ICN's and one ICN-student. The Mayo High Performance Teamwork Scale was used to measure team performance. We used the Mann–Whitney U test to compare and analyze the teams' self-assessment.
**Results**: Statistical significant differences were found between ICN-students and ICN's self-assessments on two variables: 1) The team prompts each other to attend to all significant clinical indicators throughout the procedure/intervention; and 2) When team members are actively involved with the patient, they verbalize their activities aloud. ICN's perceived and gave their support to these two assertions to a greater extent than ICN-students.
**Conclusion**: Our findings indicate that ICNs and ICN students perceive aspects of team performance in a joint team training setting differently. ICN's tend to have a higher awareness than ICN students, in terms of being attentive about clinical indicators throughout the intervention, and by noticing other team members' involvement with the patient.
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## Large-Scale Disaster Simulations: Advancing Pediatric Disaster Preparedness and Safety through Whole-Hospital, Inter-Professional Learning

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**Study/Objective**: To underline the importance of the health care network in the response to a disaster. To share one method of training HCW, and improving communication under strenuous conditions through simulation. To use pediatrics as an example of one of our most vulnerable populations, and their particular needs in a disaster.
**Background**: Disasters, whether natural or human-made, have a significant impact on the population. Hospitals play an important role in the response to disasters and Health Care Workers (HCWs) must be prepared to respond. Training HCWs for such rare events and especially maintaining their competency is challenging. It has been shown that an all-hazards (CBRNe-Chemical, Bacteriologic, Radiologic, Nuclear, explosive) approach to hospital disaster preparedness is most effective and efficient. Recent Canadian hospital surveys show considerable gaps in hospital disaster preparedness, particularly with respect to decontamination capabilities.
**Methods**: We report details of our experience in conducting two large-scale, real-time, in-situation disaster simulations in a tertiary care, Level 1 pediatric trauma center. Quantitative and qualitative data from a city-wide trauma disaster simulation (2012), as well as one including exposure to a hazardous substance (2015), will be presented.
**Results**: Our findings endorse large-scale, in-situational simulations as opportunities for whole-team learning, practicing effective communication, and overall improvement of hospital disaster preparedness.
**Conclusion**: Training for the rare but high-impact event that is a disaster, and maintaining competency of HCWs, is difficult and costly. Participants in these simulations felt they improved their ability to respond to a Chemical, biological, radiological, nuclear, and explosive (CBRNe) disaster, and that these were valuable to their learning and practice. Our findings endorse large-scale, in-situational simulations as opportunities for whole-team learning, practicing effective communication, and overall improvement of hospital disaster preparedness.
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### Advanced Simulation in Disaster Preparedness and Relief: The Gold Standard for Soft Skills Training

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**Study/Objective**: To explore and describe the gold standards, to optimize soft skills training by full-scale high-fidelity simulation. To identify which soft skills are less powered by rescue teams.
**Background**: Safety management in organizations has seen good developments. Early safety issues focused primarily on environment and equipment (the technology) matters, while later practices also considered human aspects (human factors) and the overall management of the organization (organizational factors). Advanced simulation has been demonstrated to be effective in training people to both technical and non-technical skills.
**Methods**: Teams of rescuers were exposed to full-scale high-fidelity scenarios. All phases of the simulation training process were investigated and graded in order to identify the key phases to obtain the learning objectives; Laerdal Sim Man 3 G was the patient simulator used in all scenarios.
**Results**: All phases of simulation are critical to obtaining the learning objectives; failure in providing effective feedback by reflective debriefing has been shown as the main cause of missed learnings and low motivations of participants. Team membership has been shown as the most critical soft skill to practice and retain.
**Conclusion**: Traditionally, rescue team training has been focused on knowledge and technical skills, while soft skills have been often a secondary teaching goal. Well established evidences have been demonstrated that most errors rise from human factors and non-technical skill insufficiency. Soft skills training of both health care professionals and non-health care rescuers must be a priority of all training programs. Full-scale, high-fidelity simulation is the gold standard to practice and retain soft skills.

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### Find Me if You Can! An Interprofessional Search & Rescue Disaster Collaboration among Nurses, Physician Assistants and the Military

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**Study/Objective**: Disaster preparedness is now a public health problem and an increased number of disasters have led to a greater need for trained volunteers during these times. There is a greater need for creation of simulation sites outside of the simulation laboratory. The need to educate nursing students in a non-traditional learning environment is needed to reinforce the best educational practices for our future nursing workforce. Staging a disaster simulation in a "real life setting" was found to generate better student learning outcomes when compared to traditional simulation lab activities.
**Background**: In Summer 2013, an Interprofessional Mass Casualty Search and Rescue exercise was conducted with senior baccalaureate nursing and physician assistant students, and the Indiana Air Guard CERF-P medical division. This qualitative pilot exercise was conducted to meet course curriculum requirements for disaster preparedness. The exercise included high fidelity adult and pediatric simulators along with live actors that were moulaged. Special needs victims and non-english speaking victims were used.
**Methods**: A fifteen question Likert-type, pre and post simulation evaluation was administered to participants. The pre evaluation revealed students expected to be overwhelmed, yet have a realistic experience. The post simulation evaluations revealed the exercise was realistic, allowed students to use communication skills to establish collaborative relationships, it provided an opportunity to connect classroom and clinical learning, and students utilized their critical thinking and judgment skills.
**Results**: showed the majority of students would participate in future mock disaster exercises. Lessons learned included the need for additional staff to run the mannequins, revision of the post survey, and greater formalized pre and post briefing. Lessons learned were utilized in future mass casualty simulation exercises.
**Conclusion**: This was an innovative experiential learning opportunity for student practitioners. More disaster response programs are needed for student competency in rural health settings with positive impacts on Quality and Safety Education for Nurses (QSEN) outcomes.

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### Necessity of Disaster Training in Cooperation with Public Health Centers

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**Study/Objective**: This summer, I conducted training in collaboration with DMAT and a public health center, in a large-scale earthquake medical activity training; I will report on this.
**Background**: In Japan, public health centers are established as prefectural governments, government ordinance designated cities, core cities, etc., as public institutions that are central to the maintenance and promotion activities of local residents. There are 510 public health centers nationwide, and since peacetime, it is the core of regional medical care. Even in the Kumamoto earthquake that occurred in April 2016, we will work closely with public health centers in the afflicted area, before the end of activities by the DMAT in the hyperacute phase, and gradually move the work to continue suddenly discontinue support we did not care.
**Methods**: We conducted material procurement drills, focusing on exchanges at all health centers and medical facilities in the prefecture, medical aid and relief adjustment headquarters at each site, and at prefectural office headquarters. We also conducted training on some of the health centers, and conducted an evaluation of an evacuation center.
**Results**: We procured supplies from the health care facilities, bases and prefectural agencies, and requested cooperation from the health centers. In addition, we were able to share the results

of shelter assessment with DMAT, and plan activities coordinated in the acute phase of disaster.

**Conclusion**: In the event of a disaster, a medical team such as DMAT will enter the disaster area. However, the duration of the activity is limited, and it's necessary to gradually lead to health care and health in peacetime. Cooperation between health and disaster medical care is necessary during times of peace, so that seamless support transition can be made in a short period of time.

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## Attempt of Communication and Collaboration, Web-NOLO to Prepare for Disaster in South Tama, Tokyo

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**Study/Objective**: Our group promotes web based chronology, Web-NOLO.

**Background**: In South Tama region of Tokyo, we have promoted disaster medical cooperation. The disaster medical coordinator of this region launched a working group to prepare for disasters. This made us reinforce cooperation among hospitals, clinics, the medical association and municipal officers. This group is trying to summarize the disaster drills already conducted in a few hospitals, and to support other organizations that are inexperienced in conducting such drills. It also created a web-based chronological information management system called Web-nolo. A web-based Emergency Medical Information System (EMIS) is already being used throughout Japan to manage disaster information. But there are some restrictions for using EMIS. To complement EMIS, our group created Web-nolo.

**Methods**: A Disaster Medical Assistance Team (DMAT) training was conducted by simulating an earthquake disaster in the Tama area on July 30, 2016. Web-nolo was used for this training.

**Results**: At that DMAT training, we used both EMIS and Web-nolo. Through Web-nolo, it is easy to share and understand each organization's situation. A similar system can be applied to assemble and manage the situation of staff and patients being admitted to hospitals after a disaster. A current issue with Web-nolo is that it is difficult to update information regarding the disruption of lifeline services; more staff is required and necessary to determine the importance of information.

**Conclusion**: Regarding communication tools, satellite phones and a disaster management radio communication system that includes a telephone and fax system, are available for each city and for the Tokyo metropolitan area; EMIS is available nationwide. The availability of many communication tools is useful. Web-nolo, which uses a free Google system, and which can be easily used by everyone, is considered a very useful tool. However, it essentially complements EMIS, and it is unnecessary if it is corrected.

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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## EDXL-LD and Architectural Tactics towards Information Sharing and Interoperability in Emergency Context

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**Study/Objective**: The objective of this study is to propose a new architectural approach supported by information models, to manage knowledge in the dynamic emergency context towards interoperable knowledge sharing and reuse.
**Background**: The knowledge systems for emergency management are based on evolvable information provided by various actors, by diverse collections of sensors and information supplied by human volunteers. In order to achieve a common operational picture - situation awareness, various knowledge, vocabulary and information models need to be aligned. This requires extendable time, application context architecture and models representing detailed evolvable knowledge about the types of adverse events, their potential impact and the means and resources that are best suited for response. The existing semantic research has a potential to address the identified needs, however the reported ontologies are rarely publically available, and they are also disconnected from widely used standard data models, data-exchange formats, and protocols related to emergency management.
**Methods**: The literature review and the inputs provided by domain experts in the CONCORDE consortium and WHO, have facilitated the addressing of shortcomings and challenges identified above.
**Results**: The Emergency Data Exchange Language (EDXL) based domain specific standards are taken as a base to create domain specific vocabularies. Vocabularies are published as a Linked Data (LD) and can be downloaded from GitHub software repository *https://github.com/OntoRep/EDXL*. The Model-View-Presentation (MVP) based architectural tactics as a software engineering pattern (see below) are exploited to achieve a desired extensibility and dynamicity of the system at its deployment stage.
**Conclusion:** By keeping applications' business logic separate from data and semantics, the underlying knowledge models can evolve without necessarily requiring changes to the interfaces and applications built on top of the models.

