Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

AGED CARE AND DISABILITY

Dallas Mega Shelter Onsite Medical Operations Supporting Evacuee Functional Independence and Family Unit Integrity During Response to Hurricane Harvey

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Introduction: In the United States, over 50% of people have at least one chronic medical condition, access, or functional limitation. In 2017 during Hurricane Harvey, the establishment of a comprehensive multidisciplinary onsite medical clinic provided health and medical services to over 3,800 evacuees at the Dallas Mega Shelter, providing large-scale general population sheltering support to all evacuees and prioritizing family unit integrity by meeting physical, sensory, and cognitive limitations, and chronic medical conditions. The effectiveness of the Dallas Mega Shelter onsite medical operations supporting this aim is reviewed.
Aim: To utilize onsite health and medical resources to meet access and functional needs of evacuees seeking general population mass sheltering in Dallas, Texas during Hurricane Harvey.
Methods: Observational.
Results: Over 3,800 evacuees were evaluated for functional needs support services (FNSS) resulting in over 2,500 evacuee patient encounters during 21 continuous days of onsite health and medical clinic operations.[1] A comprehensive array of services were available at no cost to the evacuees and were in accordance with the Federal Emergency Management Association (FEMA) published Guidance on Planning for Integration of Functional Needs Support Service in General Population Shelters.[2] The goal to maintain nearly all evacuees choosing to stay in the Mega Shelter was achieved. The challenges, limitations, and risks identified are reviewed.
Discussion: FNSS guidelines require all persons, regardless of limitations, when evacuated from home be provided all services necessary to allow them to remain in general population sheltering.[2] This prioritization of personal choice, functional independence, and family integrity for those with comprehensive FNSS requirements presented notable challenges, including public health and safety risks impacting the wellbeing of others. Meeting these expectations must be balanced with maintaining shelter integrity.

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Development of an Evacuation Exercise for Residential Aged Care Facilities Using the Emergo Train System (ETS)

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Introduction: Events such as the Sydney Quakers Hill Nursing Home fire highlighted the great need for robust evacuation plans for Residential Aged Care Facilities (RACFs). However, plans alone are not sufficient and routine exercises are necessary to test the capability of a facility's emergency plan. Current methods of exercising facility evacuations, such as live drills, are limited and only test isolated elements of the evacuation process, which fall drastically short of being able to simulate the real-time resources and procedures required to perform a large scale evacuation of a RACF.
Aim: To develop an exercise tool that assists Residential Aged Care Facilities (RACF) to evaluate their evacuation procedures using quantifiable data, based on real-time and providing minimal disruption to existing residents.
Methods: Utilizing the existing ETS framework, an aged care resident patient bank was developed by NSW Health Emergency Management Unit, including:

- A bank of 200 residents from data sourced from the Australian Institute of Health and Welfare.
- Layout for the resident gubers and Summary Care Plans.
- Resources and equipment routinely used in RACF's.
- Real-world testing of the prototype in exercises across NSW, Australia
- Mortality and morbidity data to measure outcomes.
- Validation of the exercise tool nationally and internationally.

Results: A bank of residents was developed to test evacuation systems and processes, in a scalable, realistic simulation based on patient outcomes. This will result in improved planning and process, empowerment of RACFs, better patient outcomes, and increased resilience and preparedness.
Discussion: A significant investment of data, time, and effort has gone into producing this resident bank for use in RACF evacuation exercises across NSW Australia. A presentation delivered at the ETS World Congress in the Netherlands (2018), by NSW Health Emergency Management Unit,

showcased the relevance and suitability of this tool across the world.

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Mortality in Nursing Home Evacuations in the United States from 1995-2017

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Introduction: There are an estimated 15,600 nursing homes with a total of 1.4 million residents in the United States. The number of residents will continue to increase due to the aging population, and the associated morbidities will make it difficult to evacuate them safely.

Aim: This study is the first of its kind to provide an analysis of the number of nursing home deaths caused by external and internal events following evacuations.

Methods: Information from the databases Lexis Nexis and PubMed were compiled and limited to news articles from 1995-2017. The gathered information included the reason for evacuation, injuries, deaths, and locations within the United States.

Results: From 1995 to 2017, there was a total of 51 evacuations and 141 deaths in nursing homes. 27 (53%) evacuations were due to external events which resulted in a combined 121 (86%) deaths, and 24 (47%) evacuations were due to internal events which resulted in a combined 20 (14%) deaths. Hurricanes were responsible for the majority of deaths during evacuations, followed by fires and floods. The number of evacuations and deaths increased the greatest between 2005 to 2008.

Discussion: External events have the greatest impact on loss of life. Internal disasters are about equal in the number of incidents, however, external events have a much greater mortality rate. Exact numbers on injuries, morbidity, and mortality are difficult to ascertain, but it appears to be related to natural disasters. In view of the increasing likelihood of natural disasters related to global warming, a drastic improvement of standard evacuation procedures of long-term nursing homes is critical to decreasing mortality of nursing home residents. There also needs to be a nationally standardized method of reporting evacuations in order to better analyze data on nursing homes.

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AUSTERE SURGERY

Surgical Procedures Performed by Emergency Medical Teams in Sudden-Onset Disasters: A Systematic Review

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Aim: To describe the types of surgical procedures performed by emergency medical teams (EMTs) with general surgical capability in the aftermath of sudden-onset disasters (SODs) in low- and middle-income countries (LMICs).
Methods: A search of electronic databases (PubMed, MEDLINE, and EMBASE) was carried out to identify articles published between 1990 and 2018 that describe the type of surgical procedures performed by EMTs in the impact and post-impact phases a SOD. Further relevant articles were obtained by hand-searching reference lists.
Results: 16 articles met the inclusion criteria. Articles reporting on EMTs from a number of different countries and responding to a variety of disasters were included. There was a high prevalence of procedures for extremity soft tissue injuries (46.8%) and fractures (28.3%). However, a significant number of genitourinary/obstetric procedures were also reported.
Discussion: Knowledge of the types of surgical procedures most frequently performed by EMTs may help further determine the necessary prerequisite surgical skills required for the recruitment of surgeons for EMTs. Experience in basic plastic, orthopedic, urological, and obstetric surgery would seem desirable for surgeons and surgical teams wishing to participate in an EMT.

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Training Australian General Surgeons for Humanitarian Emergencies: A Comparison Between Trainee Logbooks and Emergency Medical Team Caseloads

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Introduction: Emergency medical teams (EMTs) have helped to provide surgical care in many recent sudden onset disasters (SODs), especially in low- and middle-income countries (LMICs). General surgical training in Australia has undergone considerable change in recent years, and it is not known whether the new generation of general surgeons is equipped with the broad surgical skills needed to operate as part of EMTs.
Aim: To analyze the differences between the procedures performed by contemporary Australian general surgeons during training and the procedures performed by EMTs responding to SODs in low- and middle-income countries (LMICs).
Methods: General surgical trainee logbooks between February 2008 and January 2017 were obtained from General Surgeons Australia. Operating theatre logs from EMTs working during the 2010 earthquake in Haiti, 2014 typhoon in the Philippines, and 2015 earthquake in Nepal were also obtained. These caseloads were collated and compared.
Results: A total of 1,396,383 procedures were performed by Australian general surgical trainees in the study period. The most common procedure categories were abdominal wall hernia procedures (12.7%), cholecystectomy (11.7%), and specialist colorectal procedures (11.5%). Of note, Caesarean sections, hysterectomy, fracture repair, specialist neurosurgical, and specialist pediatric surgical procedures all made up <1% of procedures each. There were a total of 3,542 procedures recorded in the EMT case logs. The most common procedures were wound debridement (31.5%), other trauma (13.3%), and Caesarean section (12.5%). Specialist colorectal, hepato-pancreaticobiliary, upper gastrointestinal, urological, vascular, neurosurgical, and pediatric surgical procedures all made up <1% each.
Discussion: Australian general surgical trainees get limited exposure to the obstetric, gynecological, and orthopedic procedures that are common during EMT responses to SODs. However, there is considerable exposure to the soft tissue wound management and abdominal procedures.

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BEST PAPERS

Addressing Adolescent Mental Health after Disasters: The Critical Role of Chronic Stressors

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Introduction: Prolonged conditions of chronic stress have the potential to cause mental health difficulties and disrupt developmental processes for children and adolescents. Natural disasters disproportionately affect low-resource areas, yet little is known about the interaction between trauma exposure, chronic stressors, and mental health.

Aim: To determine the rates of post-traumatic stress disorder (PTSD), depression and anxiety among adolescents affected by earthquakes in China and Nepal, and examine the specific roles of trauma exposure and chronic stressors across the three mental health outcomes.

Methods: A school-based, cross-sectional study of 4,215 adolescents (53% female, ages 15-19 years) was conducted in disaster-affected areas of southern China and Nepal. Participants completed a series of translated and culturally adapted standardized assessments. Mixed effects logistic regression analyses were conducted for each mental health outcome.

Results: The overall rate of PTSD was 22.7% and was higher among Nepalese participants (China: 19.4% vs. Nepal: 26.8%, $p<0.001$), but did not differ between genders (China: $p=0.087$ and Nepal: $p=0.758$). In both countries, the level of trauma exposure was a significant risk factor for PTSD, depression, and anxiety (China: OR's 1.09-1.18 and Nepal: OR's 1.08-1.13). Chronic stressors significantly improved the model and further contributed to mental health outcomes (China: OR's 1.23-1.26 and Nepal: OR's 1.10-1.23). Multilevel risk and protective factors across all mental health outcomes will be presented.

Discussion: While there are limited opportunities to protect adolescents from disaster exposure, there is significant potential to address the effects of ongoing economic insecurity, domestic violence, and school cessation that are likely to worsen mental health outcomes. Programs that identify chronic stressors for adolescents in disaster-affected settings, and work to address poverty and violence, will have cascading effects for mental health, development, and security.

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August 24th, 2016 Central Italy Earthquake - Validation of "Modified Utstein Template for Hospital Disaster Response Reporting," A New Tool for Reporting Hospital's Reaction to Disasters

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Introduction: After Action Reports analyze events and recommend actions to facilitate preparedness and response to future similar disasters. However, there is no consensus among the templates developed to collect data during disasters and little is known about how to report hospital responses.

Aim: The hypothesis was that the use of a new assessment tool for hospital response to natural disasters facilitates the systematic collection of data and the delivery of a scientific report after the event.

Methods: A data collection tool, focused on hospital response to natural disasters, was created modifying the "Utstein-Style Template for Uniform Data Reporting of Acute Medical Response in Disasters",[1] and tested the reaction of the hospitals involved in the response to the Central Italy earthquake on August 24th, 2016.

Results: Four hospitals were included. The completion rate of the tool was of 97.10%. A total of 613 patients accessed the four emergency departments, most of them in Rieti hospital (178; 29.04%). Three hundred and thirty – six patients were classified as earthquake-related (54.81%), most of which with trauma injuries (260; 77.38%).

Discussion: The new reporting tool proved to be easy to use and allowed to retrospectively reconstruct most (97.10%) of the actions implemented by hospital responders. Details about activation, patient fluxes, times, and actions undertaken were easily reconstructed throughout in-field interviews of hospital

managers and patients' charts. Patients were uniformly distributed across the four hospitals, and the hospital capabilities were able to cope with this mass influx of casualties. The Modified Utstein Template for Hospital Disaster Response Reporting is a valid tool for hospital disaster management reporting. This template could be used for a better comprehension of hospital disaster reaction, debriefing activities, and revisions.

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Examining the National Profile of Chronic Disaster Health Risks in Australia

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Introduction: Despite a longstanding focus on examining acute health impacts in disaster research, only limited systematic information is available today to further our understanding of chronic physical health risks of disaster exposure. Heterogeneity of studies and disaster events of varying type and scale compounding this challenge highlight the merit of a consistent approach to examining nationally representative population data to understand distinctive profiles of chronic disaster health risks.
Aim: This epidemiological study examined the full spectrum and national profile of chronic physical health risks associated with natural and man-made disaster exposure in Australia.
Methods: Nationally-representative population survey data (N=8841) were analyzed through multivariate logistic regression, controlling for sociodemographic variables, exposure to natural and man-made disasters, and other traumatic events. Key outcomes included lifetime national chronic health priority conditions (asthma, cancer, stroke, rheumatism/arthritis, diabetes, heart/circulatory) and other conditions of 6 month or more duration (based on the World Health Organization's WMH-CIDI chronic conditions module).
Results: Natural disaster exposure primarily increased the lifetime risk of stroke (AOR 2.06, 95%CI 1.54-2.74). Man-made disaster exposure increased the lifetime risk of stomach ulcer (AOR 2.21, 95%CI 1.14-4.31), migraine (AOR 1.61, 95%CI 1.02-2.56), and heart/circulatory conditions (AOR 2.01, 95% CI 1.07-3.75). Multiple man-made disaster exposure heightened the risk of migraine (AOR 2.98, 95%CI 1.28-6.92) and chronic back or neck conditions (AOR 1.63, 95%CI 1.02-2.62), while multiple natural disaster exposure heightened the risk of stroke (AOR 3.28, 95%CI 1.90-5.67). No other chronic health risks were elevated. Despite the relatively greater chronic health risks linked to man-made disasters, natural disasters were associated overall with more cases of chronic health conditions.
Discussion: The analysis of nationally-representative population data provides a consistent method to examine the unique national imprint of disaster exposure and distinct profile of disaster health risks to inform future detection, prevention measures, disaster health preparedness, and response planning.

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Resurgence of Vector-Borne and Vaccine-Preventable Diseases in Venezuela in Times of a Complex Humanitarian Health Crisis: A Regional Menace

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Introduction: Venezuela has plunged into a humanitarian, economic, and health crisis of extraordinary proportions. This complex situation is derived from dismantling of structures at the institutional, legal, political, social, and economic level affecting the life and wellbeing of the entire population.
Aim: This study aims to assess the impact of Venezuela's healthcare crisis on vector-borne and vaccine-preventable diseases and the spillover to neighboring countries.
Methods: Since October 2014, there is a paucity of official epidemiological information in Venezuela. An active search of published and unpublished data was performed. Venezuela and Latin America data were sourced from PAHO Malaria Surveillance and from Observatorio Venezolano de la Salud. Brazil and Colombian data were accessed via their respective Ministries of Health.
Results: Economic and political mismanagement have precipitated a general collapse of Venezuela's health system with hyperinflation rates above 45,000%, people impoverishment, and long-term shortages of essential medicines and medical supplies. In this context, the rapid resurgence of previously well-controlled diseases, such as vaccine-preventable (measles, diphtheria) and arthropod-borne (malaria, dengue) diseases has turned them into epidemics of unprecedented magnitudes.

Between 2000-2015 Venezuela witnessed a 365% increase in malaria cases followed by a 68% increase (319,765 cases) in late 2017. The latest figures have surpassed 600,000 malaria cases with a prediction to reach 1 million by the end of 2018. Measles and diphtheria have recently re-emerged after a progressive interruption of the national immunization program, with vulnerable indigenous population being particularly affected. In response to Venezuela's rapidly decaying situation, a massive population exodus is ongoing towards neighboring countries causing a spillover of diseases.

Discussion: Action to halt the spread of vaccine-preventable diseases within Venezuela is a matter of urgency for the country and the region. Global and hemispheric health authorities should urge the Venezuelan government to allow establishing a humanitarian channel to bring relief.

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Surge Capacity Planning to Inform the Need for International and Domestic Emergency Medical Team Deployments Following a Severe Wellington, New Zealand Earthquake

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Introduction: Wellington, New Zealand has a significant earthquake risk with unique response challenges posed by its geography and limited road, rail, and sea access. In 2014, the World Health Organization (WHO) Emergency Medical Team (EMT) initiative published minimum and technical standards for EMTs in response to failures by responding teams to deliver appropriate and ethical clinical care during a number of disasters (Norton, 2014). The initiative has evolved to develop national and International EMTs in addition to a support capacity building within Ministries of Health to better coordinate clinical capacity during an emergency.

Aim: Over the last two years, the WHO EMT Coordination Cell (EMTCC) course has trained over 300 health personnel globally to coordinate clinical surge capacity using a three-step Impact Assessment, Needs Assessment, and Tasking process informed by disaster epidemiology and mass casualty ratios.

Methods: EMTCC planning methodology was applied to the "Wellington Earthquake National Initial Response Plan" (MCDEM, 2017) to develop a Health Action Plan for a significant Wellington earthquake. Known earthquake impact modeling for injuries was applied against predicted capacity in receiving hospitals in the affected region, and the ability to transfer patients nationally to determine unmet response needs. EMT minimum standards and operational insights from recent disasters were then used to determine the number of EMTs required for optimal tasking.

Discussion: The surge planning methodology provided a theoretical framework for national and local health emergency management staff to engage with clinical colleagues. This allowed likely EMT assistance to be pre-planned, which facilitates further planning with national and local emergency management, border, and registration agencies for rapid entry into NZ, including onward transport and logistical support. While injury treatment ratios had to be refined to reflect NZ context, the methodology proved useful for Ministries of Health to pre-identify the need for international assistance in national emergencies.

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The Importance of Enforcing Road Safety Laws to Reduce Road Traffic Collision (RTC) Occurrence and Fatalities in Nigeria

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Introduction: Road Traffic Crashes (RTC) are one of the most preventable causes of death worldwide, yet are the number one cause of death in Nigeria. In March 2010, the United Nations General Assembly launched "The Decade of Action for Road Safety (2011-2020)" to "reduce road traffic deaths and injuries by 50% by 2020."

Aim: To analyze trends in RTC and deaths in relation to current road safety laws in Nigeria, and possible future interventions.

Methods: Annual reports from 2013-2017 were obtained from the Federal Road Safety Corps (FRSC) of Nigeria. These reports were analyzed for trends in RTC, deaths, and reported causes to find areas of possible improvement.

Results: The number of RTC and deaths declined yearly from 2013-2017. Crashes decreased from 23.4% in 2013-2014 to 6.2% in 2015, to 0.4% in 2016, and then increased to 3.2% in 2017. Results showed that fatalities from RTC in 2013-2014 decreased by 8.4%, then by 9.3% in 2015, and by 7.1% in 2016, but had a 1.3% increase in fatalities from 2016-2017. Analysis showed that speed violations (SPV) were the top cause of RTC. These had a decrease in the number of crashes from 5,495 (32% of RTC) in 2013, to 3,496 (29%) in 2014, to 3,195 (26.5%) in 2015. They then increased to 3,848 (33.9%) in 2016 and to 4,840 (44.1%) in 2017. There was a decline in reports of RTC caused by driving under the influence (DAD) from 1% in 2013, to 0.8% in 2014, and 0.5% in 2015 and 2016.

Discussion: Current road safety laws have been effective in decreasing the total number of RTC and deaths. While certain laws such as those regarding DAD have been effective, other laws such as speed limits have been less successful and may require further changes in legal codes and/or enforcement.

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CASE STUDIES

Epidemic Thunderstorm Asthma

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Introduction: On November 21 and 22 of 2016, Victoria witnessed an unprecedented epidemic thunderstorm asthma emergency event in size acuity and impact. This scenario was never exercised nor contemplated. The event resulted in a 73% increase in calls to the Emergency Services Telecommunications Authority and 814 ambulance cases in the six hours from 6 pm on November 21, 2016. A 58% increase in people presented to public hospital emergency departments in Melbourne and Geelong on November 21 and 22, 2016 (based on the three-year average). 313 calls were made to the nurse on call from people with breathing, respiratory, and allergy problems (compared to an average of 63 calls for the previous month). Tragically, ten deaths are linked to this event.
Methods: A substantial amount of work has been completed, much of which goes towards addressing the Inspector-General for Emergency Management recommendations following a review of the event, including:

- Release of an epidemic thunderstorm asthma campaign and education programs which were rolled out across Victoria for the community and health professionals from September through November 2017;
- Development of a new epidemic thunderstorm asthma forecasting system on 1 October 2017 and updated warning protocols during the 2017 grass pollen season;
- Implementation of a Real-time Health Emergency Monitoring System to alert the department of demands on public hospital emergency departments on the system; and
- Introduction of a new State Health Emergency Response Plan in October 2017 to improve coordination and communications before and during a health emergency.

