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PREHOSPITAL CARE AND ROAD SAFETY

Developing Sustainable Prehospital Care for NCD Emergencies in Rwanda: A Collaboration between EMS, Ministry of Health of Rwanda, and Virginia Commonwealth University

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Introduction: Every year, 71% of all deaths globally are due to NCDs. Over 85% of these deaths occur in low- and middle-income countries (LMICs), with 36% of all reported deaths in Rwanda attributed to NCDs. Approximately 24 million lives are lost each year in LMICs due to emergency medical conditions. The collaboration between VCU and the EMS Rwanda designed and implemented a pre-hospital medical emergencies training course and train-the-trainers program to address the rise of NCDs.

Methods: During the course, pre and post 50 assessment questions were administered. Two cohorts participated 25 prehospital staff identified by EMS to form an instructor core and 19 emergency staff from public hospitals who are likely to respond to local emergencies in the community. A two-day EMCC was developed using established best practices. The Instructor core completed EMCC 1 and a one-day educator course and then taught the second cohort (EMCC2). Student's t-test and matched paired t-tests were used to evaluate the assessments.

Results: Mean score on EMCC 1 was 43% (SD: 20) compared to 85% (SD: 5) on post-course assessment. Pre-assessment failure rate was 88%. Mean scores for EMCC 2 were 45% (SD: 14) and 81% (SD: 10) on post-assessment. Pre-assessment score was low (50%). A paired t-test comparing pre-course to post-course assessment means demonstrated an increase by 42% (SD 30) for EMCC 1 ($p<0.001$) and 37% (SD: 14) for EMCC 2 ($p<0.001$) with 95% confidence. No items had to be removed from analysis based on the discrimination index (di).

Discussion: NCDs often present as emergencies such as myocardial infarction and stroke. Effective management of these in the prehospital setting is essential to optimal outcomes. This study effectively implemented a training program in Kigali, Rwanda and created an instructor core to allow scale-up of effective pre-hospital services across the country.

Getting There: Evidence-Based Decision-Making in Road Trauma Prehospital Transport and Care in Queensland

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Introduction: Process mining, a branch of data science, aims at deriving an understanding of process behaviors from data collected during executions of the process. In this study, we apply process mining techniques to examine retrieval and transport of road trauma patients in Queensland. Specifically, we use multiple datasets collected from ground and air ambulance, emergency department, and hospital admissions to investigate the various patient pathways and transport modalities from accident to definitive care.

Aim: The project aims to answer the question, "Are we providing the right level of care to patients?" We focus on (i) automatically discovering, from historical records, the different care and transport processes, and (ii) identifying and quantifying factors influencing deviance from standard processes, e.g. mechanisms of injury and geospatial (crash and trauma facility) considerations.

Methods: We adapted the Cross-Industry Standard Process for Data Mining methodology to Queensland Ambulance Service, Retrieval Services Queensland (aero-medical), and Queensland Health (emergency department and hospital admissions) data. Data linkage and "case" definition emerged as particular challenges. We developed detailed data models, conduct a data quality assessment, and preliminary process mining analyses.

Results: Preliminary results only with full results are presented at the conference. A collection of process models, which revealed multiple transport pathways, were automatically discovered from pilot data. Conformance checking showed some variations from expected processing. Systematic analysis of data quality allowed us to distinguish between systemic and occasional quality issues, and anticipate and explain certain observable features in process mining analyses. Results will be validated with domain experts to ensure insights are accurate and actionable.

Discussion: Preliminary analysis unearthed challenging data quality issues that impact the use of historical retrieval data for secondary analysis. The automatically discovered process

models will facilitate comparison of actual behavior with existing guidelines.

Health Sector Preparedness During the Eid-al-Fitr Homecoming Across Indonesia in 2017

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Introduction: Indonesia's road traffic fatality rate stands at 15.3 per 100,000 people, compared to 17 in the Southeast Asia region. Traffic fatalities are predicted to increase by 50%, becoming the third leading contributor to the global burden of disease by 2020. Indonesian police reported that 575 people died and 2,742 road accidents occurred during Eid-al-Fitr 2015. The problem is increasing rapidly in Indonesia, particularly during Ramadan. Policy makers need to recognize this growing problem as a public health crisis to prevent mass casualty incidents.

Aim: To assess the health system preparedness with regard to road traffic accidents during 2017 Eid-al-Fitr homecoming in West Java, Central Java, East Java, and Lampung.

Methods: The project started with an interview and observation followed by stakeholder analysis to assess the level of preparedness. This qualitative and quantitative research was conducted one month prior to Eid-al-Fitr homecoming 2017. The instruments were evaluated for policy, organization, communication, procedure, contingency plan, logistics, facility and human resources, financing, monitoring, evaluation, coordination, and socialization.

Results: The levels of preparedness were moderate (B) for West Java, East Java, and Lampung, but high (A) for Central Java. Levels of preparedness based on district health office indicators were high for coordination, but low for a contingency plan. Levels of preparedness based on hospitals and primary health care were high for logistics and human resources, but low for a contingency plan and financing.

Discussion: The findings indicated a moderate level (B) of health sector preparedness. Benchmark information from this research will provide information for further training in contingency planning, particularly for the district health office.

Impact of Road Safety Laws in Colombia on Road Traffic Collision Fatalities and Injuries

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Introduction: Road traffic collisions (RTC) are the leading cause of preventable death among those aged 15–29 years worldwide. More than 1.2 million lives are lost each year on roads. Ninety percent of these deaths take place in low- and middle-income countries. The General Assembly of the United Nations (UN) proclaimed the period from 2011-2020 the "Decade of Action for Road Safety," with the objective of stabilizing and reducing the number of deaths by 50% worldwide. In this context, the government of Colombia established the National Road Safety Plan (PNSV) for the period 2011–2021 with the objective of reducing the number of fatalities by 26%. However, the effectiveness of road safety policies in Colombia is still unknown.

Aim: To evaluate the effect of road safety laws on the incidence of RTC, deaths, and injuries in Colombia.

Methods: RTC data and fatality numbers for the time period of January 1, 2010, to December 31, 2017, were collated from official Colombian governmental publications and analyzed for reductions and trends related to the introduction of new road safety legislation.

Results: Data analysis are expected to be completed by January 2019.

Discussion: RTC remains the leading preventable cause of death in Colombia despite the PNSV. Data is being mined to determine the trends of these rates of crashes and fatalities, and their relation to the introduction of national traffic laws. Overall, while the absolute numbers of RTC and deaths have been increasing, the rate of RTC per 10,000 cars has been decreasing. This suggests that although the goals of the PNSV may not be realized, some of the laws emanating from it may be beneficial, but warrant further detailed analysis.

A New Strategy for Swiftwater Rescue from Roadways during Urban and Small Stream Flash Flooding

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Introduction: The swiftwater rescue (SWR) concept of operations (CONOPS) is to access as many victims as quickly as possible using strategies and tactics that maximize safety and minimize risk to all involved. "Reach, throw, row, go" has defined the primary water rescue strategy for 50+ years. However, this paradigm, originally designed for rescue from swimming pools, ponds and lakes, slow-moving rivers, and the ocean, is not conducive to SWR incidents involving