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## The J-SPEED: A Medical Relief Activities Reporting System for Emergency Medical Teams in Japan

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**Study/Objective**: To introduce the J-SPEED; medical relief activities reporting system for Emergency Medical Teams (EMTs) of Japan.
**Background**: During a disaster, information gathering and analysis are key elements for better coordination and timely response. Previous cases revealed that EMTs sometimes became the only capacity which could report medical, or more broadly health situations to a coordination body, and standardization of the reporting process from EMTs to the EMT Cortication Cell (EMTCC) will allow for better coordination, and for strengthening of the disease early warning system, since EMTs will act as additional sentinel reporting sites. One good existing model for this issue is the Surveillance in Post Extreme Emergencies and Disasters (SPEED) system employed in the Philippines. The SPEED was developed by Philippine's Department of Health and the WHO in 2010. Based on the lessons learned from relief mission of the Japan Disaster Relief Medical Team against the super typhoon Yolanda in 2013, a Japanese version of the SPEED, so called J-SPEED has been developed and published in 2015.
**Methods**: Field study.
**Results**: The J-SPEED was first activated at the Kumamoto earthquake which occurred on April 14, 2016. During the 48 days of response, EMTs from various affiliation sent 1,828 daily reports to the EMTCC, which represented medical demand of 8,089 patients. Standardized information processing and quantitative information made communications among stakeholders efficient, and supported evidence, consensus based decision making by the local authority.
**Conclusion**: Employment of the J-SPEED drastically changed the EMT coordination in Japan. Countries which don't have a relevant system can easily set up a national reporting system utilizing the SPEED framework.

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## How do we Measure Severity? An Assessment of Five Indexes used in Sudden Onset Disasters and Complex Emergencies to Measure Severity and Risk

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**Study/Objective**: The aim was to, 1) study the relation between disaster outcomes after earthquakes, expressed as number of dead and injured, and the performance of five pre-identified severity, and risk-scoring indexes, 2) to inform a model that in an initial phase of a disaster can be used to predict severity and levels of need, and thereby guide toward the appropriate levels of response.
**Background**: A disaster is as an event that overwhelms local capacity, necessitating national or international assistance. Disasters can be categorized, based on the type of hazard causing them. An earthquake is a hazard that can lead to a disaster. The disaster-severity depends on the magnitude of the hazard, underlying vulnerability, the level of exposure, coping capacity and the disaster response. While assistance should be based on needs, determined by the severity of a situation, there is no recognized way to compare severity between disaster contexts. Several initiatives have been developed to provide information on global severity and risks in disaster situations. In this study we compare five indexes and their ability to define severity: GDACs, GEO, KI's 7-need, INFORM and ECHO's Crisis index.
**Methods**: We did a mapping of the existing indexes and indicators used. Index-scores were standardized and then compared with the number of dead and injured as an absolute outcome, in earthquakes with magnitude equal to or higher than 6,5 that occurred in populated areas, between year 2001 and November 2016.
**Results**: The five indexes evaluated were all indicating the severity after the examined earthquakes. There was not one single index that gave an absolute correlation. Indexes built on higher numbers of indicators had several indicators that gave identical information.
**Conclusion**: It is possible to predict the severity of a disaster through proxy indicators. The number of indicators used is not automatically increasing the preciseness or validity of the outcome.

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## Enhanced Situational Awareness through a Decision Support Service for Optimal Allocation of Resources and Response Capacity

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**Study/Objective**: We designed and developed e-services, aiming to support the decision makers during various contexts of medical emergency response, offering them machine-aided enhanced situational awareness.
**Background**: Currently, decisions are being made by human experts with hands-on experience in emergency fields. However, in most cases, experts do not have the required computational capacity to process the relevant heterogeneous information and perform informed decisions. Evidently, time is a very critical parameter in emergency situations, especially in large-scale incidents with large number of casualties.
**Methods**: Taking this into account the services we develop, are based on the mathematical modeling of optimization problems for timely resources' allocation, addressing different phases of the response. The formulated problems address: i) the optimal allocation of Emergency Medical Services (EMS) units (in terms of demand satisfaction and time), to active emergency incident fields, ii) the optimal allocation (in terms of exploiting their capacities and response time) of EMS staff to tasks on the incident field such, as triage and retrieval running, transferring of patients to medical treatment area, offering medical treatment, and iii) the optimal allocation (in terms of profile matching, demand satisfaction and time) of patients to EMS vehicles and subsequently to first receivers (hospitals). The services are supported by semantic modeling of EMS vehicles, hospital, staff and patients profiles, as well as by machine learning tools that estimate demand for resources given historical emergency incident data. The services offer clear interfaces, so as to be interoperable with existing emergency management systems, as long as access to the necessary information is given.
**Results**: Our solution achieves the recommendation on allocation of resources, based on real-time collected information from the emergency field.
**Conclusion**: Further work will focus on modeling different cost functions in the optimization, so as to customize the recommendations based on incident and/or decision-maker needs.

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## Comparison of UAV Technology vs No UAV Technology in Identification of Hazards at a MCI Scenario in Primary Care Paramedic Students

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**Study/Objective**: The aim of this study was to compare Unmanned Aerial Vehicles (UAVs) to Non UAV technology in hazard identification, using paramedic students during a simulated Mass Casualty Incident (MCI). It was hypothesized that there is no difference in hazard identification order, and time to hazard identification.
**Background**: The proliferation of Unmanned Aerial Vehicles (UAV) technology has the potential to fundamentally change the situational awareness of incident commanders, allowing greater safety to first responders. Most studies of this technology have been descriptive in nature.
**Methods**: A randomized, controlled study was conducted with twenty-one students in their first year of a Primary Care

Provider (PCP) program. They were randomized into either a UAV group or a non UAV group. The study scenario was based on a highway accident involving ten vehicles with seven hazards. Each group was given a 60 minute lecture on UAV technology, and a 30 minute lecture on hazards. Each subject entered the scene after receiving a brief narrative. Having been informed that there were 7 hazards to be identified, the UAV group remained at the UAV ground station while the non UAV group was able to approach the scene. After identifying all hazards, the time to identification and order was recorded. Primary outcome measures were the difference in time to identification, and difference in identification order.

**Results**: The mean time (SD, range) to identify the hazards were 3'68" (1.62, 1'48"-6'48") and 2'43" (0.92, 1'43"-4'38") in UAV and non UAV groups respectively, corresponding to a mean difference of 58" (P = 0.11). A non parametric permutation test showed a significant (P = 0.04) difference in the hazard identification order driven by two hazards, fuel and workplace hazardous material information system placard.

**Conclusion**: This study demonstrated that there is a statistical difference in the identification order of hazards. Interestingly, preliminary results were unable to identify a difference in time to hazard identification.

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## Developing the Chemical Information System Requiring Emergency Medical Information in Disaster

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**Study/Objective**: The study objective is to make the basis of a chemical emergency medical information system.

**Background**: There are many database sets and websites which provide chemical databases in chemical accidents, but they don't have adequate roles for emergency medical support in Korea.

**Methods**: We reviewed the database sets and websites, which provide chemical database and emergency medical records in prehospital transport to hospitals. After an analysis was done, an adequate database set was proposed, and the algorithm for elicitation of chemicals suitable for emergency medical support, accident cases.

**Results**: By four steps of elicitation of chemicals, the number of chemicals of more than 100,000 was decreased to less than 1,000. The standard steps were accident preparedness, toxicity, and circulating amounts. We made an algorithm for the elicitation of chemicals.

**Conclusion**: When mass exposure by toxic chemical occurs, chemical emergency medical information systems will be helpful for acute identification of chemical and emergency medical response.

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## Thailand's Hospital Awareness in Emergency and Disaster Preparedness (THAI-EDP) Study: A National Survey

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**Study/Objective**: To determine the nationwide current status of hospital awareness in emergency and disaster preparedness.

**Background**: Hospital awareness and preparedness is the cornerstone for community health management in emergency and disaster as it plays a critical role in taking care of injured patients. To assess the current system is the first necessary step to improve hospital readiness for emergency and disaster.

**Methods**: A questionnaire was distributed to every provincial, general, and university hospital in Thailand. The data were extracted and reported as number and percentage. Single logistic regression analysis was used to identify factors related to hospital preparedness. Values were significant when $P < .05$.

**Results**: The questionnaire response rate was 112/119 (94%) from hospitals in every province of Thailand. Forty-four percent of the hospitals were general hospitals and 10% were academic hospitals. Only 50% of the hospitals had full-time emergency physicians. Most of the hospitals had risk assessment activities and moderate risk for disaster. An emergency management committee was set up in over 95% of the hospitals while 56% had regularly meetings. Most hospitals had an emergency management plan and sub-plan, an incident command system, triage system, hospital map, communication and staff callback system, mass-casualty incident training, and adequate personal protective equipment. Nearly 60% of the hospitals had a decontamination area and a negative pressure room for patients who are contaminated and have communicable diseases. Hospital preparedness was related to regular meetings of the emergency management committee (P = .005).

**Conclusion**: Most Thai hospitals are aware of emergency and disaster preparedness, while preparedness of chemical and communicable disease needs to be improved. A regular meeting of an emergency management committee is a predicting factor for hospital preparedness.

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## Being Aware of the Situation: Situational Awareness in the Emergency Department

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**Study/Objective**: To outline the application and benefits of Situational Awareness in the Emergency department. To show the basic aspects of Situational Awareness that can be applied in Emergency care.

**Background**: Awareness is an important concept arising in medical care. It has been a widely applied concept in aviation and military circles. Awareness is simply Knowing, being aware. Knowing what is going on around you and applying that knowledge in any situation until it becomes second nature; when you can immediately know the important aspects of the situation, and what will lead to life or limb threatening events.
**Methods**: To highlight the concepts key to Situational awareness; Normal, Change, Distractions, Bias, Target lock. Translating how training in these concepts improves outcomes. Defining the key concepts, understanding them and presenting exercises to assess the Emergency physicians grasp of the concepts.
**Results**: Projecting the gains this training has had in military and aviation, where it has improved the effectiveness of teams and outcomes of events. Leaders have been able to observe events as they unfold, identify the key aspects that would threaten outcome or prove fatal. It enables them to see changes in the progress of events and how numerous factors influence outcome. It shows the disadvantage of bias in any situation, and how focusing only on a small part of the bigger picture can be a problem.
**Conclusion**: The application of Situational awareness in emergency medicine and patient care, would optimize patient care and identify early changes or events that could be life or limb threatening. It consciously puts the emergency physician in a position to identify information and changes, which when acted upon early can improve patient outcome.