Discussion: The presentation will concentrate on the lessons learned more than two years down the track from the event in November 2016.

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Hurricane Sandy - Initial Evaluation of Patient Characteristics

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Introduction: Disaster medical team response by governmental and non-governmental responders is highly variable and poorly characterized. Each response is unique in terms of caseload, patient demographics, and medical needs encountered. This variability increases the difficulty of determining team member composition as well as supply and equipment needs. In an effort to demonstrate this issue, we have reviewed the National Disaster Medical Response to Hurricane Sandy.
Methods: This project was a retrospective chart review of Hurricane Sandy data abstracted from the National Disaster Medical System (NDMS) Health Information Repository (HIR) medical records from the NDMS system response, and were abstracted for data including vital signs, ages, sex, chief complaint, and final impressions. In addition, length of stay among other parameters was abstracted. The data was analyzed using Microsoft Excel and Access with descriptive statistics. In addition, the results were compared to similar indices in a community emergency department and prior NDMS responses.
Results: The results indicate a wide range of patient ages, chief complaints, and final impressions. The vast majority of patients seen by Disaster Medical Assistance Teams (DMAT) were stable with relatively low acuity issues. The total number of charts reviewed were 7,905. Respiratory complaints were the most frequent at 845 patients followed by toxicology/injuries at 706 patients and mental health issues at 452 patients. In approximately 3,400 patients, no diagnosis was present in the chart. Length of stay averaged below 1 hour and peak patient ages were between 50-60 with a significant number of infants less than 2 years.
Discussion: Characterization of NDMS responses by DMATs and comparison with prior events and community emergency department caseloads can provide an insight into the needs of DMATs and other response organizations in future responses.

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Level of Emergency Preparedness Before and After a False Missile Alert in Hawaii

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Introduction: On January 13, 2018, a false ballistic missile alert that lasted 38 minutes was issued across Oahu, Hawaii, United States. As a result of a system failure, an erroneous text message was sent that stated, "Ballistic missile threat inbound to Hawaii. Seek immediate shelter."
Aim: The research team wanted to know the degree of reported anxiety triggered by the event and if knowledge, attitudes, or behaviors for individual/family emergency preparedness (EP) changed post-event.
Methods: A 50-question survey that asked about individual and family EP pre- and post-event, and the level of anxiety triggered by the event, was administered to a convenience sample of full-time adult residents of Oahu. The study was conducted over a 6-8 week period post-event. Statistical analysis was used to identify factors associated with an increasing level of EP post-event and reported event-triggered anxiety.
Results: 209 participants completed the survey (29% male, 71% female) with about one half living with children. One third were essential workers. Key factors that correlate with increasing various areas of EP post-event include higher educational, receipt of electronic emergency alerts, prior emergency training, and higher reported connectedness to community. Those with higher event anxiety were more likely to develop and practice an EP plan post-event, encourage EP with friends, and report a higher level of community connectedness. The elderly were more likely to have higher levels of EP before and after the event but were less likely to receive emergency alert notifications or have EP training.
Discussion: While the event was very unfortunate, it did seem to stimulate citizen disaster EP among some groups. Additional research should explore the utility of increasing EP education for communities immediately after disasters, tailoring this education for groups, and targeting the elderly for participation in the emergency alert system.

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Morwell Coal Mine Fire as a Cascading Disaster: A Case Study

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Introduction: Despite the influential Hyogo and Sendai Frameworks, risk remains poorly understood in the emergency preparedness sector. Hazard assessment and risk management are usually considered before events. An alternative view considers risk as a cascade of potential consequences throughout an event. The 2014 fire in the Victorian rural community of Morwell included a three-phased event: a small bush fire, from which embers ignited a persistent fire in a disused open cut brown coal mine fire. The consequent air pollution precipitated a public health emergency in the nearby community of 15,000 people.
Aim: To examine this event as a case study to investigate concordance with accepted definitions and key elements of a cascading event.
Methods: Selected literature informed a risk cascade definition and model as a framework to examine the key post-event public inquiries available in the public domain.
Results: Informed by a Conceptual Framework for a Hazard Evolving into a Disaster (Birnbaum et al., 2015), Wong and colleagues promote a Core Structure of a Comprehensive Framework for Disaster Evaluation Typologies (Wong, 2017). This Core Structure provided an adequate model to examine the sequence of events in the Morwell event. Definitions of cascading effects is more complex (Zuccaro et al., 2018). Our analysis of the Morwell event used the authoritative definition of cascading disasters published by Pescaroli and Alexander (2015). Using this definition, the Morwell event increased in progression over time and generated unexpected secondary events of strong impact. The secondary events could be distinguished from the original source of disaster, and demonstrated failures of physical structures as well as inadequacy of disaster mitigation strategies, while highlighting unresolved vulnerabilities in human society.
Discussion: The Morwell coal mine fire of 2014 reflects the key criteria of a cascading disaster and provides understandings to mitigate the consequences of similar events in the future.

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Multiple Patients with Burn Injury Induced by a Chemical Explosion Managed by Physician-staffed Helicopters

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Introduction: The management of chemical and explosive events is critical to reducing morbidity and mortality. However, initial patient care considerations and protective actions for staff are unfamiliar to most frontline clinicians.
Methods: This study evaluated an Incident report.
Results: On December 1, 2017, a factory of chemical industries in Japan exploded. Dust forming as a byproduct from the crushing and packing process of the resin for ink exploded at the facility. A local fire department requested the dispatch of two physician-staffed helicopters (known as a doctor helicopter [DH] in Japan). The first party of emergency services established a headquarters and first-aid station. However, this area was feared to be at risk of a second explosion. Physicians performed re-triage for all 11 burned patients. Three severely injured patients were transported to emergency medical service centers either by ground ambulance or the DH without undergoing any decontamination. The physician who escorted the patient by ground ambulance complained of a headache. One of the severely injured patients was treated at a local hospital and then transported to an emergency medical service center after undergoing decontamination and intubation. Fortunately, all patients who were transported to medical facilities obtained a survival outcome.
Discussion: Chemical, biological, radiological, nuclear, and explosive incidents are rare, but can be fatal for responders to this kind disaster. As such, all who work at such scenes should be prepared and train adequately to ensure they have the knowledge and skill to both manage patients and protect themselves from harm.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

CBRN

Chemical, Biological, Radiological, Nuclear, and Explosive (CBRNe) Preparedness: Perceptions of Australian Emergency Department (ED) Doctors and Nurses

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Introduction: Clinicians working in emergency departments (ED) play a vital role in the healthcare response to chemical, biological, radiological, nuclear, and explosive (CBRNe) events. However, ED clinicians' individual and workplace preparedness for CBRNe events is largely unknown.
Aim: The aim of this research was to explore Australian ED nurses and doctors' perceptions of individual and workplace preparedness related to CBRNe events.
Methods: The study populations were Australian nurses and doctors who work in EDs. Data was collected via a survey with 43 questions requiring binary responses or a rating on a Likert scale. The survey consisted of questions relating to the participant's previous disaster training, perceived likelihood of a CBRNe event impacting their ED, perceived level of knowledge, perceived personal preparedness, perception of ED preparedness, and willingness to attend their workplace. Data were analyzed using descriptive and inferential statistics.
Results: There were 244 complete responses, 92 (37.7%) doctors and 152 (62.3%) nurses. When comparing doctors and nurses, there was a statistical difference between gender ($p = < 0.001$), length of employment ($p = < 0.001$), and role in the ED ($p = < 0.001$). Doctors and nurses had a similar level of previous training except for practical training in mask fitting ($p = 0.033$). CBRNe events were considered separately. Perceived level of knowledge, perceived personal preparedness, and perception of ED preparedness were significant predictors of willingness to work in all CBRNe event. Perceived likelihood of a CBRNe event impacting their ED was not a predictor of willingness.
Discussion: This research contributes to an overview of the current status of Australian ED clinicians' preparedness for CBRNe response. To increase the willingness of ED doctors and nurses attending their workplace for a CBRNe event, strategies should focus on enhancing individuals perceived level of knowledge, perceived personal preparedness, and perception of ED preparedness.

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Crisis State of Medical Readiness and Citizen Preparedness Importance for Radiological and Nuclear Incidents

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Introduction: In 2017, members of our workgroup published on the readiness for nuclear and radiological incidents among emergency medical personnel.[1] Our findings, along with a review of pertinent literature, suggest that the state of medical preparedness for these incidents is in crisis. A 2018 publication addressing nuclear terrorism preparedness relegates medical preparedness to a low priority and describes it as potentially dangerous.[2] The crisis status of medical preparedness for these incidents is addressed.
Aim: To establish a prepared medical workforce and trained public for those at risk from nuclear or radiological disasters.
Methods: This Institutional Review Board (IRB)-approved survey published an article and used a relevant literature review.
Results: Readiness for nuclear and radiological incidents is lacking in multiple areas including education, training, identifying medical needs, willingness to come to work, and perception of relative risk among medical personnel.[1] Confounding this is recent prominent publication downplaying and discouraging medical preparedness for nuclear terrorism.[2] The importance of a readied workforce and a prepared public is identified.
Discussion: In 2013, we formed a multi-national workgroup focused on preparing health professionals and the public for clinical management of casualties during nuclear and radiological disasters. Modeling has demonstrated predictable casualty injury and illness patterns suggesting that early appropriate medical response will save lives. Readiness demands an educated, skillful, and willing-to-engage medical workforce. Our 2017 publication identified several areas that place medical preparedness at risk.[1] A significant risk to medical preparedness may lie in prominent publications discouraging the pursuit.[2] We firmly believe that medical preparedness is essential and begins with a prepared public.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

CIVILIAN MILITARY COOPERATION

Disaster First Responder Training: A Train-the-Trainer Veterans Program to Combat PTSD

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Introduction: There are many health challenges faced by those returning from military service. Posttraumatic stress disorder (PTSD) is a serious problem in veterans. PTSD is a risk factor for suicide in veterans. Standard treatments include medication and talk therapy. Non-traditional treatments include civil service and leadership training.
Aim: Assess the effectiveness of Veteran Focused Train-the-Trainer (TTT) Community Disaster Response and First Aid (DRAFA) Programs in promoting health, wellness, reintegration, and decreasing PTSD symptoms of veterans.
Methods: A longitudinal cohort study was conducted using a convenience sample of veterans living in Denver, Colorado or Reno, Nevada. The sample size was over 50 (N=50+), with 25+ case-matched veterans at each location. This is an ongoing project lasting through the end of 2020. Inclusion criteria selected veterans interested in DRAFA training and education. Exclusion criteria disqualified those who are not a veteran or those unable to perform physical tasks required by curriculum. The null hypothesis was that there is no relationship between the DRAFA TTT program and the health, well-being, and reintegration of veterans back into their communities. Statistical tools used were SPSS Statistics (Version 25) and NVivo 12-12.2.0.3262. Research activities were conducted under the auspices of the University of Colorado and guided by the principles of the Institutional Review Board (IRB).
Results: Results are being evaluated using a mixed methods impact model. The main outcomes measured health, wellness, and reintegration using Veterans RAND-12 Health Quality of Life Survey, the Military to Civilian Reintegration Survey, and a satisfaction survey. Preliminary analysis may indicate a correlation between participation in the DRAFA TTT program and improved health/wellness outcomes, better reintegration into society, and decreased PTSD.
Discussion: There is growing evidence that expedited structured reintegration programs in community preparedness and disaster leadership roles for veterans alleviate PTSD symptoms and improves quality of life.

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Key Elements of Civil-Military Disaster Rescue Operation in China

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Introduction: In China, many disaster rescue operations need cooperation between civil forces and military forces. Understanding the key elements of civil-military disaster rescue operations is a basic problem faced by Chinese rescuers and scholars.
Aim: To summarize the key elements of civil-military disaster rescue operations in China.
Methods: On July 17, 2016, an expert round-table meeting was held on our campus to discuss some basic problems in disaster research. The participants arrived at a consensus that the key elements of civil-military disaster rescue operation under Chinese cultural context should be carefully analyzed using Six Sigma (Why, Who, What, When, Where, and How, 5W1H)
Methods: The minutes of the meeting was summarized into a brief report.
Results: (1) Why to rescue - it is the responsibility of modern government to protect its people; (2) Who are the rescuers - individuals or groups with passion and ability to do such work, but they should be organized properly; (3) What to do - make vital systems of the community run normally as soon as possible; (4) When to rescue - different disasters have different laws, but it is better to render help in the golden hour; (5) Where to rescue - it depends on the input process (material, human resources, etc.) and output process (patients, waste material, etc.) of the rescue operation, not merely confined to the disaster site; (6) How to rescue - cooperation among all branches of social sectors is vital to succeed, especially civil-military cooperation. Military force is the backbone force in an austere environment.
Discussion: The discipline of disaster medicine is developing rapidly in China. The research and evaluation framework should be established carefully. Civil forces and military forces should have an identical understanding of the same question. This abstract is only part of the research framework.

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CLIMATE CHANGE

Rising Sea Level and the Growing Threat of Hazardous Material Releases: A Pilot Project in Coastal Virginia

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Introduction: Hazardous materials are widely used in modern society, including in industry, business, agriculture, research, healthcare, and other sectors. As sea levels continue to rise around the globe, locations where hazardous materials are produced, stored, transported, or utilized become increasingly vulnerable to flooding, storm surge, and other problems that can result in accidental releases. Such releases can pose threats to health, the environment, and the economic viability of communities.
Aim: This paper reports on a new pilot project in Coastal Virginia to increase awareness, enhance safeguards, and strengthen preparedness for the growing threat of hazardous material releases posed by rising sea levels.
Methods: Launched under the Institute for Coastal Adaptation and Resilience (ICAR) at Old Dominion University, with support from the ODU Resilience Collaborative, the project includes several components. One part identifies hazardous materials sectors that could be affected by rising seas. Another component consists of case studies of locations that have already been affected. A third component involves stakeholder workshops where participants work collaboratively to enhance safeguards and strengthen preparedness.
Results: Designed in 2017 and 2018, the project secured initial funding early in 2018. Since then, the project has worked to identify sectors and activities that could be affected by rising seas and establish links with key stakeholder agencies, sectors, and organizations. The next steps, to be completed in 2019, involve preparation of case studies from facilities already affected by rising sea levels, and the implementation of the first in a series of stakeholder workshops.
Discussion: As sea levels rise, more hazardous materials locations become vulnerable. Proactively addressing this threat is an essential part of sea level rise preparedness, adaptation, and resilience. The new pilot project in Coastal Virginia is intended to help address this challenge by increasing awareness and bringing stakeholders together to collaboratively identify practical steps forward.

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COMMUNITY RESILIENCE

Positively Adapting to a Changed Reality

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Introduction: Following the New Zealand November 2016 earthquake, mental health staff were deployed to assist with the immediate levels of distress in the community. The work included working with individuals, couples and families, staff wellbeing sessions, psychosocial education, and participating in outreach clinics to isolated communities.
Aim: Aware of international evidence and the experience following the 2010/11 earthquakes, the aim was to provide mental health assistance to address issues as early as possible with the intent that this would reduce the future demands on specialist services.
Methods: Following the response phase, a small team of mental health specialists formed the Recovery and Wellbeing Team working in the affected communities undertaking clinical, consult, advisory, and educational work as needed. The team flexed and evolved to meet the changing needs. A range of data was collected and analyzed to monitor the work and the outcomes of this team.
Findings: With additional support provided following the earthquake, there has been a significant positive change in the numbers of referrals to secondary mental health services in Christchurch. A new model of care has now been collaboratively developed, as the mental health system positively adapted to a changed reality. This model is essentially an easily accessed, early intervention, comprehensive model of mental health service to maintain the positive gains.
Discussion: Following a significant disaster, all involved will benefit from some form of psychosocial support. For most, this will be achieved through the person's own networks. For some, the event will trigger responses from previous traumatic experiences and a few mental health supports will be required. Having skilled professionals with the ability to cope with the constantly changing needs, and who are available to meet people at the earliest opportunity, has enabled issues to be resolved rather than leaving these issues to escalate over time.

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Victorian Compendium of Community-Based Resilience Building Case Studies - Critical Success Factors Help Communities Strengthen Resilience to Disasters

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Introduction: Global conversations emphasize strengthening communities' resilience to disasters. These conversations inspired the Victorian Compendium of Community-Based Resilience Building Case Studies. The Compendium motivates community members to build expertise, reduce program duplication, and save valuable resources. Case study analysis identified critical success factors. Between 2012 and 2018, community groups completed an Expression of Interest to present at the MUDRI Advancing Community Resilience Forums, which provided an opportunity to impart resilience activities and knowledge. It also solved challenges and shared unforeseen learning. Over six years, 72 groups presented. Subsequently, 35 submitted their activity for consideration into the Compendium. Of these 35, 30 were included.
Aim: This updated research analyses critical success factors of 30 case studies. Success factors support the key tenet of the Victorian Compendium of Community-Based Resilience Building Case Studies: to promote the sharing of achievable, practical resilience building activities. The online Compendium provides free access for all communities to explore activities before, during, and after disasters.
Methods: A thematic analysis identified critical success factors of 30 Compendium case studies.
Results: Case studies revealed unique and valuable learning in diverse settings. The critical success factors included: (1) strong governance, Board support, leadership and trust; (2) partnerships; (3) commitment, adaptability, and stamina; and (4) community-based initiatives. Other success factors included a paid facilitator and local government support, stamina, and celebrating success.
Discussion: The Compendium represents an Australian first and offers an innovative contribution to resilience practice and research. It enhances other Victorian initiatives such as the Rockefeller funded Resilient Melbourne Strategy, which incorporates the Compendium to bring people together from across sectors to deliver distinct, yet connected actions to strengthen resilience. The Compendium enables diverse communities to adopt or adapt proven resilience activities, thereby preserving valuable resources. It offers the opportunity to extend to a national or international Compendium.

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COUNTER TERRORISM

Chemical Warfare Agent Terrorist Attacks in Latin America and the Caribbean Region (CWA-LAC)

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Introduction: In the past five decades, the region of Latin America and the Caribbean (LAC) has been subject to several types of terrorist attacks, with most committed by local terrorist organizations. However, there have also been attacks by international terrorist groups. Internationally, terrorist attacks are increasing in both frequency and complexity. Significant concerns exist regarding the use of Chemical Warfare Agents (CWAs) in civilian settings. Asphyxiants (e.g. cyanide), opioids (e.g. fentanyl), and nerve agents (e.g. sarin) represent some of the most lethal CWAs. To date, there is very little published data on their use in the LAC region despite the fact that the recent attacks in Syria have sparked international interest in the use and regulation of CWAs.
Aim: To improve civilian health service preparedness in response to CWAs attacks by describing the types of agents historically used within the LAC region.
Methods: Information was extracted and analyzed from the open-source Global Terrorist Database hosted by the University of Maryland, regarding CWA-LAC from January 1, 1970, to December 31, 2017.
Results: During the forty-seven year period reviewed, there were 29,846 terrorist attacks in the LAC region, with 63.6% occurring in the southern region. Twenty-nine CWA attacks were reported, with the most common agents being tear gas (37%) and cyanide (29.6%). The most frequent targets were religious figures/institutions (22.2%), law enforcement (18.5%), and government agencies/personnel (18.5%).
Discussion: Cyanide is one of the most prevalent agents used for chemical weapons attacks in the LAC region. Preparedness should be enhanced for CWA terrorist attacks, especially those involving cyanide, given its life-threatening nature, prevalence, and the existence of reversal agents. First responders, physicians, and nurses should be aware of this potential hazard and be trained to respond appropriately. Additionally, regional stockpiles of antidotes should be considered by governmental bodies within the LAC region.

