

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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