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## Challenges for Cross-Jurisdictional Interoperability by Web-Based Situational Awareness System (SAS), Japan

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**Study/Objective**: The objective of this study is to analyze the regional response capability change in Hyogo prefecture for 3 years.
**Background**: A major incident necessary for the cross-jurisdictional response is rare. But, we experienced such an incident 3 years ago with neighboring Kyoto-prefecture. Our Hyogo-prefecture has been developing the web-based SAS, similar to the Hyogo-prefecture Emergency Medical Information System (HEMIS) for data communications.
**Methods**: Adding to our response record, we investigated the response records on site and questioned the stakeholders of the Explosion in Kyoto/Fukuchiyama. From lessons learned, we investigated the web-based EMISs in each prefecture.
**Results**: An outline of the Explosion in Kyoto/Fukuchiyama is as follows: 45 Burn patients were transferred to the only critical care center, and 59 burn patients were sent to 3 hospitals in this area, within 66 minutes. There were 5 medical teams from three prefectures dispatched to the hospital. HEMIS could easily reveal that the 11 hospitals could receive 19 severe patients, and was enabled to share the information with all stakeholders. Finally, 9 among 16 severe burn patients were transported to Hyogo-prefecture, and 3 were to Osaka for further intensive treatments. As for starting prompt medical responses across the jurisdictions, voice communications are necessary, and those now depend on Drs' personal performance. Communications among local governments should be facilitated by principal disaster hub-hospitals in each jurisdiction. Web-based SAS is necessary for cooperation between medical and Fire/Ambulance agencies, but it is developing independently in each jurisdiction, and the national EMIS have no function. To fill the gaps, 6 jurisdictions in KINKI Region swapped each ID/Password for the systems login. We applied this framework to the contingency plan of an airport.
**Conclusion**: The cross-jurisdictional interoperability is a challenge to improve our response capability. Gaps of governance and technology should be filled by daily training and exercises among multi-agency or jurisdictions.

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## Situation Display for the EMS Dispatch Team during Multi-Casualty Incident Management

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**Study/Objective**: Design and test a situation display for EMS dispatch
**Background**: Effective management of multi-casualty incidents requires rapid, tight, yet flexible coordination among members of the EMS dispatch to assist in managing ambulances and hospitals. Cognitive processes such as situational awareness, communication, and decision-making are critical for effective teamwork. Shared situation displays can facilitate effective situational awareness and decision-making. This paper introduces the user-centered design and preliminary testing of a situation display for the EMS dispatch during multi-casualty incident.
**Methods**: User research included: 1) Review and analyses of procedures and incident reports; 2) Interviews with experienced EMS dispatch personnel; 3) Observations of routine work in the dispatch center. Task analysis and operational flow diagrams identified the cognitive aspects of various tasks such as, situational awareness, dynamic decision making, and teamwork processes. The analysis uncovered the need to have information integrated to support the team. The conceptual design of the display consists of four primary areas: 1) Movement of ambulances to the incident site; 2) The incident site; 3) Evacuation from the site to hospitals; and 4) Routine operations. Details include amount and locations of ambulances to the site or from the site to hospitals, casualties on site,

hospitals' capacities, and tasks performed in the dispatch center and on site. Preliminary testing of the display included running a multi-casualty incident scenario, during which participants responded to situational awareness and decision-making probes presented to them.

**Results**: The findings show that various elements in the display, increased significantly the rate of correct responses to the situation awareness and decision making probes.

**Conclusion**: The situation display includes integrated elements that support situational awareness, predictive thinking, natural decision-making, and team transactive memory systems during the management of a multi-casualty incident. Implementing such a display in the dispatch center can thus facilitate effective teamwork and improve the incident management.

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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## A National Survey of Emergency Departments Triage Systems in Thailand

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**Study/Objective**: A National Survey of Emergency Departments Triage Systems in Thailand. The aim of this study is to assess the current status and illustrate the problems of the Thailand Emergency Department triage systems.
**Background**: Because the volume of patient admissions to an Emergency Department (ED) cannot be precisely planned, the available resources may become overwhelmed at times, "crowding," with resulting risks for patient safety.
**Methods**: A cross-sectional, descriptive study design. The participants were 178 registered nurses working in emergency departments within the Unitary Care Hospitals of the Ministry of Public Health and University Hospitals. The research instruments were: personal information, a survey questionnaire, and structured interview questions. The data were analyzed using Chi-square test, Fisher Exact Probability Test, and content analysis.
**Results**: Almost all hospitals have a triage zone (87.9%) where the assignment was mainly done by a nurse (98.3%). In order to assess and identify the priority of the patient's need for medical treatment, most hospitals (75.8%) use the Emergency Severity Index (ESI) approach to classify patients into five levels with different colors. Following the ESI approach, some hospitals (15.2%) may also classify the triage into three, fpur, or five levels with different conventional classifications, both symbols and colors. When inspecting the triage system of the emergency department services, the triage system in regions were significantly different ($P < .05$). The difference in the staff knowledge and experience influences the triage quality; both under and over triages were observed among experienced nurses and related health care personnel.
**Conclusion**: It is recommended that the ESI approach should be announced as the national policy by National Institute of Emergency Medicine. This approach should be clearly identified and promoted to use for patient triage. Quality improvement projects, as well as evaluative research, are recommended to strengthen the quality of triage among nurses in the emergency room.

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## Do Physicians Triage Patients more Reliably than Nurses in the Emergency Departments? A Meta-analysis

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**Study/Objective**: The aim of this study is to compare, meta-analytically, the inter-reliability of physicians and nurses triage decisions in the emergency departments (EDs).
**Background**: Few studies compared effectiveness of physicians and nurses triage decisions in the emergency departments. It's not clear whether physicians triage patients more reliably than nurses in EDs.
**Methods**: Electronic databases were searched up until March 1, 2014. Studies were only included if they had reported sample sizes, reliability coefficients, and adequate description of the reliability assessment. The Guidelines for Reporting Reliability and Agreement Studies (GRRAS) were used. Two reviewers independently examined abstracts and extracted data. The effect size was obtained by the *z*-transformation of reliability coefficients. Data were pooled with random-effects models, and meta-regression was performed based on the method of moments estimator.
**Results**: Thirty studies were included. The pooled coefficient for the physicians, nurses, and experts were 0.770, 0.733, and 0.944, respectively. Agreement was fairly higher for the homogenous raters, in comparison with heterogeneous raters (0.770 vs 0.765).
**Conclusion**: The physicians and nurses showed a substantial level of overall reliability in the emergency departments. However, physicians showed higher agreement than nurses; the difference is not significant.

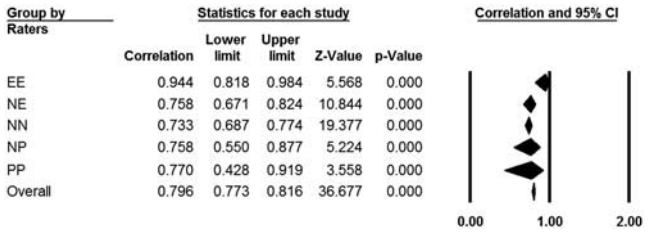


**Figure 1.** The pooled coefficients estimates of triage reliability coefficients based on ED raters. EE: expert-expert, NE: nurse-expert, NN: nurse-nurse, NP: nurse-physician, PP: physician-physician.

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## Diagnostic Accuracy of The Kampala Trauma Score using Estimated Abbreviated Injury Scale Scores and Physician Opinion

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**Study/Objective**: To determine the diagnostic accuracy of the Kampala Trauma Score in predicting Emergency Department outcomes in a limited diagnostics setting.

**Background**: The Kampala Trauma Score (KTS) has been proposed as a triage tool for use in low- and middle-income countries (LMICs). This study aimed to examine the diagnostic accuracy of KTS in predicting emergency department (ED) outcomes, using timely injury estimation with Abbreviated Injury Scale (AIS) score, and physician opinion (PO).

**Methods**: This was a diagnostic accuracy study of KTS among injured patients presenting to Komfo Anokye Teaching Hospital, Ghana. The South African Triage Scale (SATS), KTS and Revised Trauma Score (RTS) variables, PO quantifying serious injuries, and ED disposition were collected. Agreement between estimated AIS score and PO were analyzed with normal, linear weighted, and maximum kappa. Additionally, receiver operating characteristic (ROC) analysis of KTS-AIS and KTS-PO was performed.

**Results**: A total of 1,053 patients were sampled. There was moderate agreement between AIS criteria and PO by normal ($\kappa = 0.41$), weighted ($\kappa_{lin} = 0.47$), and maximum ($\kappa_{max} = 0.53$) kappa. ED mortality ROC area for KTS-AIS was 0.93 (95% CI: 0.87-0.98), KTS-PO 0.89 (95%CI 0.78-1.00), SATS 0.88 (95%CI 0.79-0.97), and RTS 0.84 (95%CI 0.72-0.96). Hospital admission ROC area for KTS-AIS was 0.73 (95%CI 0.70-0.76), KTS-PO 0.79 (95%CI 0.76-0.82), SATS 0.71 (95%CI 0.68-0.74), and RTS 0.56 (95%CI 0.54-0.58).

**Conclusion**: KTS predicted mortality and need for admission from the ED very well when early estimation of the number of serious injuries was used, regardless of method (ie, AIS criteria or physician opinion). This study provides evidence for KTS to be used as a practical and valid triage tool to predict prognosis, ED outcomes, and inform referral decision making from first- or second-level hospitals in LMICs.

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## Comparison of Six Disaster Triage Methods using the Wenchuan Earthquake Victim Database

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**Study/Objective**: A variety of disaster triage methods have been used in mass-casualty events. But most of them were only based on expert opinion. The study objective was to determine the accuracy of several disaster triage methods when predicting clinically important outcomes in the trauma victims of the Wenchuan Earthquake.

**Background**: To date, researchers have built a lot of triage methods, such as Simple Triage and Rapid Treatment (START), Triage Sieve, CareFlight, Revised Trauma Score (RTS), Sacco Score, Unadjusted Sacco Score, and so on. However, most triage methods have been based on expert opinion with limited evidence.

**Methods**: Trauma victims from the Wenchuan Earthquake Victim Database were assigned triage levels, using each of six disaster triage methods: Simple Triage and Rapid Treatment (START), SIEVE, CareFlight, Revised Trauma Score (RTS), Sacco Score, and Unadjusted Sacco Score. Methods for approximating triage systems were vetted by subject matter experts. Triage assignments were compared against mortality at discharge with area under the receiver operator curve. Secondary outcomes included death in the emergency department and ICU (intensive care unit) admission.

**Results**: In this study, 26,519 records were included. The Sacco Score predicted mortality most accurately, with area under the receiver operator curve of 0.825 (95% confidence interval 0.780 to 0.893). RTS and CareFlight was as accurate as START.

**Conclusion**: Among six disaster triage methods compared against actual outcomes in trauma registry patients, the Sacco Score predicted mortality at discharge most accurately. This analysis highlighted comparative strengths and weakness of START, SIEVE, CareFlight, RTS, Sacco Score, and Unadjusted Sacco Score, suggesting areas in which each might be improved.

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## Mass-Casualty Events: How do we Ensure an Efficient and Effective Response?

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**Study/Objective**: This case study evaluates the challenges experienced by first responders to a mass casualty incident where triage processes were flawed. The analysis highlights the importance of sound triage practice, and the significance of continuing professional development in a mass casualty event.