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A National Model for Tactical Emergency Medical Support in Finland

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Introduction: Tactical Emergency Medical Response (TEMS) originated in the 1990s in Finland. It is a nationally standardized joint-effort with EMS and police special units, such as SWAT.
Aim: To describe a national system of TEMS in Finland.
Methods: In Finland, TEMS is a national response system of specially trained paramedics and pre-hospital doctors, working normally in HEMS or a local physician staffed rapid response car. There is a two-tier selection to get accepted in the basic course. The police run background checks for all participants before they are accepted to the course. The course itself is four days and it covers the basics of police tactics, protective gear, penetrating wounds, evacuation, etc. After graduating from the basic course, the paramedic/doctor is qualified to participate in missions. Although healthcare professionals are involved, a TEMS mission is under the police command and is used as one of the police's special teams to operate in areas where normal EMS cannot be allowed for safety reasons. TEMS does not carry any weapons. The Police provide the teams with the same protective equipment that the SWAT/CTU has. After some years, there is a three-day refresher course for active TEMS service. In this course, the main training points are working in austere environments, such as helicopters, boats, and in urban environments wearing civilian clothing. Police pay for the usage of TEMS in missions, but they do not pay for training days.
Results: TEMS has good national coverage. In 2017, there were 131 TEMS activations. The normal response to a mission is a team of one or two TEMS operators.
Discussion: TEMS has achieved good national coverage and is deployed often. TEMS has also channeled information and training, such as TECC, to normal EMS personnel and raised their preparedness as well.

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Youth Participation in Post-Terrorist Attack Recovery: A Case Study in Southern Philippines

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Introduction: In the southern Philippines, human-induced disasters, such as terrorist attacks, have caused unprecedented damage to the economic, social, and political life of the attacked and nearby areas. More gruesome is the direct impacts to human life and wellbeing. This study focuses on the 2017 Marawi armed siege, the longest urban battle in the Philippines. The 154-day siege took a heavy toll, including 1,132 deaths among militants, soldiers, police, and civilians, and caused the displacement of some 400,000 local inhabitants. The city is in total ruins leaving its economic center as "Ground 0." The aftermath of the siege demands major interventions to address physical and economic damages, but more importantly, to ameliorate the human impacts caused by the brutalities of war. The displaced peoples need to recover from health impacts – psychological trauma, as well as social, environmental, and cultural. The Sendai Framework for Disaster Risk Reduction (DRR) 2015-2030 states that DRR requires society-wide engagement. Everyone, regardless of their age, gender, ethnicity, religion, or socio-economic position, should be involved in thinking, planning, and deciding about DRR. Studies on youth participation in disaster recovery are still scarce.

Aim: This current research aims to help fill this gap and to contribute to providing the much-needed evidence base for the formulation and implementation of future policies to enable and improve youth participation in post-disaster initiatives in the Philippines.

Results: Initial findings reveal that the following are crucial factors for youth mobilization: (1.) avenues for volunteering, (2.) access to adequate resources and support including information, funds, manpower, and social capital, (3.) opportunities for the youth to participate in the form of events or activities, (4.) legal mandate for youth participation in local, national, and international policies and frameworks. The study also looked at barriers or challenges to youth participation and their motivations.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

EBOLA

A State of Biopreparedness

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Introduction: Westmead Hospital (WMH) recognized gaps in its preparedness to respond to the Ebola 2014 outbreak in West Africa. A fragmented system was identified. A 'State of Bio-preparedness' project team convened to discuss all health-care services in the planning, training, and implementation of a biopreparedness response.
Methods: A survey targeting the staff's competence and confidence in biologically hazardous infection management was conducted. Semi-structured interviews explored staff members' experiences and perspectives of biopreparedness response. The collaborative team called "State of Biopreparedness" (SOB) was assembled and a clinical practice improvement project was undertaken. To assess readiness, nine simulated Viral Haemorrhagic Fever (VHF) exercises involving staff and consumers were conducted. These exercises were debriefed by the multidisciplinary committee and themes and issues were identified. These nine simulation drills then assessed readiness and evaluated performance.
Results: A number of consistent issues continue to emerge including:
1. A standard communication pathway for notification was needed - use of the incident paging system (111 pages) to notify the hospital's incident management team.
2. A consistent and coordinated approach to the training and maintenance of standardized and high-level Personal Protective Equipment (PPE) protocols for frontline clinical and clinical staff was required.
3. Clear delineation of roles and responsibilities and supporting these roles by translating the VHF Control Guideline and policy into task cards and checklists.
4. Strengthening intra- and interdepartmental staff collaboration and communication.
5. Infection control measures to be taken by staff after identifying a patient with possible VHF to reduce the risk of transmission of disease to staff, other patients, and visitors.

Discussion: Integrating disaster management processes with clinical protocols had a positive impact on the hospital's biopreparedness response. Simulation exercises were a vital and practical way for staff to feel confident and competent to perform their roles.

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Association Between Vitamin A Supplementation and Mortality Among Patients with Ebola Virus Disease: An International Multisite Cohort Study

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Introduction: Micronutrient supplementation is recommended in Ebola Virus Disease (EVD). However, there is limited data on its therapeutic impacts. This study evaluated the association between vitamin A supplementation and mortality outcomes in EVD patients.
Methods: This retrospective cohort study accrued patients with EVD admitted to five International Medical Corps run Ebola Treatment Units (ETU) in two countries from 2014-2015. Protocolized treatments with antimicrobials and micronutrients were used at all ETUs. However, due to resource limitations and care variations, only a subset of patients received vitamin A. Standardized data on demographics, clinical characteristics, malaria status, and Ebola virus RT-PCR cycle threshold (CT) values were collected. The outcome of interest was mortality compared between cases treated with 200,000 International Units of vitamin A on care days one and two and those not. Propensity scores (PS) based on the first 48-hours of care were derived using the covariates of age, duration of ETU function, malaria status, CT values, symptoms of confusion, hemorrhage, diarrhea, dysphagia, and dyspnea. Treated and non-treated cases were matched 1:1 based on nearest neighbors with replacement. Covariate balance met predefined thresholds. Mortality proportions between cases treated and untreated with vitamin A were compared using generalized estimating equations to calculate relative risks (RR) with associated 95% confidence intervals (CI).
Results: There were 424 cases analyzed, with 330 (77.8%) being vitamin A-treated cases. The mean age was 30.5 years and 57.0% were female. The most common symptoms were

diarrhea (86%), anorexia (81%), and vomiting (77%). Mortality proportions among cases untreated and treated with vitamin A were 71.9% and 55.0%, respectively. In a propensity-matched analysis, mortality was significantly lower among cases receiving vitamin A (RR = 0.77 95%; CI:0.59-0.99; p = 0.041).

Discussion: Early vitamin A supplementation was associated with reduced mortality in EVD patients and should be provided routinely during future epidemics.

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Evolving Strategy and Incident Management Systems in Hard to Reach Areas and Fragile Security Settings: The Case of Ebola Response in the Democratic Republic of Congo

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Introduction: DRC Ministry of Health declared the 9th outbreak of Ebola Virus Disease (EVD) in the Equator province on May 8, 2018, that ended on July 25, 2018. There were 54 cases with 38 confirmed, 33 deaths (61%), and 21 survivors in three "zones de santé" (districts). On August 1, 2018, the 10th EVD outbreak of the country was declared in the Ituri and North Kivu provinces. This one is the most important outbreak ever experienced. By November 18, 2018, 373 cases were reported with 326 confirmed and 214 deaths (58%) in two provinces including 14 "zones de santé." While the 9th outbreak occurred in hard-to-reach areas, the 10th is occurring in fragile security settings, requiring specific strategic/operational approaches.

Aim: To describe strategic and operational approaches including IMSs used to address these deadly outbreaks.

Methods: A case study methodology using response strategy documents and observations was used, coupled with the use of operation review exercises.

Results: The response strategy evolved continuously taking into account the epidemiological context, including geographical spread. It also took into account cultural, political, and sociological (community resistances) sensitivities. Conditions of pre-existing health system and services were considered. The prevailing security context (armed groups) was taken into account. The evolving situation impacted implementation of response areas including critical interventions like setting up confirmation and treatment centres, rapid response teams, and IMS structures. Areas of response were reviewed continuously, including response structures with further decentralization, outreach, or locally delegated interventions to ensure geographical access and continuity in response services.

Discussion: Response areas to deal with EVD outbreaks are well known. However, an effective response requires a continuous adjustment of the strategy and a flexible response structures with related IMSs based on regular deep situation analysis. Social sciences still have a critical role to play for that purpose.

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EDUCATION AND TRAINING

Disaster Medicine for India & Nepal: A Model for Developing Countries

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Introduction: Both India and Nepal are prone to a wide range of natural and man-made disasters. Almost 85% of India's area is vulnerable to one or more hazards, and more than 80% of the total population of Nepal is at risk of natural hazards. In terms of the number of people affected in reported disastrous events, India is in the top 10 and Nepal is in the top 20 globally. Over the last two decades, India and Nepal have taken steps to establish their respective National Disaster Management organizations, which provide essential disaster responses. However, key gaps still remain in trained clinical capacity for managing impacts from various disasters. Our review of the region has shown that large parts of the population suffer injuries, diseases, disabilities, psychosocial, and other health-related problems from disasters.
Aim: Develop disaster medicine clinical capacity to reduce morbidities and mortalities from disasters.
Methods: Independent published data and work undertaken by the lead author in various disasters in India and Nepal since 1993 formed the basis of establishing the Faculty of Disaster Medicine for South Asia. The Faculty of Disaster Medicine - India and Nepal (FDMIN) was launched from Pune in March 2015. This initiative is supported by the National Association of Primary Care (UK), Public Health England, Faculty of Prehospital Care of Royal College of Surgeons - Edinburgh and CRIMEDIM (Novara) - Italy.
Discussion: FDMIN has international expert advisors and has outlined 16 modules training curriculum for health care professionals. FDMIN currently has partnerships for teaching disaster medicine program with 3 medical universities and 12 major health care providers. Six pilot training programmes have been conducted in Pune, Delhi, Chennai, and Kochin. Work is underway to submit an application to the Indian regulatory bodies for approval to establish a post-graduate diploma and Master's for Disaster Medicine.

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The Effect of Moulage on Immersion, Realism, and Learning in a Traffic Accident Training Scenario for Police, Rescue Service, and Ambulance Students

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Introduction: Moulage is the art of creating faked injuries on actors for training purposes. Moulage is commonly used in disaster and emergency medicine training, as it is believed to improve learning through enhanced realism.
Aim: The aim of the current study was to test the effect of moulage on perceived realism and learning during a joint exercise featuring students from the police, rescue service, and ambulance service.
Methods: The scenario was a car accident with two victims. Students (n = 135) were divided into 12 groups. Moulage was applied to the victim actors for half the groups (n = 67), whereas the other half (n = 68) experienced the scenario without moulage. Victim cards were used in both scenarios. Immersion, realism, and learning was measured on a 100-point scale immediately post-scenario using a questionnaire.
Results: Two (moulage group) by three (student population and police, rescue service, or ambulance) ANOVAS on realism, immersion, and learning found no effects on realism or immersion (all $p>0.10$). There was an effect of student group on learning, $F(2, 92) = 3.518$, $p = 0.034$, partial eta square = 0.071, such that the rescue service students had overall lower scores on learning (M = 53.87, SD = 28.29) compared to the police (M = 66.07, SD = 27.55) and ambulance students (M = 74.99, SD = 24.51). Cohen's ds for moulage effect was calculated to 0.144 for immersion, 0.112 for realism, and 0.003 for learning.
Discussion: The current study did not find any effects of moulage on immersion, realism, or learning. The effect sizes indicate that any effect of moulage on realism and immersion, should it

exist, is in the approximate size of 2-3 points on a 100-point scale. The lack of effect may be due to limitations in the study design, but may also indicate that the use of moulage in addition to victim cards is not necessarily beneficial for novice students' learning.

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Patient Healthcare Following a Disaster: Guidelines for Family Doctors

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Introduction: Health effects of disasters are mostly consistent across hazard types. Those working in communities affected by disasters have an opportunity to provide surveillance and early management to patients affected by disaster through increased understanding of the epidemiology or health consequences in the days, weeks, months, and years after disasters. Disasters have been called a social determinant of health and population-level changes or social determinants that have been documented post-incident. Environmental and community disruption contribute to health effects. Consequent health effects are evidenced across body systems, affecting both physical and mental health.
Aim: To develop guidelines for primary care patient review following a disaster, based on the temporal pattern of disease epidemiology.
Methods: A systematic review of the literature was undertaken to examine the epidemiology of health consequences following disasters.
Results: Guidelines for Family Doctors based on the literature review were developed to assist preventative care, surveillance, early identification of emerging conditions, and ongoing management of pre-existing disease.
Discussion: Healthcare management in disasters focuses on acute healthcare in emergency departments and hospitals. However, healthcare is also being provided in primary healthcare settings during the first days to weeks of the catastrophe, with many health consequences ongoing in the weeks, months, and years after the event.

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Seven First Minutes - Community Emergency Response Training

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Introduction: Following a mass casualty incident (MCI), it can take several minutes for emergency medical services (EMS) to arrive. The course was developed by Magen David Adom (MDA) based on unique experience in dealing with MCIs, and the time between alerting emergency services to such an incident until they arrive. The course is focused on teaching the general public to channel their desire to help in such a situation into useful skills which can potentially improve patient outcomes. The seminar focuses on key principles such as safety, calling for help, providing an accurate picture of the scene, and initiating basic treatment with an emphasis on hemorrhage control.
Aim: MDA examined the ability of the general public with no previous medical training to perform a basic triage and treatment in an MCI situation. Additionally, the study examined the abilities of the study groups to manage a scene until the arrival of EMS based on the principles taught in the course.
Methods: MDA has sent teams of instructors around the world to teach over 1,000 participants. Upon completing the course, the participants partake in a drill that assesses their ability to manage a scene of 20 patients. Their ability to initiate the call for help, provide an accurate picture, initiate treatment, and give an accurate report to arriving emergency responders are examined.
Results: The average times were recorded. Within 38 seconds, dispatch was alerted to the situation. Within 2:30 minutes, treatment was initiated for all patients. Within 4:37 minutes, the scene was fully under control, and within 6:37 minutes, an accurate report was transferred to EMS on the scene.
Discussion: The participants demonstrated an unexpected willingness to learn, practice, and partake in the drills, and the results were unexpected.

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A Surprise Mass Casualty Incident Simulation: Does It Improve Knowledge or Is It Just a Bit of Fun?

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Introduction: We opened a national conference in Australia with a surprise mass casualty simulation scenario of a van versus multiple persons outside the conference venue. The purpose of this exercise was to increase awareness of, and preparation for, mass casualty incident (MCI) events for the conference delegates who were paramedics, emergency department nurses, and doctors.
Aim: The aim of the research is to understand whether a surprise MCI simulation is a useful way to increase knowledge and motivate preparedness.
Methods: A survey hosted on Qualtrics was circulated to delegates via email. The survey was designed by the research team and had 38 questions about demographics and respondents' experience with MCIs, as well as their perceptions of the simulation exercise. The questions were a mixture of 5-point Likert scales, multiple choice, and short answers.
Results: The majority of respondents were clinicians (n = 66, 76%) and those who worked in emergency departments or the prehospital setting (n = 75, 86%). While the majority had not responded to an MCI in the past 5 years (n = 67, 77%), more than half (n = 50, 57%) had undertaken MCI training during

this time. Overall, a vast majority of respondents found the simulation to be a worthwhile exercise that increased knowledge and preparedness. An overwhelming majority also reported that the simulation was relevant to practice, of high quality, and a useful way to teach about major incidents.
Discussion: Our surprise major incident simulation was a fun and effective way to raise awareness and increase knowledge in prehospital and emergency department clinicians about MCI response. This approach to simulation can be easily replicated at relatively low cost and is, therefore, a useful solution to training a group of multidisciplinary health professionals outside of the workplace.

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Training Emergency Department Charge Nurses Through Tabletop Exercises

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Introduction: In a disaster or mass casualty incident, the Emergency Department (ED) charge nurse is thrust into an expanded leadership role, expected to not only manage the department but also organize a disaster response. Hospital emergency preparedness training programs typically focus on high-level leadership, while frontline decision-making staff get experience only through online training and infrequent full-scale exercises. Financial and time limitations of full-scale exercises have been identified as major barriers to frontline training.
Aim: To discuss a cost-effective approach to training ED charge nurses and informal leaders in disaster response.
Methods: A formal training program was implemented in the ED. All permanent and relief charge nurses are required to attend one four-hour Hospital ICS course within their first year in their position, as well as participate in a minimum of one two-hour ED-based tabletop exercise per year. The tabletop exercises are offered bimonthly, covering various mass casualty scenarios such as apartment complex fires, riots, and a tornado strike. Full-scale exercises involving the ED occur annually.
Results: ED permanent and relief charge nurses expressed increased skills and knowledge in areas such as initiation of disaster processes, implementation of hospital incident command, and familiarization with protocols and available resources. Furthermore, ED charge nurses have demonstrated strong leadership, decision-making, and improved response to actual mass casualty incidents since implementing ICS training and tabletop exercises.
Discussion: Limitations of relying on full-scale disaster exercises to provide experience to frontline leaders can be overcome by the inclusion of ICS training and tabletop exercises for ED charge nurses in a hospital training and exercise plan. Implementing a structured training program for ED charge nurses focusing on leadership in mass casualty incidents is one step to building a more resilient and prepared ED, hospital, and community.

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Use of Moulage in Multi-Disciplinary Mass Casualty Incident (MCI) Training: Cost-Effective Tool or an Expectation?

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Introduction: A 2018 poll by the American College of Emergency Physicians shows 93% of surveyed doctors believe their emergency department is not fully prepared for patient surge capacity in the event of a natural or man-made disaster. While an emergency disaster plan is activated during any incident where resources are overwhelmed, many US emergency physicians today think of a mass casualty incident (MCI) as the inciting event. To better prepare our communities, an MCI simulation took place in Chicago 2018 with participation from local and federal representatives. Included were Chicago fire, police, and emergency medical services agencies, emergency medicine physicians, resident participants, and medical student volunteer victims.
Aim: The study's aim was to determine whether resource intensive moulage was an expected component or a beneficial adjunct, if moulage-based training would improve physician preparedness, and if such a training would increase the likelihood of future involvement in local disaster preparations. Analysis was performed on pre- and post-training surveys completed by participants. By reviewing the benefits versus cost, future MCI simulation planners can efficiently use their funds to achieve training goals.
Methods: Thirty-two emergency medicine physicians were surveyed before and after a five-hour training session on October 20, 2018, which included 89 moulage victims. Twenty-four after-event surveys were completed. All completed surveys were utilized in data analysis.
Results: Of polled participants, a 68% improvement in general preparedness was achieved. While only 19% of participants cited current involvement in their facility's disaster planning in pre-event survey, the likelihood of involvement after training was 8.2/10. Overall, the importance of moulage an essential component to such trainings remained constant.
Discussion: Moulage is an expected and crucial element to MCI training and should be incorporated as extensively as resources allow. MCI trainings improve physician preparedness and potentially increase physician involvement in disaster planning at home institutions.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

EMERGENCY MANAGEMENT AND RESILIENCE

Exploring the Ethical Dimensions of All-Hazards Public Health Emergency Preparedness in Canada

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Introduction: With increasing disaster risks from extreme weather, climate change, and emerging infectious diseases, the public health system plays a crucial role in community health protection. The disproportionate impacts of disaster risks demonstrate the need to consider ethics and values in public health emergency preparedness (PHEP) activities. Established PHEP frameworks from many countries do not integrate ethics into operational approaches.
Aim: To explore the ethical dimensions of all-hazards public health emergency preparedness in Canada.
Methods: A qualitative study design was employed to explore key questions relating to PHEP. Six focus groups, using the Structured Interview Matrix (SIM) format, were held across Canada with 130 experts from local, provincial, or federal levels, with an emphasis on local/regional public health. An inductive approach to content analysis was used to develop emergent themes, and iteratively examined based on the literature. This paper presents analyses examining the dimensions of ethics and values that emerged from the focus group discussions.
Results: Thematic analysis resulted in the identification of four themes. The themes highlight the importance of proactive consideration of values in PHEP planning: challenges in balancing competing priorities, the need for transparency around decision-making, and consideration for how emergencies impact both individuals and communities.
Discussion: Lack of consideration for the ethical dimensions of PHEP in operational frameworks can have important implications for communities. If decisions are made ad-hoc during an evolving emergency situation, the ethical implications may increase the risk for some populations, and lead to compromised trust in the PHEP system. The key findings from this study may be useful in influencing PHEP practice and policy to incorporate fairness and values at the core of PHEP to ensure readiness for emergencies with community health impacts.

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In What Ways Does Australian Emergency Management Reflect the Criteria of a Profession?

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Introduction: The term "profession" to describe the people who carry out emergency management (EM) in Australia continues to gain momentum. Many emergency managers see themselves and are seen by others as professionals, yet little evidence exists to confirm this proposition. Unlike other professions, there is no peak body or overarching organization in Australia to help the diverse group of emergency managers to identify standards of performance and to lobby decision-makers on their behalf.
Aim: This study identifies criteria that define a profession and considers how the emergency management sector in Australia reflects them.
Methods: A literature review and review of established professions informed criteria of what constitutes a profession. Using these criteria, a survey was conducted to identify the demographic profiles of Australian emergency managers, their perception of the criteria of a profession, and their attitudes towards professionalization of their sector. Semi-structured interviews were conducted with a representative sample. Ethics approval was obtained.
Results: A set of criteria for an EM context in Australia was created. 859 emergency managers in Australia were surveyed using an online questionnaire. No common profile emerged from the survey in terms of age, gender, background, expertise, skills, or experience. Likewise, no clear career path, no clearly defined standard training, no universal standards of performance, and no statutory certification to qualify an emergency manager as a professional were revealed. Participants variously identified some of the necessary criteria of a profession, but no uniformity emerged.
Discussion: This unique study concludes that the sector is not yet in a position to regard emergency management as a profession. Recommendations suggest steps be taken in the short- and long-term to facilitate the establishment of EM as a profession and identifies further research to inform the journey towards professionalizing the emergency management sector.

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Long-Term Disaster Resilience: A Research Gap

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Introduction: This research identified a gap in understanding the lived experience of long-term disaster resilience (LTDR). Increasing disasters could influence more people. Therefore, understanding LTDR becomes imperative. Little research documents men and women's reflections following disasters. Current research highlights survivors' mental health, particularly clinical diagnoses like PTSD. Research remains limited on the social impacts long after disasters.
Aim: Research aimed to identify a gendered perspective of the lived experience about what contributes to LTDR three years after Ash Wednesday in 1983, the Victorian floods in 1993 and 2010-11, and the 2009 Black Saturday fires.
Methods: A comprehensive, systematized search was conducted of peer-reviewed, grey, and secondary literature for a narrative review and thematic analysis.
Results: 106 references were identified. After removing duplicates and papers not fitting the inclusion criteria, two papers met the criteria. However, two borderline papers were included due to the closeness of the timeframe and brevity of research available.
Discussion: Most research is related to the immediate aftermath or short-term resilience. Papers provided no specific attributes to enhance the lived experience of LTDR as it related to gender. However, factors that could enhance the lived experience of LTDR were drawn from six themes in sociological studies. Presumptive interpretations were made about what factors may provide insight into the social and contextual issues of LTDR. The literature dearth identified the need for long-term disaster resilience research. The most striking conclusion drawn from themes tells how people perceived the way a disaster and the ensuing period affected their personal relationships and circumstances. Overall, positive experiences strengthened their resilience while negative experiences hindered their resilience. While the review resulted in a disappointing outcome, the dearth of LTDR research lacked any reference to gender but confirmed research opportunities for innovative research that could influence policy and practice.

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Overcoming Ambiguity: Conflict Between Emergency Warning Messages and Socio-Environmental Cues

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Introduction: Emergency services are not the only source of information that the public uses when considering taking action during an event. There are also environmental cues, information from the media, or actions by peers that can influence perceptions and actions. When cues from different information sources are in conflict, it can cause uncertainty about the right protective action to take.
Aim: Our research responds to concerns that conflicting cues exacerbate community non-compliance with emergency warnings.
Methods: The sample consisted of 2,649 participants who completed one of 32 surveys.
Results: The findings from this project confirmed emergency services agencies' suspicions that conflicting cues can affect information processing and risk perceptions, and therefore prevent people from taking appropriate protective action. The results were reasonably consistent across fire and flood scenarios, suggesting the problem of conflicting cues is not hazard-specific. When presented with consistent cues, participants were more likely to evacuate, perceive risk about the event, share information with friends, family, and peers, find emergency warnings to be effective, and comprehend information. When faced with conflicting cues, participants were more likely to seek out additional information. It affected their information processing and self-efficacy. The results did not change for people of different ages, native language, country of birth, or post-hazard experience. This is contrary to most emergency literature research findings, which show that individual differences play a role in impacting propensity to take protective action. However, there does appear to be a significant gender effect. These results require further exploration.
Discussion: These findings may be used to assist emergency services agencies to tailor community warnings during time-critical situations, and develop ways to mitigate ambiguity caused by conflicting cues to encourage protective action in order to save lives and properties.

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Practice, Experience, and Prospect of Disaster Medicine in China

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Introduction: In recent years, the development of disaster medicine has made rapid progress in China after the Wenchuan earthquake in 2008. China formed a more systematic and specialized health emergency force. In addition, the Ministry of Emergency Management was established In 2018, which demonstrated that the Chinese government is paying more attention to the disaster rescue work. In this report, the practice, experience, and prospect of disaster medicine in China was reviewed.
Aim: To explore the current status and prospects of disaster medicine development in China.
Methods: The literature research method was used to analyze literature at home and abroad. It was used to retrospectively analyze the rescue experience of Chinese medical rescue teams, sort out the current situation of disaster medical disciplines and rescue teams, and propose disaster medical development recommendations suitable for China's national conditions.
Results: After years of construction, China has formed a more systematic and specialized health emergency force, but the personnel, equipment, plans, and training of the professional

rescue team need to be improved. The discipline system of disaster medicine in China is still lagging behind, and it is still unable to meet the needs of the rescue situation at home and abroad.
Discussion: Disaster medicine is the area of medical specialization serving the dual areas of providing health care to disaster survivors and providing medically related disaster preparation, disaster planning, disaster response, and disaster recovery leadership throughout the disaster life cycle. It requires multidisciplinary intervention, integration, and application. A forward-looking perspective must be strengthened on the discipline and team building of disaster medicine.

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Reviewing Disasters: Hospital Evacuations in the United States from 2000 to 2017

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Introduction: Between 2000 to 2017, there were over 150 hospital evacuations in the United States. Data received from approximately 35 states were primarily concentrated in California, Florida, and Texas. This analysis will provide disaster planners and administrators statistics on hazards that cause disruptions to hospital facilities.
Aim: The aim of this study is to investigate US hospital evacuations by compiling the data into external, internal, and man-made disasters thus creating a risk assessment for disaster planning.
Methods: Hospital reports were retrieved from LexisNexis, Google, and PubMed databases and categorized according to evacuees, duration, location, and type. These incidents were grouped into three classifications: external, internal, and man-made. Both partial and full evacuations were included in the study design.
Results: There were a total of 154 reported evacuations in the United States. 110 (71%) were due to external threats, followed by 24 (16%) man-made threats, and 20 (13%) internal threats. Assessing the external causes, 60 (55%) were attributed to hurricanes, 21 (19%) to wildfires, and 8 (7%) to storms. From the internal threats, 8 (40%) were attributed to hospital fires and 4 (20%) chemical fumes. From the man-made threats, 6 (40%) were attributed to bomb threats and 4 (27%) gunmen. From the 20 total reported durations of evacuations, 9 (45%) lasted between 2 to 11:59 hours, 6 (30%) lasted over 24 hours, and 5 (25%) lasted up to 1:59 hours.
Discussion: Over 70% of hospital evacuations in the US were due to natural disasters. Compared to 1971-1999, there was an increase in internal and man-made threats. Exact statistics on evacuees, durations, injuries, and mortality rates were unascertainable due to a lack of reporting. It is critical to implement a national registry to report specifics on incidences of evacuations to further assist with disaster and infrastructure planning.

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"We Just Want to Help" - Nonprofits Contributions to Community Resilience in the Disaster Space

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Introduction: The National Strategy for Disaster Resilience (NSDR) characterizes resilient communities as having strong disaster and financial mitigation strategies, strong social capacity, networks, and self-reliance. Nonprofit organizations (NPOs) embrace many characteristics of a disaster resilient community. NPOs do not operate for the profit of individual members. Community groups like Lions and Rotary Club have long histories, and while not established to respond to disasters, they frequently have heavy involvement in preparing for or recovering from, disasters.
Aim: The study aims to address the question, "What is the potential role of nonprofit organizations in building community resilience to disasters?"
Methods: An applied research project was carried out, using theories of resilience, social capital, and the Sendai framework to conceptualize the frameworks and guide the process. Qualitative research methods, thematic analysis, and case studies helped identify Lions, Rotary, and Neighbourhood Houses Victoria strengths, barriers, and enablers.
Results: Research demonstrated how NPOs made significant contributions to building communities' resilience to disasters. NPOs facilitate three Sendai guiding principles of engaging, empowering, and enabling the community to build disaster resilience. Actions included raising awareness to disaster risk, reducing disaster risk, helping prepare for disasters, and contributing to long term disaster recovery. NPO strengths included local knowledge, community trust, and connections, which matched characteristics listed in the NSDR for a disaster resilient community. However, barriers to participation included traditional emergency services ignoring NPOs, lack of role definition, and lack of perceived legitimacy.
Discussion: As the first Australia research to scientifically analyze the contributions of these NPOs to build community resilience, before, during and after disaster, this study enhances understanding and recognition of NPOs and assists in identifying means to facilitate their disaster resilience activities and place them more effectively within Emergency Management strategic processes. Greater utilization of such assets could lead to better community outcomes.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

EMERGENCY MEDICAL RESPONSE

Helping the Helpers: A Focus on Provider Mental Health

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Introduction: Emergency medical services (EMS) is a high-stress profession, which can lead to deterioration in provider mental health over time. EMS providers may find themselves in a situation where they are not only treating the general public, but also each other. Until now, there has been no active training or emphasis on provider mental health. This has taken its toll and can lead to PTSD (post-traumatic stress disorder) in field providers and managers alike.
Aim: Identifying and managing stressors is crucial to longevity in the field of EMS. Managers must have the ability to broach sensitive matters with their subordinates, and effectively debrief them following such stressful incidents.
Methods: Magen David Adom held a two-day seminar for its administration, from which they learned signs and symptoms of PTSD, how to approach teams who had been in stressful situations, and how to properly debrief the teams. The seminar culminated in mass casualty incident (MCI) drills, where there were 4 active scenes. Scene 1 had a team that was physically injured. Scene 2 had a team which cared for the team from scene 1. Scene 3 had a team suffering from emotional stress and ceased to function. Scene 4 had only wounded civilians. The drill focused on provider emotions and used actors and props to simulate an exceedingly complex MCI situation.
Results: Following the drill, a debriefing was held and it was found that all of the points of interest had been noted and properly dealt with.
Discussion: Holding a successful drill assisted in providing participants with an accurate sense of such stressful situations in which their subordinates find themselves on a daily basis. The debriefing session succeeded in identifying potential stressors for field providers and teaching the participants the appropriate way to approach such sensitive matters.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

EMERGENCY MEDICAL TEAMS

Beyond EMT 2 Minimum Standards

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Introduction: The World Health Organization's (WHO) minimum standards are used to verify Emergency Medical Teams (EMTs) internationally. The National Critical Care and Trauma Response Center (NCCTRC) was one of the first few EMT 2 verified teams globally.
Aim: The NCCTRC aims to innovate and provide leadership in the provision of best practice clinical care in the EMT 2 setting in disaster-affected countries.
Methods: The NCCTRC developed a clinical governance framework and committee with a view of improving practice in the deployed environment. A gap analysis against the Australian National Standards was done and a decision was made to proceed with accreditation against the ACHS EQUIP 6 framework.
Results: The process of accreditation required a self-assessment that identified gaps in our guidelines and care processes thereby leading to innovative projects to meet the criterion in a sustainable way for the deployed field hospital environment. The NCCTRC has developed adapted clinical tools to manage pressure injury, falls risk, handover, hand hygiene, audits, and consumer feedback.
Discussion: The deployed field hospital environment can meet national accreditation standards for clinical care. The WHO minimum standards were introduced in 2013 and serve as a marker of the minimum requirements in the field. The challenge is to do better than the minimum. This study demonstrated that it is possible to adapt hospital accreditation standards to the field environment and provide a higher, safer quality of care to affected populations. EMT teams should maintain their clinical care standards from their home environment wherever possible in the field hospital environment. Striving to provide the best and safest care is the duty of care for vulnerable populations.

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Development of a Mobile Laboratory for Sudden Onset Disasters

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Introduction: Clinical diagnostics in sudden-onset disasters (SOD) has historically been limited. With poor supply routes, lack of a cold chain, and challenging environmental conditions, many diagnostic platforms are unsuitable.
Aim: We set out to design, implement, and evaluate a mobile diagnostic laboratory accompanying a type II emergency medical team (EMT) field hospital.
Methods: Available diagnostic platforms were reviewed and selected against infield need. Platforms included HemoCue301/WBC DIFF, i-STAT, BioFire multiplex RT-PCR, Olympus BX53 microscopy, ABO/Rh Grouping, and specific rapid diagnostic tests (RDT). This equipment was trialed in Katherine, Australia and Dili, Timor-Leste.
Results: During the initial deployment, validation of FilmArray rt-PCR multiplex tests was successful on blood culture, gastrointestinal, and respiratory panels. HemoCue301 (n = 20) haemoglobin values were compared on Sysmex XN 550 (r = 0.94). Analysis of HemoCue WBC DIFF samples had some variation when compared to Sysmex XN 550, (neutrophils r = 0.88, lymphocytes r = 0.49, monocytes r = 0.16, eosinophils r = 0.70, basophils r = 0.16). i-STAT showed non-significant differences for CHEM4 (n=10), CG8 (n = 10), and TnI (n = 5) against Vitros 250. A further trial of BioFire rt-PCR testing in Dili, Timor-Leste diagnosed 117 causative pathogens on 168 FilmArray test cartridges.
Discussion: This mobile laboratory represents a major advance in SOD. Setup of the service was quick (<24hr) and transport to site rapidly. Training was simple and performance consistent. Future deployment in fragmented health systems after sudden onset disasters with EMT2 will now allow broader diagnostics.

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Emergency Medical Teams in ASEAN Region - Challenges for Global EMT Classification

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Introduction: Quality assurance of Emergency Medical Teams (EMTs) is a world concern. The World Health Organization (WHO) published an international guideline for EMTs in

2013 and started the global EMT classification, a quality assurance program for EMTs, in 2015. There are 16 classified EMTs in the world as of October 2018. The Association of Southeast Asian Nations (ASEAN) region is a disaster-prone area. Therefore, the need for EMTs is relatively high. However, there is no classified EMT in the ASEAN region. Factors that prevent the global classification of EMTs in the ASEAN region are unknown.
Aim: The objective of this study was to analyze the inhibitory factors of the global EMT classification in the ASEAN region.
Methods: A questionnaire survey was taken to the 10 national groups of ASEAN countries. Each group consisted of EMT-related personnel. They were 39 participants for the third AMS Training of the ARCH Project held in May 2018. 10 national groups were asked to answer whether governmental EMT of their country is able to meet the criteria for the EMT global classification. The criteria were written in the WHO-provided minimum standard self-assessment checklist for the Type 1 fixed EMT.
Results: Among 39 categories in the self-assessment checklist, 5 were the most difficult categories to meet the criteria: [Core Standards] Self-sufficiency, Sanitation, and Waste Management; Indemnity and Malpractice; [Technical Standards] Logistics; EMT Capacity.
Discussion: There are some limitations to the study. Non-governmental EMTs were not covered. Participants of the training were not at the official EMT focal point for the global EMT classification. Logistical requirements may be inhibitory factors of the global EMT classification in the ASEAN region.

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The Evaluation of the World Health Organization's Minimum Dataset in Disaster Health Management in the Association of Southeast Asian Nations

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Introduction: The Minimum Data Set (MDS) developed by the World Health Organization (WHO) has been widely used among medical practitioners in International Emergency Medical Team (I-EMT) as tools to collect health information and statistics in disaster health management. The I-EMT submits MDS to the Emergency Medical Team Coordination Cell (EMTCC) for the planning of responses. The Project for Strengthening the Association of Southeast Asian Nations (ASEAN) Regional Capacity on Disaster Health Management (ARCH Project) is the ASEAN's project that has applied MDS to its activities with the main purpose of strengthening informational management during a disaster.
Aim: The study aims to evaluate the performance of MDS after being utilized in the Regional Collaboration Drill (RCD) organized by the ARCH Project in July 2017.
Methods: The performance of MDS has been evaluated by ten International Emergency Medical Team (I-EMT) of ASEAN Member States who participated in the RCD.
Results: The assessment forms were returned by ten I-EMTs, and all respondents addressed several points for the revision of MDS (10/10), including the format and the content of the MDS. Concerning the format, respondents stated that the fonts are too small (3/10), and spaces for recording additional information are needed (3/10). On the other hand, the majority of respondents suggested that some of the contents within the MDS are still unclear or some terminologies are needed to be further clarified (6/10), especially with the referral form (5/10).
Discussion: The current version of the MDS utilized for the EMT coordination should be edited and revised for its optimal usage. Applying MDS to disaster simulation is an efficient approach to test its application.

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International Disaster Medical Relief of China: Lessons and Practices

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Aim: This descriptive study explored barriers and difficulties faced by an international disaster relief team from China, which took part in two types of international disaster relief missions.
Methods: Data was collected since the founding of the Chinese international disaster relief team, including information on team composition, operational hours, and average number of patients rescued and treated by staff per day, etc.
Results: Overall, thirteen disaster relief missions utilizing the Chinese disaster relief team occurred in eight countries. All the operations were divided into two kinds of models: Urban Search and Rescue mission, and Emergency Medical service. The first model consisted of search, rescue, and emergency medical services on site. The ratio of medical staff on the team accounted for 18.8%. According to the six international health-based operations, the team was deployed ten days following the disaster, with an average working time of 17.8 days, and benefiting around 6,812 wounded and sick persons per operation. Compared with these two models, medical-based operations deployed more staff after the disaster and had a longer window of operation. The beneficiaries of medical-based operations are ten times greater than those of rescue-based operations. The differences are distinct.
Discussion: Missions will better meet the needs of international relief by enhancing organizational coordination among medical teams around the world, and by contributing to the communication between teams. They will further benefit from technical capacity building, regional coordination trainings, formatting the standard of teaming building, and evaluation of the work.