**Background**: In May 2005, six Canadians lost their lives and 21 people were injured, following a bus accident outside Edmonton, Alberta. Passengers were oilfield workers travelling to Edmonton from Fort McMurray, Alberta. Four passengers were confirmed dead on scene and subsequently, two others died in hospital. Consequently, analysis of the multi casualty incident revealed that although scene command and control was efficient and effective, accurate triage was inadequate.

**Methods**: A first-person case study analysis of a 2005, Greyhound bus accident, which occurred near Edmonton, Alberta, Canada, was analyzed.
**Results**: Achieving success and organization of a catastrophic event or natural disaster requires the recognition of the importance of scene control and command, accurate triage and the assurance of destination resource capacity. Multi casualty events are rare, and due to sparse exposure, first responders have limited experience to manage these events effectively. Mass casualty exercises are generally used, although no standardized method exists to evaluate their function and effectiveness. Accurate and timely information are essential in successful multi-casualty events; however, inexperience and limitations often lead to ineffective and inaccurate triage, treatment and transportation of patients.
**Conclusion**: To ensure efficient and effective mass casualty response, future research should focus on adequate professional development programs for first responders. In addition, tools and instruments to aid in successful multi-casualty events would be an asset in achieving success.
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## Comparison of the Predictive Value of Four Burn Scores for Death Risk in Burns Patients in Emergency Departments

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**Study/Objective**: To evaluate the predictive value of Modified Burn Score (MBS), Abbreviated Burn Severity Index (ABSI), Belgian Outcome in Burn Injury (BOBI), and Injury Severity Score (ISS) for death risk in adult patients with severe thermal burns.
**Background**: Severe burn patients have high mortality. Accurate prediction of the risk of death in patients with severe burn, contributed to objectively assess the disease, to help clinicians with better clinical decision-making and rational allocation of medical resources. At present, there is a variety of scores on the risk of mortality in burn patients. However there are still, few studies on the prediction of the risk of death in adults with severe thermal burns.
**Methods**: Retrospectively analyzed data of patients in West China Hospital from 2012 to 2014. The patient's name, gender, age, burn area, and whether complicated with inhalation injury were recorded; and the ISS, MBS, ABSI and BOBI score were calculated. Through drawing Receiver Operating Characteristic curve (ROC curve), the area under the curve of the four scores Area Under Curve (AUC), and the sensitivity and specificity for death prediction were obtained. Based on the sensitivity and specificity for death risk prediction, the Youden index was calculated, the best cutoff value was found, and the best score of death risk prediction for adult patients with severe thermal burn was selected.
**Results**: There were 85 adult patients with severe thermal burn that were included, with 49 males and 36 females. The AUC of ABSI, MBS, BOBI and ISS were 0.925, 0.825, 0.813, 0.715.
**Conclusion**: ABSI has the best value for the death risk in severe thermal burns adult patients.
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## New Triage System: Using Digitized Information Entered via a Digital Pen

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**Study/Objective**: We examined the capability of this new triage system, using digitized information entered via a digital pen, as an information tool in times of disaster.
**Background**: Triage is important in deciding the priority of treatment for many patients injured by disaster. Because the patient's information entered on triage tags and the chronologic list made in each section are done by hand, the process is complicated and accuracy and rapidity cannot be guaranteed. We have created a new triage tag using the Anoto Live Digital Pen (Anoto K.K., Tokyo, Japan).
**Methods**: The new triage tag uses a check box form as much as possible to reduce readout errors. Furthermore, we developed the system to collect digitized triage information and format the collected data as a chronologic list. We divided the triage data into three categories: check box, numerical characters, and letter characters. We demonstrated this new system during disaster training with simulated patients and assessed whether each category was exactly recognized as digital data.
**Results**: We were able to collect data from 22 simulated patients. The simulated patient information entered on the handwritten triage tag was quickly digitized, and a chronologic list could be made. Assessment of the accuracy of the digitized data for each category was as follows: check box, 100.0% (correct number/total number = 127/127); numerical characters, 71.8% (102/142); and letter characters 51.1% (47/92). The errors in the letter characters were almost exclusively confined to content written in Chinese characters.
**Conclusion**: This new triage system using digitized information entered via digital pen has some problems with the recognition of letter and numerical characters. However, this system, almost exactly, digitized the data and may be a useful device during times of disaster in the future.
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## Computer Versus Manual Triage in a Live Disaster Simulation

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**Study/Objective**: To compare the use of computerized versus paper-based "Simple Triage and Rapid Treatment" triage in disaster simulations.
**Background**: Efficient and accurate triage during mass casualty incidents is a critical step of disaster response. Traditionally, triage

has been manually performed using paper cards, yet new digital technologies claim to be more efficient.
**Methods**: This prospective observational cross-over study was performed during a live disaster simulation at an urban level 1 trauma center. Healthcare providers (two doctors, two paramedics, and two nurses) each triaged a total of thirty simulated patients, half using paper-based (manual) and half using computer-based (electronic) triage. Speed and accuracy of triage using both methods was measured. Following the exercise, simulated patients and participating health care providers completed a feedback form.
**Results**: There were no significant differences in triage times (seconds) between manual and electronic methods by doctors ($10.3 \pm 7.2$ vs $15.3 \pm 8.0$, respectively) and nurses ($12.8 \pm 9.8$ vs $11.2 \pm 7.2$), whereas the manual method was faster for paramedics ($11.1 \pm 7.2$ vs $21.5 \pm 7.6$, $p < 0.001$). However, after accounting for extra actions required using the manual method, adjusted triage times for doctors ($21.4 \pm 7.8$) and nurses ($24.0 \pm 9.9$) were significantly longer using manual compared to the electronic method ($p < 0.001$). Triage accuracy was similar ($p = 0.70$) between manual (72/90, 80%) and electronic (75/90, 83%). The electronic method was preferred by 4 out of 6 (67%) healthcare providers, while almost half (14/30, 47%) of patients had no preference. While patients commonly perceived the computer method as "less personal" they also perceived it as "better organized".
**Conclusion**: This study suggests that computer triage may be the most efficient triage tool for healthcare providers familiar with the technology. Further studies are required to assess the performance of electronic hospital triage in the context of a rapid patient surge and limited computer availability. We present a framework for assessing the accuracy, efficiency and feasibility of digital technologies in live disaster simulations.
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## Evaluation of Mass Casualty Triage Algorithms in a Pediatric Population

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**Study/Objective**: This study compared the effectiveness and accuracy of five MCT algorithms in a surrogate pediatric trauma population at a tertiary care children's hospital emergency department.
**Background**: In disasters, first responders use Mass Casualty Triage (MCT) algorithms to assess victims and direct efforts to provide the greatest good for the greatest number of victims. Several algorithms exist; few were designed for application in pediatric victims.
**Methods**: An observational, single cohort study with prospective and retrospective data collection was employed. Using a standard observation sheet, prospective data were collected on a convenience sample of pediatric patients with trauma activation levels from one to three, with one being identified as the most severely injured. Trained observers recorded physiologic and treatment observations on injured patients. An MCT category was determined using each of the five algorithms. After the patient's completed electronic medical record was available, a second reviewer retrospectively determined the patient's MCT category based on a gold standard definition; a standard that uses clinical outcomes to assign a MCT category. The prospective and retrospective categories across the five algorithms were then compared.
**Results**: The results of this study demonstrate that when existing MCT algorithms are applied to a pediatric trauma population, as if they were disaster victims, they are inconsistent. The algorithms were more accurate for Priority 2 and 3 traumas. JumpSTART, CareFlight, and Triage Sieve assignments were similar and were more accurate than START and SALT. SALT was the least accurate algorithm overall.
**Conclusion**: A larger sample size is needed to potentially capture a more injured population and a greater variety of patients. Additional research is needed to increase the number of major traumas included, and to increase the sample size overall. The results of this study demonstrate a potential deficit in the algorithm's effectiveness of categorizing pediatric patients in a mass-casualty event.
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## Trilogie Pilot Study - Assessing the Efficacy of a Triage Sieve Educational Intervention using Non-medical Emergency Service Providers

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**Study/Objective**: The key objective of this pilot study was to determine if a standardised educational intervention would provide non-medical emergency service personnel with enough knowledge to accurately complete a triage sieve questionnaire. A secondary objective was to assess the suitability of a previously utilized triage sieve questionnaire for use with non-medical emergency services.
**Background**: Non-medical emergency services may be first on scene of a Mass-Casualty Incident (MCI); however, they are not currently trained to undertake primary triage (triage sieve).
**Methods**: Non-medical participants from the Country Fire Service were recruited for this study. All participants completed a triage sieve questionnaire prior to receiving the same standardised educational intervention. Participants were then divided into two groups to repeat the triage sieve questionnaire. One group was provided with an aide-memoire currently used by SA Ambulance Service while the other group received no decision making assistance.
**Results**: Current accepted triage accuracy rates are 5% under- and 50% over-triage. Pre-educational intervention results showed accuracy rates of 65.8% for under-triage and 50.7% for over-triage. Post-educational intervention achieved accuracy rates of 2.0% for under-triage (using an aide-memoir) and 9.2% (without an aide-memoir); conversely, the group without an aide-memoir achieved a lower over-triage accuracy accuracy rate than those who used an aide-memoir (8.4% versus 9.5%, respectively). As the improvement in under-triage rate from this study was similar,

Kilner suggests the educational intervention and triage sieve questionnaire are suitable for training non-medical emergency services.
**Conclusion**: This pilot study supports the hypothesis that the provision of training and an aide-memoir to volunteer nonmedical fire service personnel in South Australia will enable them to perform a triage sieve as effectively as volunteer emergency ambulance service personnel. While it has identified methodological changes to the parent study, it also suggests that this approach has the clear potential to improve casualty outcomes at a MCI.

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## Knowledge of the START Triage Method by Physicians and Nurses in a Tertiary Care Teaching Hospital

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**Study/Objective**: To evaluate knowledge of the START triage method by physicians and nurses in a tertiary care teaching hospital.
**Background**: The Centre Hospitalier de l'Université de Montréal is a large tertiary care teaching environment without the designation of "trauma center." A recent online survey (PHARE project) conducted among the CHUM community, revealed that physicians are insufficiently trained in both basic and specific emergency measures.
**Methods**: In order to evaluate hospital disaster readiness, an online study was conducted among the entire CHUM community. Within this survey, we evaluated knowledge of the Simple Triage and Rapid Treatment (START) method, (11 questions) among physicians (ER and ICU) and nurses (ER) at our institution. The online survey was conducted on a volunteer basis between September 13 and October 2, 2016. Completed questionnaires were included in the analysis.
**Results**: Overall, 65% of ER physicians, 80% of ICU physicians and 29% of ER nurses participated in the study. The START method of triage was known by 30% of physicians and 47% of ER nurses; among them 50% of physicians compared to 89% of nurses received training to use this triage method. Among participants, 32% of ER physicians, 44% of ICU physicians and 46% of ER nurses received specific training in massive patient arrival (code orange), while 16% of ER physicians, 38% of ICU physicians and 14% of ER nurses had participated in a disaster simulation exercise. Overall, the level of knowledge (68% of correct answers on average) of the START triage method was not aligned with perception of knowledge among physicians and nurses.
**Conclusion**: The PHARE project revealed that ER physicians, ICU physicians and ER nurses at the CHUM are insufficiently trained to adequately use the START triage method in disaster situations. Efforts in the future will be directed toward developing disaster triage exercises for key personnel at our institution.

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## Comparison of the Application Value of Three Evaluation Systems for Triage in Burned Patients

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**Study/Objective**: To investigate the application value of Simple Triage and Rapid Treatment (START), Modified Baux Score (MBS) and Ryan model for triage in patients with burn injuries.
**Background**: Burn injury is common around the world. Simple and accurate triage methods or scores are certainly important for victims after a disaster, which also can be utilized to predict the mortality of patients with burn injuries.
**Methods**: Case notes of all patients with burn injuries admitted to emergency department of West China Hospital from March 2012 to July 2014 were retrospectively reviewed. START, MBS and Ryan models were computed for classification of the severity degree with related indexes (gender, age, length of stay, GCS score, blood pressure, heart rate, respiratory frequency, hemoglobin concentration, potassium concentration, burn surface area and inhalational injury, etc). The Receiver Operating Curves (ROC) were made for each evaluation system and analyzed for correlation with mortality, and Z-Test was utilized to distinct the area under curve (AUC) made respectively with START, MBS and Ryan model.
**Results**: There were 352 patients (median age 22.07 years, 66.19% males, 33.81% females ) was included. There were 14 patients who died in hospital while 338 survived to discharge. The AUC of START, MBS and Ryan model were 0.557, 0.923 and 0.856 respectively. AUCs of MBS and Ryan model have significant differences with that of START ($P < 0.05$), while there was no significant differences between MBS and Ryan model ($P = 0.152$).
**Conclusion**: MBS and Ryan model performed better than START on burn injury triage. However, MBS might be used more widely because of its simpleness.

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## Identifying Vulnerable Persons in the Community using Standard Clinical Assessment Data

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**Study/Objective**: Development of decision support algorithms to identify highly vulnerable home care clients during emergencies and disasters by using the Resident Assessment Instrument for Home Care (RAI-HC).
**Background**: Several studies have shown the increased vulnerability and disproportionate mortality rate among frail, community-dwelling, older adults as a result of disasters. Parallel to an escalating number of disasters, Canada is faced with an aging demographic and a policy shift emphasizing aging at home. This results in a greater vulnerability of this group of high-needs, community-dwelling individuals to the effects of events that lead to interruption of home health care services and/or displacement.

Despite the growing vulnerability, it has proven to be difficult to identify the most vulnerable persons.
**Methods**: Data used for the analysis comes from the RAI-HC database in Ontario (n = 275,854). Data links were made between the RhAI-HC data and the 2013 hydro outage data (n = 10,748). The results were compared to non-exposed client data (n = 12,072). Methods used included frequency tabulation, bivariate and multivariate logistic regression, as well as Kaplan-Meier survival plotting and Cox proportional hazards ratios.
**Results**: The study led to the development of the Vulnerable Persons at Risk (VPR) and VPR Plus algorithms. These algorithms were highly predictive of mortality, LTC admission, and hospitalization. To test the ability and identify those most vulnerable, home care clients during disasters, the algorithms were applied to home care clients exposed and not exposed to the 2013 hydro outage. This analysis showed that exposed high-risk clients, identified by the VPR and VPR Plus, were more likely to die and to be admitted to LTC than non-exposed high-risk clients.
**Conclusion**: The analysis has shown the usefulness of information collected, as routine clinical practice, using inter-RAI assessment instruments during emergencies and disasters. The analysis further showed that the VPR/VPR Plus are valid and reliable algorithms.
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## Analyzing the Emergency Triage Logbook Components of Road Traffic Accident Victims at AaBET Hospital in Addis Ababa, Ethiopia

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**Study/Objective**: To analyze demographic, clinical, and referral characteristics of patients presenting after Road Traffic Accidents (RTA) to Addis Ababa Burn, Emergency and Trauma (AaBET) Hospital (Addis Ababa, Ethiopia) over a seven month period.
**Background**: Within Africa, Ethiopia has among the highest burden of RTA. The country loses around 3,000 people from RTA annually. Nevertheless, there remains limited data on RTA victims presenting to urban Emergency Departments (EDs) in Ethiopia.
**Methods**: We conducted a retrospective chart review of all patients presenting after RTA at AaBET Hospital, from August 18, 2015 to March 9, 2016. Selected patient variables from ED triage logbooks were entered into Microsoft Excel and analyzed using SPSS version 21.
**Results**: During the study period, AaBET Hospital saw 662 RTA victims, comprising 32.1% of all trauma-related patients. Median age was 27 years. Using South African Triage Scale triage color categories, most patients were assigned lower triage acuity, with 289 (43.7%) patients assigned as Green and 273 (41.2%) patients assigned as Yellow. Of Green (lower acuity) victims (n = 289), the majority (54.3%) were referred from health institutions. Among those referred from health institutions (n = 408), 164 (40.2%) were referred without communication to the receiving facility. RTA patients coming from the scene were significantly less likely to arrive by ambulance [Adjusted OR = 0.3 (95%CI: 0.21-0.43)] as compared to those who were referred from health institutions.
**Conclusion**: In Addis Ababa, many patients being referred to a specialized trauma hospital after RTA have low triage acuity. Nevertheless, these referrals place highest demand on limited ambulance services, and often occur without clear communication between facilities. Strengthening primary health institutions to manage low-acuity RTA victims without referral may decrease strain on pre-hospital transport and trauma center resources, which may instead be directed toward RTA patients from the scene, and those suffering from more critical injuries.
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## Controlled Undertriage - Hazard or Benefit at Overcrowded Emergency Departments (EDs)?

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**Study/Objective**: To verify if modification of the Emergency Severity Index (ESI) allows safe triage, when an increased patient influx, overflows available resources.
**Background**: Extrapolating (after: Fullam C), the ED of the University Hospital in Cracow, nurse staffing needs is covered at 90% without administration. Staff reports that the influx is a threat to those who are in serious condition, paying particular attention to patients appearing despite, not requiring an emergency service.
**Methods**: For routine triage the ESI was modified by the council of emergency medicine specialists. Wait time for acuity levels was recommended. Modifications in acuity levels were: pain and inaccurate danger zone vitals – level 3, many resources needed but accurate danger zone vitals – level 4, chronic disease (no exacerbation) or old injury (excluding head and chest) – level 5. Analyzing patients flow between January 12, 2015-March 31, 2016, caring participant observation authors measured: patients' number, assigned acuity level (1-5), deaths, final decision on further hospitalization and real wait time.
**Results**: A total number of patients was 15,077. Detailed results are shown in table 1.
**Conclusion**: Level 3 patients are the most vulnerable. Their wait time may exceed recommendations, while it should decrease. Since 1, 2 and 3 acuity level patients represent only 21% from the studied population, it is possible to shorten the 1.5 hour wait time. It shall be implemented, even by delaying level 4 – those who are not at risk of death. It is necessary to increase staffing, also to implement system solutions.

| Acuity level | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Triage color | Red | Orange | Yellow | Green | Blue |
| Recommended wait time | 0 min | 15 min | 1.5 hour | 4 hours | 12 hours |
| Was the recommended time exceeded? | No | No | Yes | Yes | Yes |
| Did death occure? | Yes | Yes | Yes | No | No |
| Visits by acuity level | 0.56% | 2.57% | 17.84% | 73.29% | 5.74% |
| Hospitalization by acuity level | 100% | 76.49% | 43.1% | 14.35% | 2.08% |

**Table 1**. The ESI modification in practice.

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## The Relevant Factors of the Early Prognosis and the Need of Intensive Medical Resources of Patients with Multiple Injuries

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**Study/Objective**: To estimate the early prognosis and evaluate the need of intensive medical resources of patients with multiple injuries.
**Background**: A large amount of research and clinical practice indicates that the multiple injuries are urgent and the illness change of a patient's condition is rapid, which leads to the a high mortality rate. We can take some early and effective methods of triage to make patients receive timely, effective treatment, thus to reduce the mortality rate. In that case, we need some early and effective indicators of triage.
**Methods**: We recruited 115 patients with multiple injuries admitted to emergency department of West China Hospital, Sichuan University between March 2016 and May 2016 and collected 19 clinical indicators from each patient. The indicators included gender, age, temperature, heart rate, respiratory rate, peripheral oxygen saturation, systolic pressure, diastolic pressure, power of hydrogen (PH), hemoglobin, base excess (BE), serum potassium, serum sodium, serum calcium, lactic acid, glucose, partial pressure of oxygen (PO2), carbon dioxide partial pressure (PCO2), and peritoneal effusion. We analyzed the correlation of these indicators with deaths within the first 24 hours, emergency surgery, admissions to intensive care unit (ICU), and length of ICU stay through the method of a rank sum test and logistic regression with SPSS 19.0.
**Results**: The results showed that the possibility of death (A) could be expressed as: A = -0.276*BE(mmol), -3.005*T(°C)-0.073*PO2 (mmHg) 110.843 and the need of admissions to intensive care unit (B) as: B = 1.007* peritoneal effusion + 0.140* glucose (mmol/L) - 3.224.
**Conclusion**: BE, T, PO2 may be useful in early forecasting the prognosis of patients with multiple injuries; glucose and peritoneal effusion can evaluate if the patient needs the intensive medical resources.

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## Validation of CRISTO as a Triage Tool in Emergencies and Disasters

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**Study/Objective**: Our objective was to validate CRISTO (C: Walking; R: Respiratory failure; I: Unconscious/neurological impairment; S: Bleeding/Shock; T: Complex trauma/ Behavioral disorder; O: Others), as a method to be applied in victim classification, as well as in the comparison of efficiency and execution time regarding the Standardized Testing and Reporting (STAR) method.
**Background**: In April 2016, Ecuador suffered an earthquake which caused 671 deaths and left 8,690 people homeless. This event tested the capacity of response and the implementation of protocols, including triage in the country. START is a validated and widely used method for victim classification; however, the average evaluation time it has, among other things, has made us question its effectiveness in major disasters like this one.
**Methods**: This is a descriptive and comparative study of two triage methods. A total of 12 simulated patients were evaluated by 10 First Response Teams during a disaster simulation exercise; five for each triage method, selected by drawing lots. Triage was carried out by Technologists in Medical Emergencies, or Medical Doctors with training in both methods and previous experience in each procedure. The simulation patients were 1 black, 4 red, 3 yellow and 4 green. We compared sorting efficiency and evaluation time for each method.
**Results**: The percentage of positive answers with CRISTO was 85%, and with START was 73.3% ($p = 0.21$); nevertheless, when we evaluated triage time, CRISTO (10.8 sec.) was faster than START (9.5 sec.), $p = 0.025$.
**Conclusion**: In conclusion, CRISTO is a reliable and fast method of triage, ensuring greater patient care during large events with multiple victims.