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Research on the Design of a Training Course for an International Emergency Medical Team

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Introduction: Currently, Technical Advisors of the World Health Organization's (WHO) Emergency Medical Teams (EMT) Secretariat are conducting standardized verification work for international emergency medical teams in various countries and organizations. However, a uniform and standard training course for an International EMT is lacking.
Aim: To design a training course model based on knowledge structure, teaching, and evaluation methods for an International EMT.
Methods: The first and second level catalogue defined as chapters and sections for the International EMT training curriculum were drafted based on literature and summaries of fragmentary experience. The teaching syllabus with the method of teaching and evaluation was initially outlined. The expert consultation form was designed and validated. Experts from International EMTs from various countries were consulted and investigated. The Delphi method was used, and the chapters and sections were adjusted and weighed according to experts' advice through the Analytic Hierarchy Process. The teaching and evaluation methods for each knowledge module were obtained based on suggestions from experts.
Results: A total of 25 experts were consulted. By 2 rounds of consultation with a Kendall coordination coefficient W value of 0.210 and chi-square value of 78.61 ($p<0.05$), consensus about the knowledge structure for the curriculum was achieved, which consisted of 6 chapters: (1) introduction of International EMT, (2) Disaster medicine, (3) Global health, (4) Care in austere condition, (5) Medical technology, (6) Field training, with the weights of 0.1415, 0.1584, 0.1536, 0.1827, 0.1728, and 0.1909, respectively, and 32 sections. Teaching methods for different knowledge modules were determined, which included lecture, demonstration, discussion, drills, and tabletop simulation. The evaluation methods were affirmed via a quiz, written examination, skill test, and teamwork test assessed by intra-group and inter-group evaluation.
Discussions: Through scientific investigation of experts from International EMTs, a training course model for International EMT was established.

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Review of Effectiveness of the Foreign Medical Team Deployment in Nepal Earthquake, 2015

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Introduction: Nepal experienced a massive earthquake on 25th April, 2015 measuring 7.8 Richter scale followed by large aftershock on 12th May that further added to the destruction, especially in Sindhupalchowk and Dolakha. On request of Government of Nepal, international community extended financial and technical assistance to overcome the impact of the earthquake. Foreign Medical Teams (FMTs); now known as emergency medical team, from different countries and volunteers from within the country had helped in health service delivery.
Aim: to get a clear picture of Strengths, Weaknesses/Gaps and Areas of Improvement that would be very important in making the response better in any future events of such scale when discussed and shared with all relevant stakeholders in Nepal.
Methods: It was a multi-method study. Both quantitative and qualitative approaches were used to have an in-depth overview of the research question and the objectives set for the study. Records and reports relating Foreign Medical Team Coordination Committee (FMTCC) and meeting minutes of Health Emergency Operation Centre were reviewed.
Results: Total of 8,962 deaths and 22,302 injuries occurred following earthquake of which 8,864 deaths and 21,156 injuries occurred in the most affected 14 districts of Nepal. In FGD and KIIs, most of the participants highlighted the earthquake had a huge impact on infrastructures. A large number of casualties were reported immediately after earthquake. Health facilities were overloaded with injured patients. One hundred and thirty-seven FMTs from 36 countries worked in Nepal to provide medical relief.
Discussion: Timely preparation and readiness of the procedures to handle the FMTs including their registration process, medical licensing procedures, procedures of coordinating mechanisms with the district, case management and treatment guidelines to be followed by the FMTs are crucial to have a better health sector response including that of FMTs.

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The Roles of ARCH Project in the Strengthening of the ASEAN Disaster Health Management

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Introduction: The Project for Strengthening the Association of Southeast Asian Nations (ASEAN) Regional Capacity on Disaster Health Management (ARCH Project) is the project under the collaborative framework between the National Institute for Emergency Medicine, Thailand, Ministry of Public Health, and Japan International Cooperation Agency. The project aims to strengthen disaster health management focusing on the International Emergency Team (I-EMT) operation and coordination in ASEAN by using various mechanisms, for example, regional collaboration meeting, regional collaboration drill, training, etc.
Aim: The study aims to evaluate the outcomes which ARCH Project's activities have been facilitating to strengthen the ASEAN disaster health management.
Methods: A comparative study is utilized to see the improvement of the ASEAN disaster health management of the current situation and the project's outputs compared to the previous survey in 2015.
Results: Recent ASEAN disaster health management has been strengthened in three distinctive dimensions: (1.) national capacity of each ASEAN Member States is being strengthened

through the project's training courses; (2.) the ASEAN I-EMT coordination platforms have been set up to the extent that the progress of developing the toolkits such as the Standard Operating Procedures for the Coordination of EMT in ASEAN is at its eighty percent, while the Database of the EMT and their Minimum Requirements and Qualifications are now at its ninety percent; and (3.) Standard reporting forms (medical record and health need assessment form) for all ASEAN member state (AMS) has been developed and fully completed.

Discussion: The ARCH Project has been facilitating the strengthening of the ASEAN disaster health management through its capacity building endeavors and the creation of collaborative mechanisms for operations and coordination. These activities should be maintained either under the existing or newly created mechanisms in order to build a sustainable collaborative framework.

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University of Adelaide Higher Degree by Research Program Supported by an Australian Government Research Training Program Scholarship

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Introduction: Collaboration between Foreign Medical Teams (FMT) and Host Health Personnel (HHP) is a core standard for healthcare in a medical response to disaster,[1] but descriptions of its application from recipient nation HHP are rare. This paper details the findings from a qualitative study on the experience of collaboration between International Foreign Teams (IMT) and HHP in Gorkha, Nepal since the 2015 earthquake.

Aim: To present findings from a study that explored the experience of collaboration by Nepal health workers working with IMT since the 2015 earthquake.

Methods: A qualitative study design using semi-structured interviews regarding the experiences and perspectives on collaboration of 12 Nepali health workers was used. The interviews were transcribed, translated, and collated using Nvivo software by QSR international, and themes regarding collaboration were identified.

Results: Data collection is not yet complete. However, preliminary results from early analysis indicate that collaborative practice is not uniformly applied by IMT. HHP Satisfaction with IMT appears highly dependent on collaboration. Emerging themes are that rigid organizational procedures, language and cultural barriers, and intimidating leadership inhibit collaboration. Objectives were assumed to align immediately post-disaster, with evidence of objectives increasingly diverging over time. IMT leadership that was experienced, responsive to suggestions, and regularly involved HHP in planning, implementing, and reviewing activities were highly appreciated.

Discussion: Emerging themes indicate the time-critical nature of many disasters, along with cultural/institutional/administrative barriers, make the building of collaborative relationships difficult despite being foundational for successful missions. Participants in IMT must proactively involve HHP in the objectives setting, planning, implementation, and reviewing of activities. Successful IMT participation is not only clinically competent but actively seeks collaborative relationships with HHP throughout the mission.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

EMERGENCY RADIOLOGY

Point of Care Transcranial Ultrasonography to Detect Midline Shift in Neuro-Emergencies in the Emergency Department

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Introduction: Midline shift (MLS) in the brain is a life-threatening emergency, which requires immediate surgical intervention following diagnosis. Currently, CT Brain is accepted as the gold standard in detection of MLS. Unfortunately, the diagnosis may be delayed when the patient is unable to undergo a CT Brain immediately due to several reasons. This has led to a constant endeavor to identify and develop other methods for detection of MLS, among which Transcranial Sonography (TCS) is included.

Aim: To validate point-of-care TCS for detection of MLS in neuro-emergency patients in the Emergency Department, and compare it to CT values of MLS.

Methods: This double-blinded prospective study was conducted from March 2018 to August 2018 in the Emergency Department of VIMS Hospital, Salem. All patients above the age of 18 who required a CT Brain were included, and a TCS was performed. MLS on TCS was calculated by measuring the distance between the outer table of the skull and the third ventricle on both sides, through the temporal window using a 2.8 MHz Sector Probe. MLS on CT was defined as the difference between ideal midline and septum pellucidum.

Results: A total of 87 patients were included in this study. The MLS (mean ± SD) was 0.21cm ± 0.31cm using TCS, and 0.20cm ± 0.34cm using CT. The Pearson's correlation coefficient between CT and TCS was 0.97 ($p < 0.01$). The area under the ROC curve for detection of a significant MLS using TLS was 83.7%. Using 0.5cm as a cut-off, the sensitivity, specificity, and positive likelihood ratio were 86.7%, 98.6%, and 61.92, respectively.

Discussion: This study concludes that Transcranial Sonography could detect Midline Shift with reasonable accuracy, and can be used as a point-of-care tool in the Emergency Department to facilitate early diagnosis of MLS and intervene accordingly in neuro-emergencies.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

HEATWAVES

Helping Runners Under Extreme Heat: The 2017 Montreal Half-Marathon Experience

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Introduction: The 2017 Montreal Half-Marathon was held on September 24th despite a record-breaking, out-of-season heatwave. The Urgences-santé Corporation (USC), Quebec's largest emergency medical service (EMS), was tasked with coordinating and delivering prehospital response for over 15,000 runners at a time when the province's paramedics were on strike.
Aim: USC's mission was to ensure runner safety under extreme conditions with limited staffing. In conjunction with the event's medical teams, we implemented a new approach that oriented patients to the event's clinic with the aim of limiting ambulance transports off-site and thus optimizing resources by promoting a "treat and release" principle.
Methods: Emergency response was organized around the event's clinic, which offered a level of care comparable to proximate emergency departments, including mass-cooling capacities. This capacity allowed us to modify provincial protocols, and thus prioritize treating patients on-site instead of transporting them to a hospital. Consequently, the prehospital response on the course could be assured with only 15 ambulances (staffed by managers) and a single team deployed at the event's clinic, acting as transport officers. Heatstroke identification protocols were reinforced for the safety of the runners and spectators.
Results: A total of 1,071 participants received medical attention, including 24 who were treated for a heat-related incident. On the course, 32 were evaluated by paramedics and 20 were transported to the event's clinic. Only 7 patients were transferred from the clinic to a hospital, of which only one was for a heat-related incident. No deaths resulted from the race.
Discussion: By anticipating and preparing for the extreme heat, the coordinated prehospital response safely reduced off-site transports, minimizing treatment delays for patients, and maximizing the use of on-site resources. We attribute this success to a strong collaboration with the race organizers, the presence of an on-site clinic, and an increase in prehospital resources.

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It's Hot Today, Eh? Montreal's 2018 Heat Wave from Urgences-santé's Perspective

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Introduction: A heatwave hit the Greater Montreal area during the week of July 1 to July 8. The Urgences-santé Corporation (USC), Quebec's largest emergency medical service (EMS), saw its crews struggling to respond to a record-breaking number of emergency calls while going door-to-door to make sure the at-risk population was not overburdened by the heat.
Aim: USC's mission was to ensure its population's emergency medical care and safety under extenuating conditions. In conjunction with our municipal partners and the public health services, we deployed an aggressive communication strategy, urging people to only call 911 in the case of a life-threatening emergency, with the aim of limiting ambulance transports.
Methods: Ambulance resources were increased (> 20% compared to the same period in 2017). More than 60 media interviews were given. Paramedic supervisors were sent to emergency departments to contain the offload delays. USC's community response team was going door-to-door in pre-identified urban heat islands (UHI), bringing medical attention directly to those in need.
Results: Despite our communications efforts, a record-breaking 1,568 calls (> 37% compared to the same period in 2017) were received in a 24 hour period. Through the door-to-door campaign, 12 people in need received medical attention. More than 90 people are suspected to have died as a result of a July heat wave in Quebec, with figures showing that 60 deaths in the cities of Montreal and Laval alone may be linked to elevated temperatures.
Discussion: Through strong collaboration with our municipal and provincial partners, and the public health services, an important communication strategy and additional resources were deployed. Crews were able to prevent additional deaths. With the observed increase in extreme weather events, this strategy will definitely be useful in the future.

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The Impact of Japan Heatwave on Community Emergency Medicine in 2018

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Introduction: Due to the heatwave in Japan, the number of patients with heatstroke transported via ambulance hit the highest record according to the Tokyo fire department in 2018. Now, heatwaves are thought to be a natural disaster. Emergency

medical professionals located in a Tokyo suburb covering 40,000 individuals experienced a wide range of challenges in patient care with heatstroke.

Aim: To assess the impact of the 2018 Japan heatwave on community emergency medical service.

Methods: Patients (aged ≥ 16 years) with heatstroke and who were transported to our hospital by ambulance from June to September of 2018 were included. Data were derived from pre-hospital records and electronic medical records. Weather data was referenced from a Japanese meteorological agency.

Results: The number of all-cause cases was 1,764, and the total number of heatstroke cases was 51 (2.9%). Heatstroke cases were concentrated in July and August of 2018. The rate of males was 69%. The average age was 63 ± 23 years. Physical labor was associated with 31% of cases, such as sports in 7.8%. Hospitalization was required in 24%. ICU admission was required in 9.8%. There was no fetal case directly caused by heatstroke in this survey.

Discussion: The risk factors of heatstroke considered to be male and elderly. About one-half of heatstroke patients were over 70 years old, and it may have been related to regional characteristics. As mentioned in the Heatstroke STUDY 2012 (Miyake, 2014), most cases which occurred inside residences were found that there was no air conditioner use. There was also an increased number of patients with heatstroke who made emergency visits by themselves. Further investigation is needed annually to estimate the effect of climate change. It is important to make a strong recommendation from public health agency about heatstroke prevention, including air conditioner use during hot weather.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

HUMANITARIAN

Conceptualizing a Gender-Based Framework for Implementing Disaster-Resilient Village Program in Aceh Province, Indonesia

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Introduction: It is critical to understand how gender relations shape women's and men's lives to enhance their resilience toward disaster because women and men have different roles, responsibilities, and access to resources. Unequal participation between women and men in a disaster risk reduction program will influence how each can be affected by various hazards, and how they will cope with and recover from disaster. Even though women are often considered to have incredible resilience and capacity to survive in the face of disasters, they also experience a range of gender-specific vulnerabilities.
Aim: This study aims to evaluate women's participation in current efforts of the Disaster-Resilient Village Program and to develop a conceptual framework for implementing gender-based a disaster resilience program at the community level.
Methods: This study employed a mixed-method approach and adopted several major activities including literature review, interview, focus group discussion, and a questionnaire survey with a total of 300 respondents. Three selected villages in Aceh Besar District, Aceh Province, were the study area of this study.
Results: By using descriptive and inferential statistics, this study proposed a gender-based framework for implementing Disaster-Resilient Village Program.
Discussion: This framework contributes to the emerging literature on gender-based disaster risk reduction and may assist policymakers in formulating regulations related to the community-based disaster risk management program. On the practical front, this study provided indicators to practitioners regarding some conditions that should be taken into account when mainstreaming gender in community-based disaster risk management programs. This study offered an original contribution to the existing bodies of knowledge on gender studies in disaster risk reduction efforts.

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Exploring Health Challenges of South Asian Women at the Evacuation Centers after Disasters

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Introduction: Globally, women are considered to be more vulnerable during disasters. South Asia including India, Pakistan, Bangladesh, Sri Lanka, Myanmar, and Nepal experience many disasters, and are also ranked lowest on the gender equality index. Women of these countries tend to face many health challenges while staying at evacuation centers after disasters.
Aim: This study highlights the health challenges South Asian women face while staying in evacuation centers after disasters.
Methods: A narrative review was conducted using the keywords, "women after disaster," "evacuation centers," and "emergency health care." Literature identified from the references were also added until reaching saturation. 47 articles were obtained through Elsevier, Google Scholar, Scopus, and ProQuest.
Results: Women in shelters in South Asian countries experienced many health challenges including genito-urinary tract infections (studies from India, Sri Lanka and Bangladesh), increased maternal mortality (Nepal and Pakistan), and sexual assault with resulting unwanted pregnancies and sexually transmitted diseases, including HIV (Nepal). Factors that contributed were the unavailability of separate toilets, inadequate sanitation, lack of sanitary supplies, and inadequate childbirth and maternity care resources. Rape victims at the shelters of Myanmar received delayed medical treatments, causing long-term health complications. Post-disaster stress and trauma were evident among women at the shelters initiated by insecurity, fear of abuse, and unfair relief distribution.
Discussion: Women face certain challenges when staying in evacuation shelters in South Asian countries, which impacts their wellbeing after disasters. It is important to recognize women's special requirements and to preserve women's rights while developing disaster preparedness strategies. Socio-cultural perspectives of the disaster-prone areas should be considered at the policy planning level to ensure an effective and practical health-safety system. Additionally, further research focusing on women's wellbeing at the evacuation centers is required to inform and overcome health challenges faced by women living in the shelters.

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The Health Impacts of Toxic Remnants of War on Civilian Populations: A Scoping Review

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Introduction: An estimated two billion people are currently affected by war, with civilian populations increasingly exposed to the hazards of armed conflict. While the effect of explosive remnants of conflict is well documented, the impacts of the toxic remnants of war on civilian health are less well understood.
Methods: This study was a scoping review examining the human health impacts of exposure to toxic remnants of war. Toxic remnants of war refer to any toxic or radiological substances arising from military activities. In this study, however, the focus was limited to the health effects of exposure to toxic substances and explosive by-products from munitions fired, dropped, or abandoned during conflict. The following databases were searched: Embase PubMed, Scopus, and Web of Science. The Mixed Methods Appraisal Tool (MMAT) was used to assess the methodological quality of studies that met the inclusion criteria.
Results: Common toxicants reported on were Tetrachlorodibenzo-p-dioxin TCDD, white phosphorus, depleted uranium, lead, mercury, and sulfur mustard. Common health effects included respiratory diseases as well as cutaneous, cardiovascular, reproductive, and congenital effects. Posttraumatic stress disorder, depression, anxiety, cognitive impairments, and decreased quality of life were also commonly reported. The evidence base, however, is mixed with heterogeneity in study design and outcome measures. Lack of baseline data and inadequate exposure models make establishing an adverse causal relationship between an agent and a disease challenging.
Discussion: Civilian exposures to toxic remnants of conflict remain understudied and under-addressed. The study suggests assessment of the human health impacts of toxicants should be part of a post-conflict response, especially given the potential long-term intergenerational effects. The current lack of recognition of the human health impacts of toxic remnants of conflict also limits the amount of global resources assigned to post-conflict decontamination.

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International Humanitarian Law and Review of Recurrent Violations Including Chemical Weapons Use

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Introduction: The basis of International Humanitarian Law (IHL) is the Theory of Natural Law, which states that the laws of morality and the ability to use reason in the determination of inalienable human rights, are innate to humans, and cannot be taken away by any states or laws. IHL is an agreement among nation-states that applies to situations of conflict to protect civilians and guides conduct in time of war. IHL extends protection to civilian medical personnel. The recent escalation in chemical weapons use by states has violated IHL and the 1997 Chemical Weapons Convention (CWC) treaty, with little repercussion from the international community.
Aim: We review the increase in chemical weapons use, international chemical weapon treaty violations, and violations of IHL against medical personnel.
Methods: A review was conducted of existing medical and grey literature for sources discussing chemical agents, their history, and violations of laws prohibiting their production, stockpiling, or use. The following publications were reviewed: PubMed, EBSCHost, and Google Scholar.
Results: The use of sarin, chlorine, and mustard gas against civilians has been confirmed multiple times in Syria by the United Nations since 2011. Physicians for Human Rights mapped 537 attacks, both violent and chemical, against 348 different medical facilities in Syria from March 2011 to July 2018. Since March 2011, at least 847 civilian medical personnel have reportedly been killed. Many were killed by government forces as part of a war strategy creating further incapacitation. Most recently, Medecins Sans Frontiers concluded its Yemen mission due to repeated attacks, including two in one week in October 2018.
Discussion: There must be recognition and emphasis on the health severity of such attacks and the violations of IHL and the CWC. Physicians must use their unique positions for advocacy and call for action in upholding international treaties.