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## The Use of the Mobile Information and Communication Technologies in Mass-Casualty Incident and Disaster Management - A Medical Triage System

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**Study/Objective**: Worldwide, Mobile Information and Communication Technologies (ICT) have been used in prehospital emergency care and emergency and disaster medicine. In Poland, the use of ICT in routine emergency practice does not raise any concerns, but special application used in mass-casualty incidents and disasters is still being discussed.
**Background**: The development of "intelligent" Command Support System (CSS) for Emergency and Disaster Medicine is the aim of this study. The problem of the correct allocation of

the injured in hospitals after mass-casualty incidents and disasters is what we want to solve during this study.
**Methods**: The study was based on the analysis of the local EMS database and simulations of mass-casualty incidents (MCI) during "sand table drill." We compared a management model with and without ICT support. The study measured the following aspects: the triage on site, the decision-making model, the effectiveness of EMS (response time and appropriate management medical staff), the information flow to/from the command and control center, the criteria deciding on a patient transport model, and allocation in hospitals.
**Results**: The ICT monitoring emergency medical care has proved greater effectiveness of decision making with the ICT support than the traditional one. Moreover, ICT allows to take decisions that could not be taken within the traditional model due to the lack of current feedback from the incident analysis and hospital database. The ICT provides new management possibilities during MCI and disasters.
**Conclusion**: The use of ICT in disaster management improves the efficiency of the allocation of the injured in hospitals. The results allow to define new directions for development of intelligent Command Support Systems for emergency and disaster management.
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## Results of Lectures and Training on Two Methods of Disaster Triage for Local Residents who are not Medical Personnel

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**Study/Objective**: To compare the results of lectures and training on two methods of disaster triage, START (ST) and SALT Step 1 (S1) for local residents.
**Background**: In the Nerima-ward, if a major earthquake occurs, medical personnel are on duty to initiate triage at the regional first-aid station. However, the process is expected to face delays because they often reside outside the ward. To avoid mass confusion, the emergency plan calls for local residents to carry out triage. For a decade, they have received only an annual ST lecture, and problems such as complexity and risk of infection exist.
**Methods**: We developed and implemented a training course for residents, wherein both ST and S1 are taught. Each trainee experienced ST then S1, acting as an officer or an assistant or patients. The two methods were compared in terms of the results of triage completion rate and judgement of correct triage rate. Comparison of the responses to the questionnaire completed was also conducted.
**Results**: After the training, the triage completion rate and correct judgement rate were both higher in S1. A comparison of the responses showed that confidence in practice was higher for S1. Anxiety, concerning blood contact and the decision to categorize black tags, was revealed in the questionnaire about ST.
**Conclusion**: Although ST is often used for initial triage, the method is rather complicated. Counting pulse or respiration is not an easy task. There are other problems such as the risk of infection and decision making. We speculate that this result was mainly because of the simplicity of the method, although the teaching order might have induced a learning effect. Our conclusion is that S1 could be an easier alternative for triage conducted by residents. However, we also continue to teach ST because they are expected to serve as assistants after the arrival of medical personnel.
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# Abstracts of Scientific Papers-WADEM Congress on Disaster and Emergency Medicine 2017

## Providing Empowerment for Rural Pastoralists after Natural Disasters

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**Study/Objective**: In developing nations, wealth and wellbeing is often linked to livestock. By extension, national food security depends on sustainable production. Natural disasters, disease, epidemics, and civil unrest create insurmountable obstacles for pastoral family herds. Providing preventative education for rural agronomists enables farmers to maintain herd health through challenging circumstances.

**Background**: Continued decline in human and animal health, following the Haitian earthquake in January 2010, resulted in the formation of Veterinarians Abroad Supporting and Teaching (VAST). Facing some of the highest political instability, infant mortality rates, illiteracy rates, and infectious disease rates found globally, the Haitian ability to rebuild after large-scale natural disasters and wide-scale emergencies was weakened. Problematically, a cholera epidemic devastated the working population, impairing the restoration of normal structural functionality.

**Methods**: VAST began work in Haiti in May 2012. This included building key relationships with government, local veterinarians, and national universities. Guest lectures occurred at two universities, and two animal health clinics were held in remote rural locations. In October 2013, additional clinics and workshops occurred in two other Haitian regions, and two more university classes were provided.

**Results**: Lectures on disease surveillance, biosecurity measures, and basic zoonotic disease epidemiology were provided to more than 300 agronomy students in Haiti. Clinics and workshops supervising treatment of more than 550 food animals, and training 15 animal care workers in basic animal husbandry and disease, have occurred. Feedback shows ongoing improvement in food animal health and economic prosperity in the focus areas.

**Conclusion**: Teaching animal husbandry workers recognition of key diseases, implementation of prevention strategies, and treatment of chronic cases improves long-term economic sustainability. Educating whole families on animal management and health improves living conditions. Empowering people through the animals that provide the foundation of their security provides resilient, informed, connected, and uplifted community longevity and stability.

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## Flood Related Injuries and Diseases Occurring in Horses in Louisiana from 2001-2016

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**Study/Objective**: Horses exposed to flooding conditions may present with unique and potentially life-threatening injuries. This report summarizes the types of flood related injuries and diseases occurring in horses in Louisiana from 2001-2016 (Tropical Storm Allison, Hurricanes Katrina, Rita, Gustav, Ike, Isaac, the Historic Flood of 2016).

**Background**: Floods are common weather-related disasters threatening the lives of people and animals, with an average yearly financial loss due to floods in the US averaging $6 billion. Flood-related livestock injuries and death make up a major component of these losses impacting the economic and emotional welfare of horse-owners. By working closely with producers and agricultural leaders, veterinarians and owners can lessen the impact of flood-disaster associated injuries and diseases with proper preparation and detailed planning.

**Methods**: Medical records and incident action reports from 2001-2016 were reviewed, categorized, and summarized:

**Results**: Euthanasia was required for horses sustaining fracture disease, septic tendonitis, aspiration pneumonia, fungal encephalopathy and colic. Severe dermatitis and cellulitis was observed in horses which had been standing in water for greater than 24 hours. Horses with water-line dermatitis and cellulitis, which were decontaminated appropriately and administered systemic anti-inflammatory and antimicrobial agents, had a more positive outcome than those which were not.

**Conclusion**: There is no way to prepare for every equine medical situation that arises in a flood situation, however,

| System | |
|---|---|
| Integument & musculoskeletal | -Limb, head, neck, and trunk lacerations and abrasions -Lameness – fracture, cellulitis, tendonitis, -Hoof injuries -Myositis |
| Dermatitis/cellulitis/ sepsis | -Inflammation -Bacterial & fungal infection |
| Ophthalmic | -Corneal ulceration -Traumatic uveitis |
| Gastrointestinal dysfunction | -Colic (impaction, colitis) -Esophageal obstruction |
| Neurologic | -Head and neck injuries -Infectious neurologic conditions -Tetanus -Botulism |
| Respiratory | -Aspiration pneumonia -Upper respiratory tract obstruction -Infectious respiratory diseases |

Veterinary

by having an awareness of commonly occurring flood related diseases, adequate veterinary resources, and early recognition and treatment will result in a more positive outcome.

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### Goat Evacuations During the 2012 Oklahoma Wildfires

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**Study/Objective**: Evaluate Goat Owners' Responses to a Wildfire Threat with regard to Shelter-In-Place vs Evacuation Decision-Making.
**Background**: Much of Oklahoma's economy is dependent on animal agriculture; Oklahoma also suffers disasters such as wildfires. Livestock are at-risk from disasters, such as a wildfire, because numbers, dispersal, and handling requirements make movement from a threatened area difficult. In disasters, a typical response of livestock owners is to choose between shelter-in-place or cutting fence to turn them loose. In 2012, a group of goat owners were able to arrange successful ad hoc evacuation of goats from wildfire-threatened farms.
**Methods**: Using a triangulated research design of in-depth interviews, observations, documents, spatial mapping, and visual data, we gathered information from affected counties. We focused on variables that influenced the ability to evacuate goats vs shelter-in-place, such as the availability of transportation resources, an evacuation location, assistance with animal handling, the size of the herd, dispersal (pastured vs penned/stabled), and the rapidity of wildfire onset.
**Results**: In all, 470 goats were evacuated. Some goats suffered injuries and were treated post-evacuation. The average evacuation distance was 15 miles. The majority of evacuation coordination and resource-sharing occurred via social media and cell phones. Residents worked hard to evacuate animals threatened by wildfire, but ran into difficulties in transporting large numbers of livestock to safety, particularly with regard to dispersal and trailer availability.
**Conclusion**: Our findings emphasized the necessity for emergency plans to include safeguarding livestock. As social networks were found crucial in successful animal movement, such networks should be mobilized as a means of developing and testing evacuation plans for livestock. Animal owners should create and practice an animal evacuation plan, and permanently identify their animals. Finally, we recommend that owners have a priority list for evacuation. We have also identified avenues requiring further investigation, including highlighting goat-specific concerns during and following wildfires.

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### Emergent Planning for the Veterinary Care and Short-Term Housing of Companion Animals Evacuated due to a Wildfire in Alberta, Canada

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**Study/Objective**: This case study describes emergent planning for the veterinary care and short-term housing of companion animals evacuated due to a wildfire.
**Background**: In response to a wildfire, 88,000 residents of Fort McMurray, Alberta, Canada were evacuated from their homes. The short-notice evacuation and immediate threat of fire prevented many residents from retrieving companion animals before leaving the city. Measures for interim animal care, including shelter in place, retrieval from homes, examination by a veterinary professional, and staging at a local facility were instituted. Animals were then to be transported to the nearest metropolitan center for temporary housing. Representatives from the government of Alberta, the Alberta Society for the Prevention of Cruelty to Animals, and the Alberta Veterinary Medical Association were called upon to plan and implement solutions for veterinary care and short-term housing of animals in Edmonton, Alberta.
**Methods**: Over the course of one weekend, organizations worked collaboratively to secure and establish a facility, equipment, supplies, veterinary professionals and auxiliary volunteers. With the assistance of a commercial realtor, a vacant warehouse was chosen as a suitable facility. A local registered charity that offers animal wellness services to First Nations communities, provided support with experienced personnel, equipment, and supplies. Protocols for animal intake, triage, housing, veterinary care, and treatment of sick and injured animals were created. Roles for veterinarians and veterinary technologists were defined. Medical records, including examination, treatment, and housing forms were developed. In order to provide continuous oversight of all aspects of animal care, requests for volunteer veterinarians and veterinary technologists were disseminated.
**Results**: Within 56 hours of request, and without a prior plan or a secure source of supplies or equipment, the short-term housing facility was operational and received the first intake of animals.
**Conclusion**: Over an 11-day period, 1,192 animals were examined, provided with medical treatment as necessary, and housed.