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Newborn and Child Health Care in Humanitarian Crisis Settings: Piloting of Training Package for Primary Health Care Workers in Rural Nepal

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Introduction: The community-based integrated management of newborn and childhood illness (CBIMNCI) training package has been widely used throughout Nepal. Adding a component of disaster response and management to this program would greatly impact the community, and could improve the knowledge and skills of community workers for the management of children during a disaster.
Aim: Describe the development and implementation of a community-based training for children in disasters.
Methods: Using expertise from emergency and pediatric emergency physicians, pediatricians, and psychiatrists, we developed a two-day training and facilitator manual covering topics such as trauma, resuscitation, burn, drowning, disaster, nutrition, and care of the newborn. The information and manuals were presented to the Nepal Division of Child Health for approval. Four pilot trainings were conducted in Bardia and Bardibas in Nepal in September 2017, including knowledge and skill-based sessions. Knowledge was tested pre- and post-training using multiple choice questions (MCQ) and self-reflections. Skills were evaluated by direct observation and marked using

a Likert scale. Confidence was assessed using a confidence matrix before and after the course. Overall feedback was taken at the end of the session.
Results: Of 82 participants, 74 participants from four trainings were included for analysis. Post-test Cronbach's alpha for MCQ was 0.82 and the confidence matrix was 0.86. Mean score for the pre-test MCQ was 6.12 (SD 2.22) compared to the post-test mean of 10.97 (SD 2.97), which was a statistically significant improvement ($p<0.05$). Trainees reported that the trauma teaching was helpful. They felt that it improved confidence regarding trauma and disasters.
Discussion: Adding this training to current CBIMNCI can be an effective tool to reach out to primary health care workers, and provide further knowledge and skills on care of children during a disaster or humanitarian crisis.

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Towards a Better Response: Combining Pareto Ranking and Geostatistics to Model Gender-Based Vulnerability in Rohingya Refugee Settlements in Bangladesh

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Introduction: The Rohingya refugee crisis in Bangladesh continues to overburden humanitarian resources and undermine the health and security of over 900,000 people. Spatial, sector-specific information is required to better understand the needs of vulnerable populations, such as women and girls, and to target interventions with improved efficiency and effectiveness.
Aim: The aim of this study was to create a gender-based vulnerability index and explore the geospatial and thematic variations in the gender-based vulnerability of Rohingya refugees residing in Bangladesh by utilizing pre-existing, open-source data.
Methods: Data sources included remotely-sensed REACH data on humanitarian infrastructure, UN Population Fund resource availability data, and the Needs and Population Monitoring Survey conducted by the International Organization for Migration in October 2017. Gaps in data were addressed through probabilistic interpolation. A vulnerability index was designed through a process of literature review, variable selection and thematic grouping, normalization, and scorecard creation. Pareto ranking was employed to rank sites based on vulnerability scoring. Spatial autocorrelation of vulnerability was analyzed with the Global and Anselin Local Moran's I applied to both combined vulnerability index rank and disaggregated thematic ranking.
Results: Twenty-four percent of settlements were ranked as most vulnerable, with 30 highly vulnerable clusters identified predominantly in the Upazila of Sadar. Five settlements in Dhokkin, Somitipara, and Pahartoli were categorized as less vulnerable outliers amongst highly vulnerable neighboring sites. Security- and health-related variables appear to be the largest drivers of gender-specific vulnerability in Cox's Bazar. Clusters of low security and education vulnerability measures are shown near the refugee ingress point near Gundum.
Discussion: The humanitarian space produces tremendous amounts of data that can be analyzed with spatial statistics to better target research and programmatic intervention. The critical utilization of these data and validation of vulnerability indexes is required to improve the international response to the global refugee crisis.

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The Use of Evidence in Humanitarian Response Decision-Making

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Introduction: The need to use evidence in humanitarian settings is recognized, yet utilizing that evidence to make decisions about humanitarian response remains a challenge.
Aim: To identify how, when, and why decision makers in humanitarian response use scientific, peer-reviewed evidence to make decisions.
Methods: An online cross-sectional survey of fifteen open- and closed-ended questions on demographics, experience, and role in humanitarian response was developed by Evidence Aid (EA) and Karolinska Institutet (KI). The online survey was available on the EA website from August 2015 to October 2018. Participants were self-selected, recruited through social media channels and mailing lists of EA and KI. All respondents and responses were anonymized. Responses were analyzed with descriptive statistics and content analysis.
Results: 47 people responded, primarily working in Europe or North America with roles of humanitarian response director/manager, independent consultant, or policymaker. Personal assessment of the quality of information, trust in the source, and information that was contextually relevant or based on field experience were factors for deciding whether information should be considered evidence. Reasons for using evidence when making decisions included adhering to good practice to maximize impact and effectiveness of aid, reassurance that the right decisions were being made, personal or organizational values, and using evidence as a tool to protect beneficiaries and organizations from poor quality decisions and program content.
Discussion: Using evidence for decision making was common practice during the process of designing implementing and evaluating humanitarian response content, yet reasons for use varied. The importance of evidence developed and validated from field experience and trust in the source reported by this sample suggests that strengthening collaborative efforts between decisionmakers and evidence generators could be one approach to improve evidence and evidence use in humanitarian response.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

INDUSTRIAL AND OCCUPATIONAL HEALTH

Coping With On-Call Work: Current Knowledge to Support Women in the Emergency Services

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Introduction: All Fire and Emergency Services (FES) personnel must balance FES work with their other responsibilities. Given that women tend to take on a greater responsibility for management of household/domestic activities than men, the on-call component of their FES work may be associated with very different challenges. Despite this, women have rarely been the focus of on-call research.
Aim: To explore women's on-call experiences in the FES by examining coping styles and strategies, with the goal of helping to innovate the way women are supported in FES roles.
Methods: Relevant findings from two studies are included. The first study involved FES personnel from two agencies in Australia (n=24) who participated in a semi-structured interview. The second study was an anonymous online survey to determine work characteristics, sleep, stress, and coping in on-call workers more broadly, with workers from all industries across Australia (n=228) invited to participate.
Results: Interview data identified two major themes in terms of coping with on-call work. Support (from family, social, and work), planning, and preparation were identified as important in helping women cope in the context of on-call unpredictability. Results from the survey (43% women) showed that on-call workers were an engaged group in terms of their coping, with 67% classified as having a positive coping style and 58% of women indicating that they agreed/strongly agreed with the statement, "I cope well with on-call work."
Discussion: Taken together, these data highlight engagement with positive coping by women who do on-call work, including in the FES. Importantly, positive coping strategies, such as talking about emotions, problem-solving, and seeking support have been linked to increased shift work tolerance in other populations. Coping style and strategies represent modifiable variables which could be specifically applied to assist women to manage the unique challenges associated with on-call work in the FES.

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Towards a Taxonomy of Workplace "Pressure" in Complex, Volatile, and Emergency Situations

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Introduction: Pressure in the workplace has been studied in a number of settings. Many studies have examined pressure from physiological and psychological perspectives, mainly through studies on stress. Performing under pressure is a fundamentally important workplace issue, not least for complex, volatile, and emergency situations.
Aim: This research aims to better understand performance under pressure as experienced by health and emergency staff in the workplace.
Methods: Three basic questions underpin the work: (1) how do health and emergency workers experience and make sense of the 'pressures' entailed in their jobs? (2) What impacts do these pressures have on their working lives and work performance, both positively and negatively? (3) Can we develop a useful explanatory model for 'working under pressure' in complex, volatile, and emergency situations?

The present paper addresses the first question regarding the nature of pressure; a subsequent paper will address the question of its impact on performance. Using detailed interviews with workers in a range of roles and from diverse settings across Ecuador, this study set out to better understand the genesis of pressure, how people respond to it, and to gain insights into managing it more effectively, especially with a view to reducing workplace errors and staff burnout. Rather than imposing preformulated definitions of either 'pressure' or 'performance,' we took an emic approach to gain a fresh understanding of how workers themselves experience, describe and make sense of workplace pressure.
Results: This paper catalogs a wide range of pressures as experienced by our participants and maps relationships between them.
Discussion: We argue that while individuals are often held responsible for workplace errors, both 'pressure' and 'performance' are multifactorial, involving individuals, teams, case complexity, expertise, and organizational systems, and these must be taken into account in order to gain better understandings of performing under pressure.

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What About Us? Addressing the Needs of First Responders in Behavioral Health Disaster Planning in Chicago

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Introduction: Behavioral health needs of first responders often receive less attention than those of survivors. Fire, police, medical, and other personnel frequently witness direct loss of life, assaultive violence, and other stressors during disasters. Evidence indicates a greater incidence of psychiatric sequelae among disaster workers. What role do emergency management authorities have in addressing the needs of such personnel?
Aim: To evaluate integration of first responder behavioral health needs among a metropolitan healthcare coalition, the Chicago Healthcare System Coalition for Preparedness and Response (CHSCPR).
Methods: CHSCPR developed a Behavioral Health Annex providing uniform guidance on behavioral health integration into emergency operations with attention to first responders. An electronic Behavioral Health Capability Survey of coalition members was performed in March 2017 to assess implementation of these recommendations. Qualitative and quantitative responses were recorded.
Results: Fifteen of thirty-five institutions responded, including academic and private community hospitals. Many reported no services. Where services existed, most facilities endorsed use of employee assistance programs or external vendors for staff support. 4/15 (26.7%) reported proactive strategies to mitigate stress such as information sheets on healthy coping. Measures for family support of affected emergency personnel were varied and typically outsourced to online resources, or reported as "in development."
Discussion: Findings suggest that recognition of emergency personnel behavioral health needs is lacking in city-wide disaster planning with greater emphasis on post-disaster needs than preventative efforts. Increased awareness of risk for psychological decompensation among first responders, and inclusive efforts to mitigate this risk, are warranted in future disaster planning.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

LATIN AMERICA AND CARIBBEAN CHAPTER

"What Do You Know About Zika?": Investigating Women at a Primary Healthcare Facility in a Small Municipality in Brazil

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Introduction: In Brazil, poverty-stricken population groups were the most affected by Zika virus (ZIKV). Women and children are fragile links that need focused attention, especially in relation to health care.
Aim: To investigate vulnerable, at-risk women in relation to their awareness of the ZIKV infection knowledge about the disease.
Methods: With evidence-based risk communication literature and consequences of ZIKV infection, a data collection instrument with open-ended questions was developed. Women from a small municipality in west-central Brazil, most from a rural setting, were interviewed at primary health care centers in April 2018. Interviews were recorded and transcribed. A preliminary analysis ensued.
Results: Forty women were interviewed. The average age was 42.3 (21-74 yrs) and 39 women had at least one child. The average number of people living in the same home was 3.8 (1-18) and 24 homes (60%) had one to four children. Fourteen women (54%) were beneficiaries of income supplementation programs. Two interviewees mentioned they had never heard of Zika and eight (20%) had no actual knowledge to convey. Other groups had some knowledge about ZIKV. Fifteen (37.5%) associated ZIKV with mosquito bites and another 15 with pregnancy or birth defects. Ten women (25%) mentioned dengue or chikungunya, but only 7 (17.5%) were aware of symptoms. Only eleven women (27.5%) declared public health workers as information sources.
Discussion: Positive aspects of awareness and knowledge were the tentative relationship some women made between pregnancy risk and exposure to mosquitoes, and with dengue or chikungunya. However, given ample media coverage and the severity of the epidemic, it is noteworthy to point out that all aspects were mentioned by fewer than half of the women. Health workers were not represented as relevant sources of information. Future in-depth content analysis of interviews may reveal important issues for risk communication strategies for this population.

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Risk Perception of Zika Virus Infection Among Vulnerable Women in Rio de Janeiro

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Introduction: The Zika virus (ZIKV) infection outbreak in Brazil surged in late 2014, peaking in 2015. The most affected region was the northeast, but Rio de Janeiro was especially affected in poor, vulnerable, low-income communities with inadequate sanitation and water. Most cases of the ZIKV-related neurologic syndrome, microcephaly, were detected among newborns coming from this environment.
Aim: To identify risk perception and consequences of ZIKV infection for pregnant women in a vulnerable community in Rio de Janeiro.
Methods: Forty women who frequented a primary health care center (PHC) in a ZIKV-prone area of Rio de Janeiro were interviewed based on an open-ended questionnaire on ZIKV infection and risk. No censorship regarding age or other demographic characteristics was applied. Interviews were transcribed and analyzed according to analytical categories stemming from the literature and prior work. Preliminary analysis focused on risks for pregnant women and other groups.
Results: Absolute number of responses reflect density of issues within all responses. Age range was 15-60 years. Several women identified microcephaly as a consequence of ZIKV infection for newborns, but many respondents did not cite any health problem associated with ZIKA in pregnancy. Although some cited pregnant women and children as most vulnerable, people living in or near insalubrious environments, such as the elderly, and those with low immunity were more cited. Information was mostly obtained from health professionals and television. Many confused origin and symptoms of ZIKV infection with other arbovirus infections.

Discussion: This vulnerable group of women, who continuously attend a PHC in the area, have had community experience with the disease and its consequences, showed surprisingly little knowledge as to the risks of ZIKV infection for pregnant women. Results may indicate that the health system has still not achieved adequate risk communication for at-risk women for ZIKV infection in Rio de Janeiro.

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Surveillance and Control of Threats in the Public Health System in Brazil: Mapping Managers' Competencies

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Introduction: With the increase in the number and intensity of disasters, integrated risk management has been a subject of discussion in Brazilian health system, in which the local level plays an important role. Competency Mapping of Managers working at a Municipal Health Office from a Metropolitan Area of Curitiba, Southern Brazil was developed.
Aim: To describe gaps in core competencies identified for Surveillance and Control of Risks and Threats.
Methods: The Public Health Core Competencies contained in the booklet: A Regional Framework for the Americas, of the Pan American Health Organization, originated a semi-structured self-assessment questionnaire. A Likert scale with levels of proficiency (from one to five) was aggregated to the 56 specific core competencies. It was applied to a sample of 78 managers between the months of October 2017 and January 2018. The data obtained were submitted to quantitative analysis. Gaps (Training Priority Degree) were defined according to the grade of importance and expression by means of a arithmetic mean and standard deviation.
Results: Gaps were identified for the competencies: Design disaster risk management plans for natural, technological and biological threats so as to mitigate their impact on health (2.82 ± 1.16); Design investment projects for reducing the health risks of disasters (2.8 ±1.07); Provide an immediate response to threats, risks and damage from disasters based on the risk assessment, in order to protect health (2.89 ± 1.13); Plan and execute post-disaster reconstruction, based on the damage identified for the immediate restoration and protection of the population's health (2.81 ± 1.11).
Discussion: The degree of expression for these competencies indicate the need of preparing public health managers for surveillance, by monitoring the exposure of people or population groups to environmental agents, or their effects with an integrated approach to injuries and the etiology of emergencies and disasters.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

MASS GATHERINGS

Anatomy of a "Mass" Mass Gathering

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Introduction: Mass gatherings are growing in frequency. Religious, or in this case, "mass" mass gatherings are also growing in complexity, requiring considerable effort from nations hosting a Papal Mass. Ireland hosted a papal mass in 1979 when the prospect of terrorism at such events was significantly lower. Large high-profile events such as a Papal Mass offer a platform via the media and social media to gain widespread coverage of adverse events. In 2018, a predicted 500,000 guests were scheduled to attend a Papal Mass gathering in Phoenix Park, Dublin, a bounded 1,700-hectare park in the center of Dublin.

Aim: To develop a medical plan estimating numbers of people requiring medical attention at a Papal Mass held in Ireland late August 2018, and compare same with actual numbers treated post-event. This study aims to reduce the medical impact of such an event on local receiving hospitals through plans that effectively manage medical- and trauma-related presentations on site.

Methods: A literature review of medical reports regarding medical care at Papal Mass gatherings worldwide found a range of predicted medical attendance from 21-61 per 10,000 attendees. On that basis we had prepared on-site facilities, facilities on travel routes and access point system for medical care for a crowd of 500,000 were selected.

Results: One of 6 receiving hospitals in Dublin had an increase in average presentations on the day. Attendance was reduced significantly due to weather. 261 patients were treated on site, falling in line with lower rate predicted of 31 patients treated in hospital on site and 17 transports off-site.

Discussion: A predictable number of patients presented for medical care. On-site medical services reduced transports to hospital. Reduced attendance ensured facilities were sufficient, but could have been under the pressure of the predicted attendance of 500,000.

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Axis Dimensional Analysis of Religious Mass Gathering Human Stampede Reports

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Introduction: Human Stampedes (HS) occur at religious mass gatherings. Religious events have a higher rate of morbidity and mortality than other events that experience HS. This study is a subset analysis of religious event HS data regarding the physics principles involved in HS, and the associated event morbidity and mortality.

Aim: To analyze reports of religious HS to determine the initiating physics principles and associated morbidity and mortality.

Methods: Thirty-four reports of religious HS were analyzed to find shared variables. Thirty-three (97.1%) were written media reports with photographic, drawn, or video documentation. 29 (85.3%) cited footage/photographs and 1 (2.9%) was not associated with visual evidence. Descriptive phrases associated with physics principles contributing to the onset of HS and morbidity data were extracted and analyzed to evaluate frequency before, during, and after events.

Results: 34 (39.1%) reports of HS found in the literature review were associated with religious HS. Of these, 83% were found to take place in an open space, and 82.3% were associated with population density changes. 82.3% of events were associated with architectural nozzles (small streets, alleys, etc). 100% were found to have loss of XY-axis motion and 89% reached an average velocity of zero. 100% had loss of proxemics and 91% had associated Z-axis displacement (falls). Minimum reported attendance for a religious HS was 3000. 100% of religious HS had reported mortality at the event and 56% with further associated morbidity.

Discussion: HS are deadly events at religious mass gatherings. Religious events are often recurring, planned gatherings in specific geographic locations. They are frequently associated with an increase in population density, loss of proxemics and velocity, followed by Z-axis displacements, leading to injury and death. This is frequently due to architectural nozzles, which those

organizing religious mass gatherings can predict and utilize to mitigate future events.

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Global Event Data Research Registry: Taking Mass Gathering Research to the Next Level

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Introduction: Research on events and mass gatherings is hampered by a lack of standardized and central reporting of event data and metrics. While there is work currently being done on report standardization, this will require a plan for recording, storing, and safeguarding a repository of event data. A global event data registry would further the work of standardized reporting by allowing for the collection and comparison of events on a larger scale.
Aim: To characterize the considerations, challenges, and potential solutions to the implementation of a global event data registry.
Methods: A review of the academic and grey literature on the current understanding and practical considerations in the creation of data registries, with a specific focus on an application to mass gathering events.
Results: Findings were grouped under the following domains: (1) stakeholder identification and consultation, (2) research goals and clinical objectives, (3) technological requirements (ie hosting, format, maintenance), (4) funding (budget, affiliations, sponsorships), (5) ethics (privacy, protection, jurisdictions), (5) contribution facilitation (advertising, support), and (6) data stewardship and registry access for researchers.
Conclusion: This work outlines key considerations for undertaking and implementing an event data registry in the mass gathering space, and compliments ongoing work on the standardization of data collected at mass gathering events. If practical and ethical considerations are appropriately identified and managed, the creation of an event data registry has the potential to make a major impact on our understanding of events and mass gatherings.