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### A Risk Based Algorithm for Managing the Companion Animals of Medically Vulnerable Disaster Evacuees

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**Study/Objective**: This presentation describes a risk-based algorithm for managing the companion animals that present at a shelter of convenience with their medically or mentally impaired owners. A case study will be presented implementing this algorithm for the evacuees of Hurricane Ike to College Station, Texas in 2008.
**Background**: Special medical needs patients with pets present unique challenges when they are evacuated in disasters. The human animal bond is critical to these individuals who are often

socially isolated. This presentation describes a risk-based approach to analyzing the factors that should be considered when managing the companion animals of this special population. The application of these principles will be demonstrated through discussion of a US Public Health Service veterinary mission, in a US Health and Human Services Federal Medical Station established for evacuees of Hurricane Ike, which struck the US gulf coast in September 2008.

**Methods**: A structured approach was applied to develop the most effective method for managing each pet that presented, which included a hazard identification based on owner, pet, environmental, and animal interaction factors. Based on an analysis of these factors, a method was developed to manage each animal, which could include hospitalization, quarantine, or regular on-site visits. An unforeseen byproduct of this approach was an improvement of morale for shelter residents and medical personnel.

**Results**: Approximately 300 evacuees presented with about 30 companion animals (dogs and cats). The mission resulted in 100% rabies vaccination, 100% reunification, veterinary care as needed, zoonotic disease risks identified and mitigated, and the human animal bond maintained for the duration of the evacuation.

**Conclusion**: The case study demonstrated that public health pet management is important to the animals, patients, and staff in a disaster scenario. A structured hazard identification process requires a team approach including medical, mental health, veterinary, sanitarian, and community partners.

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## The Promoting of Wellbeing Before, During, and After an Animal Health Emergency Response

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**Study/Objective**: Animal health disease responses can expand to become emergencies that affect responders and agricultural workers differently. The effects of stress from long days, uncertainty, decision making or new duties can manifest themselves during and well after an event is concluded. As many emerging and notifiable diseases are zoonotic, the use of One Health principles are required for effective leadership and decision making to protect human and animal health.

**Background**: Utilizing the pillars of emergency management, the preparedness phase is to assess response needs and to develop protocols that should include human resources that minimise risks to responders for their safe return to normal duties. Also part of the assessment is the continuation of business, and decisions will be required for the prioritizing of tasks. Wellbeing is defined by the World Health Organization (WHO) as 'a state of mind in which an individual is able to realize his or her own abilities, cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community'.

**Methods**: During preparedness and tabletop disease simulations, all potentially affected parties should be included for the sharing of knowledge, discussion, modelling, and prioritization for response and business continuity. The sharing of responder experiences is an effective method to introduce the topic of wellbeing and good practices that support resilience. Additional time should be scheduled for group discussion and good practices, for the development of protocols that support wellbeing as part of responder health and safety.

**Results**: Normally well-being may be taken for granted; however, during an extended response it is necessary to support and encourage good wellbeing practices for all of those affected the response.

**Conclusion**: The self-monitoring of staff during and after a response is a good practice to be supported by awareness training.

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## An Emergency Exercise in the Veterinary Diagnostic Laboratory - Preparing for a Foreign Animal Disease Outbreak

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**Study/Objective**: The objectives of this simulation were to design and conduct an operational exercise to test the Standard Operating Procedure (SOP) for management of a suspected Foreign Animal Disease (FAD) case in the postmortem laboratory, and to evaluate joint coordination and communication networks between the veterinary diagnostic laboratory and regulatory agencies involved in outbreak response.

**Background**: In this era of heightened awareness of the risks of emerging and transboundary diseases, postmortem facilities remain a problematic site for potential exposure and spread of high-risk pathogens. A producer experiencing high mortality on a farm is likely to bring a carcass to a laboratory for postmortem examination. Should this animal be infected with a Foreign Animal Disease (FAD) such as foot and mouth disease, the biosecurity and notification procedures implemented in the first few hours following a tentative diagnosis by the pathologist will assist in containment of the disease, and limit potential spread to other clients using diagnostic laboratory facilities.

**Methods**: Employing templates developed by the Justice Institute of British Columbia, exercise and evaluation guides were developed to describe scope, objectives, expected actions, and desirable timelines during the simulation.

**Results**: This FAD simulation was deemed a success, based upon formal feedback provided by the evaluator. All exercise participants fulfilled their respective roles and worked as a cohesive team, remaining calm and handling challenges as they arose. An informal "hotwash" networking session held immediately following the exercise included partners from several animal health regulatory agencies. A gap analysis was performed, and after-action plans were developed to resolve the identified deficiencies.

**Conclusion**: A well-designed operational exercise ensures a successful outcome, measured by an opportunity to practice

procedures in real time, thereby validating emergency preparedness plans in the veterinary diagnostic laboratory. Moreover, simulations provide an excellent occasion to interact with local animal health partners, thereby facilitating coordination during an actual emergency.

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## Establishment of Safer Animal Rescue Capacity in Turkey

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**Study/Objective**: The main objectives were to prevent flooding and its effects in the long-term through local institutional capacity building in the Southeastern Anatolian Region. Specific objectives were to improve the capacities of local governmental and non-governmental organizations in flood management, in the prevention of flood, in mitigating infrastructure, and economic and social losses caused by flood.
**Background**: Regarding the mitigating flood risk in flooded areas in the SAR Project open call, Sanliurfa Disaster and Emergency Management Directorate (DEMD) and SAR Culture, the Research and Development Association prepared a project titled "Capacity Building for Decreasing Animal Losses from Flood in Sanliurfa" and was accepted by the financing authority.
**Methods**: Activity 1: Establishment of a Project Team. Activity 2: Preparation of Training Materials: Training materials needed include first aid for small and large animals, rescuing animals in dramatic situations with appropriate methods, infectious diseases, proper techniques of animal handling, restraint and evacuation, hygiene, and post-flood animal care and nutrition. Activity 3: Training: The animal welfare training duration was 10 days. Trainers were veterinarians, Sanliurfa emergency personnel, and geographers. It has been emphasized to participants that rescuing animals is important, along with people, in floods or other natural disasters. Some part of training has been carried out by emergency personnel. In this context, rope application for animals is practical. In addition, duties of emergency personnel, fire protection, and humanitarian rescue in the earthquake and flood areas were explained.
**Results**: The activities that were provided under the project expanded the knowledge of emergency personnel in animal welfare. Animal welfare training has been given to 70 young people engaged in animal husbandry. These volunteers have become aware of intervening animals, together with veterinarians and emergency personnel, using appropriate techniques.
**Conclusion**: The project is a positive contribution to animal welfare. An Animal Rescue Center has been established within the Sanliurfa fire brigade.

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## Veterinary Oversight of a Short-Term Housing and Veterinary Care Facility for Companion Animals Evacuated due to a Wildfire in Alberta, Canada

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**Study/Objective**: This case study describes veterinary oversight of a short-term housing and veterinary care facility for animals evacuated due to a wildfire.
**Background**: Under significant threat of a wildfire, a short-notice mandatory evacuation order was issued for the city of Fort McMurray, Alberta, Canada. Eighty-eight thousand residents fled the city. Given the unforeseen nature of the evacuation, many residents had to leave their companion animals behind. With owner permission, animals were retrieved from their homes, examined by a veterinary professional, and staged at a local facility. Stable animals were transported by ground to an 80,000 square foot facility in Edmonton, Alberta for short-term housing, veterinary care, and reunification.
**Methods**: Under the direction of representatives of the Alberta Veterinary Medical Association, 24 hour veterinary oversight was provided for all aspects of animal care, including intake, triage, housing, and medical treatment. Animals arrived in Edmonton in groups ranging between 16 and 251 animals. Pending anticipated intake volume, a minimum of 2 and maximum of 24 veterinary professionals were at the facility at any given time. Upon arrival, each animal underwent a physical examination by a veterinarian. Animals in good health were cared for in species-specific housing areas. Animals requiring minor medical care were treated by a veterinarian and housed in a medical treatment area. Given a limited scope of diagnostic and therapeutic resources, animals in need of testing or treatment beyond minor care were transferred to local veterinary practices for assessment and medical treatment.
**Results**: Between May 9 and May 19, 2016, there were 1,192 companion animals (feline, avian, small mammal, reptile, amphibian, canine, and arachnid) received, examined, provided with veterinary care, and housed.
**Conclusion**: Local veterinary practices contributed essential care to sick and injured animals. Veterinary oversight of the short-term housing facility would not have been possible without the compassion and expertise of 151 volunteer veterinary professionals.

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## Animals in Disasters: Lessons Learned from California's 2015 Valley Fire

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**Study/Objective**: Lessons learned from California's 2015 Valley Fire can aid in preparing the next clinic or community for disaster.
**Background**: Fire swept through 70,000 acres and 3 populated communities in less than 48 hours, destroying over 1,400 homes and affecting countless animals. Few people had time to prepare to evacuate There was little government resources for animals. Private practitioners, animal rescue organizations, and trained animal disaster rescuers shouldered the responsibility for animal needs while working within a government response structure.
**Methods**: Middletown Animal Hospital was activated by the California Office of Emergency Services (Cal-OES), and multiple rescue groups were authorized to deploy to aid the hospital's response. Veterinary care and shelter was provided to lost, injured, or displaced animals presented to us by owners, residents, relief workers, disaster responders, or anyone else with a need. Volunteer veterinarians and technicians rotated through the hospital. All animals treated were documented and posted to social media as a reunification resource. Additional site options were developed. These efforts were synthesized on the fly because there was no pre-existing plan.
**Results**: More than 800 animals were treated over 4 weeks. The Middletown Animal Donation Operation received and distributed over $80,000 of animal supplies. Nearly every domestic species was treated; conditions treated included burns, smoke inhalation, vomiting/diarrhea, heart failure, and dermatitis; surgeries performed included amputation, tendon repair, wound/burn debridement/repair, and prolapsed rectal repair.
**Conclusion**: Lessons Learned include: Prepare and Pre-Defend your space. Prepare for evacuation - and evacuate! Prepare for surviving the fire or re-entry by anticipating worst case needs. If you are a veterinarian, your clinic may become the best place from which to stage animal relief and rescue. Get disaster training and certification. Do not count on the government to provide animal disaster relief. Organized Veterinary Medicine and Animal Rescue Groups can provide relief. Be prepared by establishing working relationships ahead of time and seek help when needed.

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## Incorporation of Experiential Learning for Disaster Response for Veterinary Students, Veterinarians, and Other Animal Stakeholder Groups, Strengthens Overall Community Resilience

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**Study/Objective**: This outlines a dynamic training program that is incorporated into the professional curriculum at the Louisiana State University School of Veterinary Medicine (LSU-SVM). The program's success is based on providing tools necessary for building a community animal response team, whereby veterinary doctors and other animal stakeholders work with emergency officials to care for animals during disaster response situations.
**Background**: Veterinarians, medical doctors, firefighters, and nurses are among the top respected professionals in the world today. The veterinary professional's daily focus on saving lives makes their leadership role a vital one for development of community disaster response planning, and mitigation for both animals and people. For veterinarians to be effective leaders in disaster situations, they must be trained in basic core competencies, including the Incident Command System (ICS) and National Incident Management System (NIMS), animal euthanasia, biosecurity, all-hazards emergency preparedness, business continuity training, technical responder training, and incident de-briefing. Specific instruction on biosecurity and euthanasia are staples included in standard veterinary professional curricula; business planning and continuity are available as elective courses in veterinary schools and ICS/NIMS are available to the public via the Federal Emergency Management Agency, a division of the U.S. Department of Homeland Security.
**Methods**: The LSU-SVM and the LSU-Ag Center partnering with the Louisiana State Animal Response Team (LSART), have developed a training certificate program to develop core competencies of disaster response (large animal emergency technical rescue, slack water rescue, hazardous material management, triage, planning and assessment) for veterinary students and graduates, animal stakeholder groups and other animal care professionals.
**Results**: The LSART/LSU partnership has trained over 1,000 veterinary students, veterinarians, first responders, and animal care personnel since 2001.
**Conclusion**: With the integration of specific disaster response training modules within the veterinary professional curriculum, graduate veterinarians are better equipped to contribute to community disaster response situations, thus strengthening overall community resilience.

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## Veterinary Integration into Multi-agency Disaster Response: Training the Next Generation of Responders

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**Study/Objective**: Outline a protocol for training and integrating veterinary students, veterinarians and first responders to improve community resilience during disasters.
**Background**: Veterinarians take an oath to use 'scientific knowledge and skills for the benefit of society', which includes

promoting public health and relieving animal suffering. Public safety is enhanced when animal health is addressed in disaster management. Obstacles to functional disaster responses that include animals may be due to limited 1) evacuation/sheltering plans; 2) integration of professionals 3) training opportunities.
**Methods**: A general review of legislature, literature, training reports, incident debriefings, community group meetings and agency consultations was conducted to assess the availability and effectiveness of veterinarians in disaster response. A veterinary student survey (Davis) was used to assess disaster response understanding, skill set and interest for training.
**Results**: Recent fires illuminate the need for local veterinary involvement in response. Community organizers report difficulty in securing veterinary services in disasters. A veterinary student survey showed the majority are interested in training as part of their medical education. Fire services report gaps in animal handling. Law enforcement reports public safety concerns. These professionals don't regularly interact, and time is lost when faced with an incident involving animals. England and France have models for integrating veterinarians into fire service. A working group of veterinarians, consultants and community organizers developed a 10 module lecture and lab disaster curriculum that covers all hazards-all species animal handling, evacuation, sheltering, biosecurity, triage, and Incident Command System.
**Conclusion**: Veterinarians are skilled in animal movement/capture, husbandry, and triage; first responders have skills in technical rescue; law enforcement is charged with public safety and traffic control. Training veterinary students in disaster response, aligns with the veterinary oath and creates the next generation of professionals capable of participating in disaster response. Trainings that include first responders foster a seamless response further maximizing positive outcomes.

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## Co-Location and Close Proximity Facilities for Animal and Human Sheltering as Part of a Community Disaster Preparedness Plan: Application of GIS

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**Study/Objective**: The objective of this study is to establish a Geographic Information System (GIS) report for animal shelter facilities that are co-located or in close proximity to human shelter locations for Yolo County, California.
**Background**: The inclusion of animals in emergency management is gaining more attention from the general public, government agencies and academic institutions worldwide. Addressing the needs of animals during disasters is crucial, not only for the welfare of animals, but also safety for people. Animals that are abandoned experience starvation, injury and death. People's concern for animals puts their own physical and psychological well being in danger, because of their reluctance to comply with evacuation orders. Animal owner non-compliance in turn, jeopardizes first responder safety. Shelter location is critical to the development and implementation of emergency planning. In the US, jurisdictions that have variable plans in place, are likely to exclude animals in paper documents only. GIS data management and analysis can facilitate efficacious emergency planning for human and animal sheltering needs.
**Methods**: Base maps were obtained from county websites. Facility locations were acquired from Red Cross, Office of Emergency Services and Google, and stored in attribute tables. All data was downloaded into ArcGIS. Multiple ring buffers identified animal facilities within 500, 1,000 and 1,500 meters (.31 mi., .62 mi., .93 mi.) of human facilities. A proximity analysis was performed to determine the nearest shelter sites for people and pets and was reported in near tables.
**Results**: Red Cross shelters, veterinary clinics, pet-friendly hotels, outdoor sites and county animal shelters were identified. The majority of Red Cross shelters were not within 1500 meters of animal housing. Less than 10% of Red Cross shelters were within 500 meters of veterinary clinics.
**Conclusion**: The GIS reports provide quick visual assessments of relative locations of human and animal facilities for pre-disaster planning. Utilizing GIS analysis can identify gaps and be instrumental in emergency preparedness community planning for animals and people.

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## Epidemiological Evaluation of Cat Health at a First-response Animal Shelter in Fukushima, following the Great East Japan Earthquakes of 2011

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**Study/Objective**: The purpose of this study was to retrospectively evaluate the incidence of Upper Respiratory Infection (URI) and diarrhea in cats at the first response animal shelter in Fukushima, and investigate factors affecting the duration of disease and determinants of treatments performed.
**Background**: Unplanned animal rescue, in addition to unregulated and/or unstandardized sheltering of affected animals during disaster, caused secondary damage to animals such as disease epidemics. Stress-related disease such as URI and diarrhea were extremely common in cats at the first response shelter in Fukushima, imposing not only animal welfare and cat health issue, but also public health concern.
**Methods**: A retrospective cohort study was performed at a first response temporary disaster shelter in Ihno, Fukushima Prefecture, Japan. Between April 27, 2011 to December 31, 2012 there were 189 cats brought in by animal control officers from the restricted area to the temporary disaster shelter as part of an animal rescue operation. The incidences of URI and diarrhea were compared between the first and second years, and related to factors predictive of disease duration and frequency, including choice of treatment options.

**Results**: Of the impounded cats, 80% and 59% developed URI, 71% and 54% of cats developed diarrhea, and 91% and 83% of cats had at least one disease in 2011 and 2012, respectively. Uses of multiple drug administration (more than five drugs) was associated with prolonged URI and diarrhea. Multiple antibiotics, antihistamines, interferon, and steroids were associated with relapse of and prolonged URI.
**Conclusion**: The incidence of disease in cats at the shelter was high. Developing a standardized treatment protocol for commonly observed diseases at Japanese animal shelters to prevent and control diseases, to promote animal welfare, and to protect public health in the face of future disasters is overdue.
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## Disaster Preparedness for Pets

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**Study/Objective**: The objectives of this study were to perform pet-owners' attitude survey to evaluate disaster preparedness for pets, and to perform questionnaires to investigate the effect of pets on the recovery of disaster.
**Background**: Almost all disasters involve people, animals and the environment in the affected area. People will evacuate from hazardous locations and the pets owned by people may be an issue in the evacuation process, if there was no planning for pets. Recent change in human-animal-bond, pet-owners see their pets as family members and risk themselves for the sake of their pets. Animals affected by disasters are also gaining more public attention, and the need for pet preparedness should be addressed and incorporated in the community emergency planning.
**Methods**: The pet-owner's attitude survey was conducted at pet shops and rabies vaccination sites (only for dogs), and the pet-owners were randomly assigned to answer 47 questions regarding on the perceptions toward pet disaster preparedness. Questionnaires to investigate the effect of pets were performed in the City of Sendai at a City Festival. Pet-owners and non-pet owners were randomly assigned, and the posttraumatic stress disorder (PTSD) by the earthquakes in 2011 were scored. Questions regarding the perception for pet evacuation were also recorded.
**Results**: Thus, 95% of the pet-owners wanted to evacuate with the pets, but only 26% of them knew the location of a pet-friendly shelter. Then, 20% had identification for their pets, and 96% of pet-owners and 88% of non-pet owners thought pets should be evacuated with people. Pet-owners had higher PTSD scores than non-pet owners within 1 month from the earthquakes, but the score was lower for the pet-owners after 5 years.
**Conclusion**: Addressing pet disaster preparedness is important for not only animal welfare but also for people's safety and mental health. Pets can be a risk factor during disasters but could act as profactor for recovery.
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## Epidemiological Evaluation of Dogs Rescued in the Fukushima Prefecture Following the Great East Japan Earthquakes of 2011

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**Study/Objective**: The objectives of this study are to report characteristics, disposition, and health status of dogs rescued in the Fukushima Prefecture, and to perform a retrospective epidemiological evaluation of factors associated with disposition and disease incidence.
**Background**: Rescued dogs from the restricted area by the nuclear accident were initially housed at a temporary shelter in Ihno, Fukushima Prefecture. This first shelter operated under chaotic conditions: dogs were kept in individual cages proximate to each other, poor husbandry was maintained by unfamiliar/untrained staff, and lack of exercise was associated with deterioration of the mental and physical health of the impounded dogs. Secondary shelter was newly built in Miharu with better housing and trained staff, and all the remaining dogs at Ihno shelter were transferred.
**Methods**: All dogs rescued from the Fukushima Prefecture from March 2011 to July 2015 were included. The data including medical records, intake data and disposition (adopted, reclaimed by owners, or died in shelter), were retrieved and evaluated for the factors associated with disease and disposition.
**Results**: Five hundred and twenty-nine dogs were admitted to the Ihno and Miharu shelters, including 179 that had detailed medical records. Seventy-six percent of dogs admitted to the shelters were mixed breed. Twenty-six percent of dogs had verified ownership, and almost 16% of dogs were reclaimed by their owners. Sixty-six percent of dogs developed diarrhea, and 17 different antibiotics were used to treat it. Using three or more different antibiotics was associated with prolonged signs of diarrhea.
**Conclusion**: To improve the welfare of dogs in disasters, responsible owner education, a well-organized registered volunteer training program for care of animals at shelters, proper disease management protocols, and enrichment strategies to prevent stress in shelter setting are essential.
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