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The Impact on Local Emergency Departments During a "Schoolies Week" Youth Mass Gathering

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Introduction: Community-based strategies designed to minimize the impact on local emergency services during mass gathering events (MGEs) require evaluation to provide evidence to inform best practice.
Aim: This study aimed to describe characteristics and outcomes for people aged 16-18 years requiring emergency care before, during, and after a planned youth MGE "Schoolies week" on the Gold Coast, Australia.
Methods: A retrospective observational study was undertaken. Presentations from all young adults to the emergency department (ED) or In-Event Health Service (IEHS) over a 21-day period in 2014 were included. Descriptive and inferential analyses were performed to compare across time and to describe characteristics of and outcomes for young adults requiring healthcare.
Results: A total of 1029 presentations were made by youth aged 16 – 18 to the ED and IEHS over the study period (ED: 139 pre, 275 during, and 195 post; IEHS: 420 during). Patient characteristics and outcomes to the ED that varied significantly between pre, during, and post Schoolies periods included patient's age (higher proportion of 17-year-olds), residing outside the Gold Coast region, and not waiting for treatment. All were higher during Schoolies week. Of the 24,375 MGE attendees, 420 (1.72% [95% CI, 1.57 – 1.89], 17.2/1,000) presented to the IEHS. The majority were toxicology related (n=169, 44.9%). Transportation to hospital rate was low (0.03% [95% CI, 0.01 – 0.06], 0.3/1,000) for the 24,375 MGE attendees.
Discussion: Findings from this study support previous research indicating that MGEs can impact local emergency healthcare services. The provision of the IEHS may have limited this impact. The recipients of care delivery, predominantly males with trauma- or toxicology-related problems, warrants further investigation. Research describing the structures and processes of the IEHC could further inform health care delivery in and out of hospital settings.

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On the Way Out: An Analysis of Patient Transfers from Four, Large-Scale, North American Music Festivals Over Two Years

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Introduction: Music festivals are globally attended events that bring together performers and fans for a defined period of time. These festivals often have onsite medical care to help reduce the impact on local healthcare systems. Historically, the literature suggests that patient transfers offsite are frequently related to complications of substance use. However, there is a gap in

understanding as to why patients are transferred to a hospital when an onsite medical team, providing a higher level of care (HLC), is present.
Aim: To better understand the causes that necessitate patient transportation to the hospital during festivals that have onsite physician-led coverage.
Methods: De-identified patient data from a convenience sample of four, large-scale Canadian festivals (over two years) were extracted. Patient encounters that resulted in transfers to hospital, by ambulance, non-emergency transport vehicle (NETV), or self-transportation were analyzed for this study.
Results: Each festival had an onsite medical team that included physicians, nurses, and paramedics. During 34 event days, there were 10,406 patient encounters, resulting in 156 patients requiring transfer to a hospital. A patient presentation rate of 16.5/1,000 was observed. The ambulance transfer rate was 0.12/1,000 of attendees. The most common reason for transport was musculoskeletal injuries (54%) that required imaging.
Discussion: The presence of onsite teams capable of treating and releasing patients impacted the case mix of patients transferred to a hospital, and may reduce the number of transfers for intoxication. Confounding preconceptions, patients in the present study were transferred largely for injuries that required imaging. Results suggest that a better understanding of the specific effects onsite medical teams have on avoiding off-site transfers will aid in improving planning for music festivals. Findings also identify areas for further improvement in care, such as onsite radiology, which could potentially further reduce the impact of music festivals on local health services.

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Prediction Modeling Studies for Medical Usage Rates in Mass Gatherings: A Systematic Review

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Introduction: Mass gatherings attended by large crowds are an increasingly common feature of society. In parallel, an increased number of studies have been conducted to identify those variables that are associated with increased medical usage rates.
Aim: To identify studies that developed and/or validated a statistical regression model predicting patient presentation rate (PPR) or transfer to hospital rate (TTHR) at mass gatherings.
Methods: Prediction modeling studies from 6 databases were retained following systematic searching. Predictors for PPR and/or TTHR that were included in a multivariate regression model were selected for analysis. The GRADE methodology (Grades of Recommendation, Assessment, Development, and Evaluation) was used to assess the quality of evidence.
Results: We identified 11 prediction modeling studies with a combined audience of >32 million people in >1500 mass gatherings. Eight cross-sectional studies developed a prediction model in a mixed audience of (spectator) sports events, music concerts, and public exhibitions. Statistically significant variables ($p<0.05$) to predict PPR and/or TTHR were as follows: accommodation (seated, boundaries, indoor/outdoor, maximum capacity, venue access), type of event, weather conditions (humidity, dew point, heat index), crowd size, day vs night, demographic variables (age/gender), sports event distance, level of competition, free water availability, and specific TTHR-predictive factors (injury status: number of patient presentations, type of injury). The quality of the evidence was considered as low. Three studies externally validated their model against existing models. Two validation studies showed a large underestimation of the predicted patients presentations or transports to hospital (67-81%) whereas one study overestimated these outcomes by 10-28%.
Discussion: This systematic review identified a comprehensive list of relevant predictors which should be measured to develop and validate future models to predict medical usage at mass gatherings. This will further scientifically underpin more effective pre-event planning and resource provision.

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Proposing a Minimum Data Set for Mass Gathering Health

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Introduction: There is currently no standardized approach to collecting mass gathering health data, which makes comparisons across or between events challenging. From 2013 onward, an international team of researchers from Australia and Canada collaborated to develop a Minimum Data Set (MDS) for Mass Gathering Health (MGH).
Aim: The process of developing the MDS has been reported on previously at the 2015 and 2017 World Congresses on Disaster and Emergency Medicine, and this presentation will present a final MDS on MGH.
Methods: This study drew from literature, including the 2015 Public Health for Mass Gatherings key considerations, previous event/patient registry development, expert input, and the results of the team's work. The authors developed an MDS framework with the aim to create an online MGH data repository. The framework was populated with an initial list of data elements using a modified Delphi technique.
Results: The MDS includes the 41 data elements in the following domains: community characteristics, event characteristics, venue characteristics, crowd characteristics, event safety considerations, public health considerations, and health services. Also included are definitions and preliminary metadata.
Discussion: The development of an MGH-MDS can grow the science underpinning this emerging field. Future input from the international community is essential to ensure that the proposed

MDS is fit-for-purpose, i.e., systematic, comprehensive, and rigorous, while remaining fluid and relevant for various users and contexts.

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The Sun Herald Sydney City-2-Surf Fun Run: Historical Injury Patterns and Development of a Predictive Model to Inform Health Service Planning

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Introduction: The Sydney City-2-Surf is the world's largest annual run entered by around 80,000 people. First aid planning at mass participation running events such as the City-2-Surf is an area in the medical literature that has received little attention. Consequently, first aid planning for these events is based on experience rather than evidence. The models for predicting casualties that currently exist in the literature are either dated or not statistically significant.
Aim: The aim of this study was to characterize patterns of injuries linked to geographic location across the course of the City-2-Surf, and to explore relationships of injury types with location and meteorological conditions.
Methods: Records for formally treated casualties and meteorological conditions were obtained for the race years 2010-2016 and statistically analyzed to find associations between meteorological conditions, geographic conditions, casualty types, and location.
Results: The most common casualties encountered were heat exhaustion or hyperthermia (39.2%), musculoskeletal (25.4%), and physical exhaustion (10.2%). Associations were found between gradient and the location. Type of casualty incidence with the individual distribution trends of casualty types were quite clear. Clusters of musculoskeletal casualties emerged in the parts of the course with the steepest negative gradients, while a cluster of cardiovascular events was found to occur at the top of the 'heartbreak hill,' the longest climb of the race. Regression analysis highlighted the linear relationship between the number of heat and physical exhaustion casualties and the apparent temperature (AT) at 12pm (R^2= 0.59, P=0.044). This linear equation was used to formulate a model to predict these casualties.
Discussion: The findings of this study demonstrate the relationship between meteorological conditions, geographic conditions, and casualties. This will assist planners of other similar events to determine optimum allocation of resources to anticipated injury and illness burden.

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This is Sparta - A Five-Year Obstacle Course Racing Injury Analysis

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Introduction: Obstacle Course Races (OCR) are mass participation sporting events, challenging participants to complete physical and mental tasks over a variety of distances and terrains. The case series studied, Spartan Race, has races occurring in urban, rural, and wilderness venues, ranging from 5 to 42 kilometers, while incorporating 20 to 60 obstacles.
Aim: To understand the injury rates, injury and illness patterns, and transport considerations within OCRs.
Methods: A secondary data analysis of de-identified medical charts from 56 Spartan Race events occurring in Eastern Canada from 2014 to 2018 was performed. The scope of practice was first aid from 2014 to 2017, with the addition of advanced life support onsite in 2018.
Results: Over 5 years, 2,387 injuries occurred among 127,481 participants, creating a patient presentation rate of 18.7/1000. Although the majority of injuries (92%; n=2,204) were treated onsite, a transport to hospital rate of 1.2/1000 (n=154) occurred along with an ambulance transport rate of 0.23/1000 (n=29). Lacerations (55%) and musculoskeletal (36%) injuries were the most frequent clinical presentations observed, whereas life-threatening emergencies (affecting airway, breathing, and circulation) were infrequent (n=10). Transport to the closest local tertiary care center was on average 49.8 kilometers (25.3 kilometers) and 40.5 minutes (17.9 minutes) away from the venue.
Discussion: These results suggest that there may be an upper limit to the injury rates within Spartan Races. The majority of patient presentations were able to be treated onsite, supporting the need for a qualified onsite medical team to mitigate the strain on local healthcare systems. Although life-threatening emergencies were uncommon, they do occur, and medical teams must be appropriately prepared. Further research is needed to understand the staffing and equipment requirements of medical teams, the demographic information of the injured, and the examination of the impact OCR events have on the local health care systems.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

NATURAL HAZARDS

Assessing the Quality of Roof-Harvested Rainwater after Bushfires

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Introduction: Roof-harvested rainwater held in domestic tanks is used for a variety of purposes in Australia, including drinking and irrigation. There is limited evidence about the quality of rainwater after bushfires. Current health guidelines can be interpreted that landholders need to drain their rainwater tanks to avoid the risk of contamination. Anecdotal reports indicate that following such advice caused additional distress to landowners affected by bushfires in South Australia. Sustainable water management is important for future resilience and more evidence on water quality following bushfires is needed.
Aim: This project investigated whether there is contamination of roof-harvested rainwater after bushfires, and if so, whether such water was safe for various purposes.
Methods: In 2017 we tested artificially contaminated water spiked with chemicals associated with bushfires (chromated copper arsenate-treated ash and firefighting foam) and conducted a pilot field study using two purposely built roofs during a pre-fire season burn off. A field validation is planned for the summer of 2018/19 (December 2018 - March 2019), i.e., we plan to obtain 200 samples from 50 households affected by bushfire – two samples immediately after the fire event and another two after the first rain.
Results: The artificially created contaminated water fell within guidelines for non-potable uses such as irrigation and stock watering, but was found unsuitable for drinking even after being filtered through two commercially available water filtration systems. We also plan to present results from our field study of 50 households.
Discussion: Contaminant concentrations, even in artificially spiked water samples, are low and acceptable for non-potable uses. Bottled water should be used for drinking. Landholders should be encouraged to use their water for recovery purposes. Such advice may assist with decreasing the stress experienced by affected landholders and help with recovery efforts through the availability of a greater body of water.

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Effectiveness of Children's Disaster Risk Reduction (DRR) Program on Earthquake Preparedness in Jordan

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Introduction: Children represent a particularly vulnerable population in disasters. Disaster Risk Reduction refers to a systematic approach to identifying, assessing, and reducing risks of disaster through sets of interventions towards disaster causes and population vulnerabilities. Disaster Risk Reduction through the education of the population, and especially children, is an emerging field requiring further study.
Aim: To test the hypothesis that an educational program on Disaster Risk Reduction can induce a sustained improvement in knowledge, risk perception, awareness, and attitudes toward preparedness behavior of children.
Methods: A Disaster Risk Reduction educational program for students aged 10-12 was completed in an earthquake-prone region of Jordan (Madaba). Subject students (A) and control groups of similarly aged untrained children in public (B) and private (C) schools were surveyed one year after the program. Surveys focused on disaster knowledge, risk perception, awareness, and preparedness behavior. Likert scales were used for some questions and binary yes/no for others. Results were collated and total scores averaged for each section. Average scores were compared between groups and analyzed using SPSS.
Results: Students who had completed the Disaster Risk Reduction program were found through Levene's test to have statistically significant improvement in earthquake knowledge (5.921 vs. 4.55 vs. 5.125), enhanced risk perception (3.966 vs. 3.580 vs. 3.789), and improved awareness of earthquakes (4.652 vs. 3.293 vs. 4.060) with heightened attitudes toward preparedness behavior (8.008 vs. 6.517 vs. 7.597) when compared to untrained public and private school control groups, respectively.
Discussion: Disaster Risk Reduction education programs can have lasting impacts when applied to children. They can

improve students' knowledge, risk perception, awareness, and attitudes towards preparedness. Further work is required to determine the frequency of re-education required and appropriate age groups for educational interventions.

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Learning Lessons during Recovery from Disasters

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Introduction: The Fort McMurray Alberta wildfire was one of Canada's largest natural disasters in history, burning 589,995 hectares of land until being controlled on July 5, 2016. In responding to the fire, Alberta Health Services (AHS) prompted a province-wide coordinated response. Through a combination of pre-emptive strategies and responsive activities, the AHS response has been considered a success. Underlying the successful response is the collective experiences and contextual knowledge of AHS staff members acquired from past events. While the frequency and severity of risks associated with extreme weather and climate change are increasing worldwide, there is a persistent knowledge gap in the evidence-base informing public health emergency preparedness. It is imperative that lessons learned from past events inform future preparedness activities. Learning lessons is a systematic implementation process that can be used to inform future responses and best practices that are transferable to similar situations.
Aim: To describe strategies employed and challenges encountered during recovery after the Alberta wildfires.
Methods: A single-case study approach was employed to understand the AHS method to "learning lessons," and the process involved in translating lessons into actionable goals. Semi-structured interviews with senior leaders (n=11) were conducted and internal documents were obtained.
Results: The analysis revealed a strategic learning process, including debriefs, staff surveys, interviews, and member validity checking. The implementation process used to translate the lessons identified included a project management framework, evaluation techniques, and the utilization of tacit and explicit knowledge. Key challenges for implementation involve clarification of processes, leadership commitment, resource and time constraints, staff turn-over, and measuring outcomes.
Discussion: Translating the lessons from the Alberta wildfires is crucial for enhancing preparedness, and exploratory research in this area can contribute to building a program of research in evaluation during disaster recovery.

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"Operation:Navajeevan": Novel PPP Model Flood Relief Camp

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Introduction: In August 2018, Kerala, India witnessed its worst flood in over a century. With the support of the national health mission, Operation Navajeevan, a public-private partnership between the district health administration and local hospitals was established in Kozhikode to provide medical aid to flood victims. This study identifies prerequisites, describes challenges, and depicts the epidemiology of patients seen in these camps.
Aim:
1. Identify prerequisites and medical needs/challenges faced by medical relief camps in a flood-affected region
2. Formulate protocols to avoid duplication of services
3. Prepare an ideal PPP emergency medical camp model

Methods: A control center with drugs and a logistics unit was set up at the district administration to monitor and supervise various camps. A mobile medical documentation format was created to record the details of each camp. Cases of patients seen at these camps were compiled and later analyzed. The medical officer sent reports from each camp to the control center each day to specify the daily difficulties faced by each camp. Mobile ICUs were kept on standby to respond in the event of emergent circumstances or surge demands. Transfer protocol and treatment guidelines were formulated and standardized.
Results: Over two weeks, approximately 40,000 patients were seen in 280 medical camps. Major medical issues included exacerbation of chronic illnesses due to loss of medications (18,490), acute respiratory infections (7,451), psychiatric illnesses (5,327), trauma (3,736), skin infection (792), tropical fever (498), acute gastroenteritis (394), and ACS (17). Of the cases of fever, 137 people had leptospirosis. Major challenges included a lack of training in disaster management and failure of documentation systems.
Discussion: A well-organized control center, improved training in disaster medicine, and reliable documentation systems are crucial for coordinating medical camps in disaster areas. Public-private partnerships offer a model for providing medical relief in disaster settings.

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Preparedness for a Severe Rainfall: The Importance of a Timeline

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Introduction: For recent years, we often hear the words, "never experienced before" on a weather forecast in Japan.
Aim: To evaluate our response to "Heisei 30-year July heavy rain" in the Hyogo Emergency Medical Operations Center.
Methods: Review our actions taken and exchanges of views with local government representatives in a time-related manner compared with public announcements of evacuation/sheltering warning.
Results: A specialized warning of heavy rain was announced at 10:50 PM on Friday by the local meteorological observatory.

At 11:50 PM, the emergency management headquarters of prefectural medical response was established in the hospital, but a connection could not be established to 10 regional health centers for the weekend. Water levels of some rivers were increasing nearly to flood levels, and an evacuation order was announced to hundreds of thousands of people. This situation continued for a few days throughout many regions. The information of flood or landslide probability was continuously monitored, but an attempt was made to decide the timing of cancellations of standby.

Discussion: An ordinary response to disaster depends on a clear turning point, such as the occurrence time. In heavy rainfall, there are two issues. One is about actions to prevent disaster and another is a recognition of geographic points or surface. Many critiques to the response focus on the judgments and actions for prevention before a critical event. Lessons learned included the importance of preventive actions along with a timeline and the judgment of restoration.

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The Role of Japan DMAT in Tokyo Inland Earthquake

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Introduction: An inland earthquake is expected to occur in Tokyo in the near future, and disaster preparedness and response measures have been put in place by the government of Japan and local authorities.

Methods: Japan Disaster Medical Assistant Teams (DMATs) conducted two large-scale drills for the first time in preparation for a Tokyo inland earthquake, in collaboration with the following participants: the Tokyo Metropolitan Government, disaster base hospitals in Tokyo, three Staging Care Units (SCUs), and neighboring prefectures. One of the scenarios was a north Tokyo Bay earthquake affecting the Tokyo wards and had 142 Japan DMATs participation. Another scenario was Tama inland earthquake affected mid-west of Tokyo and 110 DMATs participated. The drill included headquarters operation, affected hospital support operation, patient transportation within the area and to the wider region, SCU operation, collaboration with associated organizations, and logistics operation.

Results: Post-drill assessments identified the following areas that need to be addressed: review of Japan DMAT implementation strategies; improvement of SCUs; establishment of a patient air transportation framework; securing means of patient transportation; improvement of communication systems; strengthening of disaster response of all hospitals in the Tokyo Metropolis; and preparations for survival in the event of isolation caused by the disaster.

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Study of Medical Supply and Demand Balance for the Nankai Trough Earthquake

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Introduction: The Nankai Trough, marking the boundary between the Eurasian Plate and the Philippine Sea Plate, is forecasted to create a tragic earthquake and tsunami within 30 years.

Aim: To clarify the gap between medical supplies and demand.

Methods: Collected the data of the estimation of injured persons from each prefecture throughout Japan, and also the number of Intensive Care Unit (ICU) and High Care Unit (HCU) beds in Japan from the Ministry of Health database. We re-calculated the number of severe cases based on official data. Moreover, we calculated the number of beds of hospitals with the capacity to receive severe patients.

Results: The total number of disaster base hospitals is 723 hospitals with 6556 ICU beds, and 545 hospitals have 5,248 HCU beds throughout Japan. When the Nankai Trough earthquake occurs, 187 disaster base hospitals would be located in the area with seismic intensity 6-upper on the Japanese Seismic Intensity Scale of 0-7, and 79 disaster base hospitals would be located in the tsunami inundation area. The estimated total number of injured persons is 661,604 including 26,857 severe cases, 290,065 moderate cases, and 344,682 minor cases.

Discussion: Even if all ICU and HCU beds are usable for severe patients, there will be 15,053 more beds needed. The Cabinet Office of Japan assumes that 60% of hospital beds would not be able to be used in an area of the seismic intensity of 6-upper. If 80% of beds are used in the non-disaster time, the number of beds which are usable at the time of a disaster will decrease more. The beds needed for severe patients would be significantly lacking when the Nankai Trough earthquake occurs. It will be necessary to start treatment of the severe patients who are "more likely to be saved more."

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They have Arrived! How Dallas, Texas Provided Shelter-Based Onsite Medical Care to Evacuees from Hurricane Harvey

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Introduction: After Hurricane Harvey and the flooding that ensued, 3,829 displaced persons were transported from their homes and sheltered in the Dallas Convention Center. This large general population sheltering operation was medically supported by the onsite Mega-Shelter Medical Clinic (MMC). In an altered standard of care environment, a number of multi-disciplinary medical services were provided including emergent management, acute pediatric and adult care,

psychiatric/behavioral services, onsite pharmaceutical, and durable medical equipment distribution, epidemiologic surveillance, and select laboratory services.
Aim: To describe how onsite medical care in the adapted environment of a large population shelter can provide comparable services and limit the direct impact on the local medical community.
Methods: A retrospective chart review of medical records was generated for all clinical encounters at the MMC. Data were sorted by daily census, disease surveillance, medical decision making, treatment, and transport destinations.
Results: 40.7% of registered evacuees utilized the MMC accounting for a total of 2,654 clinic visits by 1,560 unique patients representing all age groups. During the sustained MMC operations, 8% of patients required emergency transport and 500 additional patient transports were arranged for clinic appointments. No deaths occurred and no iatrogenic morbidity was reported.
Discussion: Medical care was provided for a large number of evacuees which mitigated the potential impact on the local medical infrastructure. The provision of medical services in a large population shelter may necessitate adaptation to the standard of care. However, despite the nontraditional clinical setting, care delivery was not compromised.

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Typhoon Mangkhut Case Study: Household and Community Typhoon Preparedness in Hong Kong, a Densely Populated Urban City

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Introduction: As a subtropical urbanized city in Southeast Asia, Hong Kong is prone to frequent typhoons. With an increasing number of severe typhoons, usual preparedness measures should be explored to assess their adequacy to safeguard health and wellbeing. Typhoon Mangkhut (2018) serves as an example of the successes and limitations of community preparedness for a severe typhoon.
Aim: To explore how Hong Kong residents prepared for Typhoon Mangkhut and whether their usual preparedness measures provided enough protection.
Methods: A population-based randomized telephone survey of Hong Kong residents (n=521) was conducted soon after Typhoon Mangkhut's landing. Only residents aged 18 or above and understood Cantonese were included. Socio-demographic factors, types of typhoon and general preparedness, risk perception, and impacts from the typhoon were asked. Descriptive characteristics and univariate analysis were used to describe the patterns and associations.
Results: 8.6% of respondents felt their home was at high risk of danger during typhoons although 33.4% reported some form of impact from Mangkhut. Over 70% reported doing at least one typhoon specific preparedness measure. Among those who practiced at least one typhoon specific preparedness measure, 37.2% (p=0.002) were affected by the typhoon.
Discussion: Despite the high adaptation of preparedness measures, warranted by the frequent typhoons, Hong Kong residents were not adequately prepared for a severe typhoon. While the early warning system and evacuation of flood-prone areas mitigated some of the impact, unexpected effects such as flying air conditioners, roadblocks affecting employment, swaying buildings, and loss of power supply were not accounted for. Future preparedness for natural disasters which will become more extreme due to climate change and needs to account for unforeseen risks.

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Typhoon Preparedness Measures of the Hong Kong Public for Typhoon Mangkhut

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Introduction: Climate change has brought more extreme weather events to Hong Kong. The increasing number of powerful tropical cyclones that hammered Hong Kong in recent years reminded the territory to review typhoon preparedness of the community.
Aim: Typhoon Mangkhut slammed Hong Kong in September 2018 and caused significant devastation. Three weeks after the devastation, the Hong Kong Jockey Club Disaster Preparedness and Response Institute commissioned the Public Opinion Programme at The University of Hong Kong to conduct a survey to understand the general Hong Kong public's typhoon preparedness measures and their information seeking behaviors.
Methods: A cross-sectional population-based anonymous telephone survey was conducted on a random sample of 1,018 Cantonese-speaking adults aged 18 or above.
Results: The most common typhoon preparedness measures were taping windows (45%), followed by food stockpiling (18%), and closing of doors/windows (10%). Only 2% and 1% of the respondents were prepared for water and power outage, respectively. 36% of the respondents did not take any precautionary measures. 29% sought typhoon precautionary measures information from the mass media and 31% of respondents relied on their previous experience. Other sources of information included government sources (7%) and social media (7%).
Discussion: Though no death cases were reported related to Typhoon Mangkhut, the effect of the superstorm caused over 300 casualties, blocked roads, and transportation chaos caused

by fallen trees and other debris, power and water outage, serious floods, and severely damaged public and private facilities. Around 40,000 households experienced a power outage and some residential estates were left without water. The survey revealed the lack of precautionary measures of the Hong Kong public for power and water outage. More education on typhoon preparedness, especially on power and water outage and more community-level support on localized disaster preparedness advice, would likely improve disaster preparedness for the Hong Kong public.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

NON COMMUNICABLE DISEASES

Application of National and Sub-National Indicators to Rank Needs of People with Life-threatening Conditions and Chronic Diseases Before, During, and After a Disaster

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Introduction: Disasters can damage the essential public health infrastructure and social protection systems required for vulnerable populations. This contributes to indirect mortality and morbidity as high as 70–90%, primarily due to an exacerbation of life-threatening conditions and chronic diseases. Despite this, the traditional focus of public health systems has been on communicable diseases. To address this challenge, disaster and health planners require access to repeatable and measurable methods to rank and prioritize the needs of people with life-threatening and chronic diseases before, during, and after a disaster.

Aim: Propose a repeatable and measurable method for ranking and prioritizing the needs of people with life-threatening and chronic diseases before, during, and after a disaster.

Methods: The research began with identifying the risk disasters pose to people with life-threatening and chronic diseases. The data gathered was then used to develop indicators and explore the use of DisasterAWARE™ (All-hazard Warnings, Analysis, and Risk Evaluation) to rank and prioritize the needs before, during, and after a disaster.

Results: This research found people at greatest risk are those with underlying cardiovascular and respiratory diseases, unstable diabetes, renal diseases, and those undergoing cancer treatment. A sustainable method to help address this problem is to expand the use of DisasterAWARE™ (All-hazard Warnings, Analysis, and Risk Evaluation) to rank and prioritize needs at national and sub-national levels.

Discussion: DisasterAWARE™ has been successfully applied to the assessment and prioritization of disaster risk and humanitarian assistance needs in Southeast Asia (ASEAN, Viet Nam), Central America (Guatemala, El Salvador, Honduras, Nicaragua), South America (Peru), and the Caribbean (Jamaica, Dominican Republic). Using the indicators developed through this research, this proven methodology can be seamlessly and easily translated to rank and prioritize the needs of people with life-threatening and chronic diseases before, during, and after a disaster.

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Determining Key Influences on Patient Ability to Successfully Manage Noncommunicable Disease After Natural Disaster

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Introduction: Natural disasters often damage the public health infrastructure required to maintain the wellbeing of people with noncommunicable diseases. This increases the risk of an acute exacerbation or complications, potentially leading to a worse long-term prognosis or even death. Disaster-related exacerbations of noncommunicable diseases will continue, if not increase, due to an increasing disease prevalence, sustained rise in the frequency and intensity of disasters, and rapid unsustainable urbanization in disaster-prone areas. However, the traditional focus of public health and disaster systems remains on communicable diseases, despite a low risk. There is now an urgent need to expand the public health response to include noncommunicable diseases.

Aim: To explore the key influences on patient ability to successfully manage their noncommunicable disease after a natural disaster.

Methods: A survey of people with noncommunicable diseases in Queensland, Australia, collected data on demographics, disease/condition, disaster experience, and primary concern post-disaster. Descriptive statistics and chi-square tests with Bonferroni-adjustment were used to analyze data.

Results: There were 118 responses to the survey. Key influences on the ability to self-manage post-disaster were access to medication, medical services, water, treatment and care, power, and

food. Managing disease-specific symptoms associated with cardiovascular disease, diabetes, mental health, and respiratory diseases were primary concerns following a disaster. Stress and anxiety, loss of sleep, weakness or fatigue and shortness of breath were common concerns for all noncommunicable diseases. Those dependent on care from others were most worried about shortness of breath and slow healing sores. Accessing medication and medical services were priorities for all patients post-disaster.

Discussion: The key influences on successful self-management post disaster for people with noncommunicable diseases must be reflected in disaster plans and strategies. Achieving this will reduce exacerbations or complications of disease and decrease demand for emergency health care post-disaster.

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Disaster Risk Reduction and Health: The Potential of Health Registers for Public Health Monitoring

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Introduction: The Sendai Framework seeks to substantially reduce disaster risk and losses in lives, livelihoods, health, and other assets including persons, communities, and countries. The framework focuses on reducing mortality while increasing population wellbeing, early warning, and promotion of health systems resilience. The use of scientific evidence to inform policy and formulate effective initiatives and interventions is crucial to disaster risk reduction within health. Different instruments and methodologies are available to guide policy and operations. The potential value of routinely collected patient data from health registers is that they can provide pre-event health and comparison group data without burdening affected populations.

Aim: The current contribution aims to illustrate how health registers can help monitor the health impact of natural and human-made disasters.

Methods: Patient data from health registers of general practitioners and other health professionals, sometimes combined with other registers and data sources, have been utilized to monitor the health impact of disasters and environmental hazards in the Netherlands, Norway, and Sweden since 2000.

Results: Health registers allowed monitoring of mental health problems, medically unexplained symptoms, chronic health problems, and social problems. These were compared to groups not directly exposed. The health impact and care utilization was tracked after the fireworks explosion in Enschede affecting inhabitants of the neighborhood (2000; data range 1999-2005), children and parents after the Volendam café fire (2001; data range 2000-2006), Swedish survivors of the Tsunami in Southeast Asia (2004; data range 2004-2010), and parents of children affected by the terrorist attack on Utøya (2011; data range 2008-2014).

Discussion: Health systems with registers have an important advantage when it comes to the potential for monitoring population health, and perhaps offer early warnings of pandemics. However, data generation should be closely connected to policy-making before and during the planning and evaluation of public health intervention.

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The Effect of Natural Disasters on Cancer Care: A Systematic Review

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Introduction: As the incidence of cancer and the frequency of extreme weather events rise, disaster mitigation is becoming increasingly relevant to oncology care.

Aim: To investigate the effect of natural disasters on cancer care and the associated health effects on patients with cancer through the means of a systematic review.

Methods: Between database inception and November 12, 2016, Embase, ScienceDirect, MEDLINE, Scopus, PsycINFO, Web of Science, and CINAHL were searched for articles. Those identifying the effect of natural disasters on oncology services, or the associated health implications for patients with cancer, were included. Only articles published in English were included. Data extraction was done by two authors independently and then verified by all authors. The effects of disaster events on oncology services, survival outcomes, and psychological issues were assessed.

Results: Natural disasters cause substantial interruption to the provision of oncology care. Of the 4,593 studies identified, only 85 articles met all the eligibility criteria. Damage to infrastructure, communication systems, medication, and medical record losses substantially disrupt oncology care. The effect of extreme weather events on survival outcomes is limited to only a small number of studies, often with inadequate follow-up periods.

Discussion: To the best the authors' knowledge, this is the first systematic review to assess the existing evidence base on the health effects of natural disaster events on cancer care. Disaster planning must begin to take into consideration patients with cancer.

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Is There Calm After the Storm? A General Practice Registry-based Study Following the Case of a Severe Hailstorm in the Netherlands

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Introduction: On June 23 and 24, 2016, a heavy hailstorm in the south of the Netherlands destroyed farms, greenhouses, and crops, and caused severe damage to many residences and cars in multiple communities. The size of the massive hailstones ranged from 3 to 5 centimeters in diameter. The farm damages alone were estimated to be 100 million euros, while total insurance industry losses were expected to exceed half a billion euros. In addition to the storm, the affected region also had its first tropical day of the year, with temperatures reaching 32 degrees Celsius. To date, the psychosocial impact and possible adverse health effects caused by the storm have not been thoroughly investigated.
Aim: To explore whether the occurrence of chronic and acute health problems in the affected region increased after the hailstorm compared to "control" areas.
Methods: Health data for the time period before (2013-2015) and immediately after the hailstorm (2016-2018) will be collected based on electronic health records (morbidity, psychosocial problems, and prescribed medication) from general practices (GP) located in the affected municipalities. For the same period, health problems in the affected region will also be compared with GP-registered data from different Dutch municipalities with similar urbanization levels, which will be used as a control group. The combination with external datasets (e.g. socioeconomic status, environmental exposures) will also be considered.
Results: Multilevel regression analyses will be carried out to test the health impact of this sudden, onset event. The current study is a work in progress. Final results are expected in February 2019 and are presented during the conference.
Discussion: The present study illustrates how routinely collected patient health records, recorded by GPs, can be used for epidemiological research in the aftermath of a disaster within the context of climate and weather extremes in Europe.

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NORTH AMERICA CHAPTER

Advancing Performance Measurement for Public Health Emergency Preparedness: An Integrated Knowledge Translation Approach

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Introduction: Public health emergency management involves the timely translation of relevant evidence and effective coordination of diverse actors. In practice, this can be challenging in the absence of a common framework for action among diverse actors.
Aim: To apply an Integrated Knowledge Translation (iKT) approach throughout the development of a conceptual framework and performance measurement indicators for public health emergency preparedness (PHEP), to ensure knowledge generated is relevant and useful to the field.
Methods: The iKT approach was initiated by identifying a research question based on priorities from the field. The two phases of the study used participatory research methods as well as active engagement with potential end users at key study milestones. The Structured Interview Matrix (SIM) facilitation technique for focus groups and an expert panel using Delphi methodology were used to define the PHEP framework and performance measurement indicators, respectively. An advisory committee was assembled consisting of potential end-users of the research, in senior positions in applied and decision-making roles.
Results: iKT was an essential component for this applied public health project, contributing to and enhancing the relevance of the knowledge generated. iKT contributed to the following: broad national engagement and interest in the study, successful recruitment in both phases, and engagement with decision-makers. This multi-dimensional participatory approach successfully generated knowledge that was important to the field demonstrated by relevance to practice and policy in jurisdictions across Canada. Furthermore, the approach fostered building resilience in local and national communities through collaboration.
Discussion: The iKT approach was essential to generating knowledge that is relevant and useful to the field, mainly to promote health system preparedness and resilience. Future research to study the implementation of knowledge will be important to continue addressing the knowledge-to-action gap in health emergency management research.

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Effect of Tornado Outbreaks on Morbidity and Mortality in Texas

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Introduction: In the United States, tornadoes are the third leading cause of fatalities from natural disasters[1]. To aid prevention and mitigation of tornado-related morbidity and mortality, improvement in standardizing tornado specific threat analysis terminology was assessed. The largest number of tornado-related fatalities has occurred in the state of Texas for over a hundred years. The occurrence of tornadic clusters or "outbreaks" has not been formally standardized. The concept of "tornado outbreaks" is better defined and its role in fatality mitigation is addressed in this Institutional Review Board (IRB) approved study.
Aim: To understand the role of "tornado outbreaks" related clusters in Texas in relationship to morbidity and mortality.
Methods: This IRB approved (IRB2017- 0507) research study utilized GIS tools and statistical analysis of historical data to examine the relationship between tornado severity (based on the Fujita Scale), the number of tornadoes, and the trends in morbidity and mortality. This study was funded in part from The National Science Foundation grant (NSF Grant #1560106) in support of the CyberHealthGIS Research Experience for Undergraduates (REU).
Results: A statistically significant difference was demonstrated between the severity of a tornado and related morbidity and mortality during "tornado outbreaks" in Texas during a defined 30-year period.
Discussion: Understanding the role and discerning the impacts of "tornado outbreaks" as related to tornado severity has critical implications to disaster preparedness. Applications of this conclusion may improve shelter planning/preparation, timely warning, and educating the at-risk public. Subsequently, examining the likelihood and improved descriptions of "tornado outbreaks" may aid in reducing the number of tornado-related injuries and fatalities nationally.

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1. Boruff, B. J. (2003). Tornado hazards in the United States. *Climate Research* 24(2), 103-117.

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NURSING

Disaster Nursing: Trends in the Professional Literature

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Introduction: Nurses' broad knowledge and treatment skills are instrumental to disaster management. Roles, responsibilities, and practice take on additional dimensions to their regular roles during these times. Despite this crucial position, the literature indicates a gap between their actual work in emergencies and the investment in training and establishing response plans.
Aim: To explore trends in disaster nursing reflected in professional literature, link these trends to current disaster nursing competencies and standards, and reflect based on the literature how nursing can better contribute to disaster management.
Methods: A systematic literature review, conducted using six electronic databases, and examination of peer-reviewed English journal articles. Selected publications were examined to explore the domains of disaster nursing: policy, education, practice, research. Additional considerations were the scope of the paper: local, national, regional, or international. The International Nursing Councils' (ICN) Disaster-Nursing competencies are examined in this context.
Results: The search yielded 171 articles that met the inclusion criteria. Articles were published between 2001 and 2018, showing an annual increase. Of the articles, 48% (n = 82) were research studies and 12% (n = 20) were defined as dealing with management issues. Classified by domain, 48% (n = 82) dealt with practical implications of disaster nursing and 35% (n = 60) discussed educational issues. Only 11% of the papers reviewed policy matters, and of these, two included research. Classified by scope, about 11% (n =18) had an international perspective.
Discussion: Current standards attribute a greater role to disaster-nursing in leadership in disaster preparedness, particularly from a policy perspective. However, this study indicates that only about 11% of publications reviewed policy issues and management matters. A high percentage of educational publications discuss the importance of including disaster nursing issues in the curricula. In order to advance this area, there is a need to conduct dedicated studies.

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Mapping the Disaster Competency Landscape in Undergraduate Nursing - A Case Study of Nursing Educators in British Columbia, Canada

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Introduction: In British Columbia (BC), Canada, it is increasingly commonplace for communities to experience yearly disaster events such as floods, forest fires, avalanches, and mudslides. Nurses are known to be one of the largest groups of healthcare workers and are often challenged to care for members of the public during these events. Many nurses have stated that they do not have enough education to provide quality care in a disaster role, as they received no education in their undergraduate nursing degrees.
Aim: The aim of this study was to explore how and what nurse educators are teaching undergraduate nursing students regarding the disaster nursing role within Schools of Nursing in BC, Canada. Understanding the current practice of teaching will serve as a starting point for shaping future best practice undergraduate nursing disaster educational frameworks.
Methods: This study used a qualitative case study methodology guided by Merriam's procedural approach with a theoretical framework of adult teaching and learning.
Results: The findings indicate that disaster nursing knowledge is taught either within existing global health courses or rarely is leveled throughout the program. Many challenges exist for educators, which include lack of current resources, workload restrictions, and lack of personal disaster knowledge. Content is determined by the educator. However, there is no specific model or link to disaster nursing competencies or assessment strategies. Most content is delivered didactically by the educator with some expert guest speakers or collaborative simulation events.
Discussion: The identified priority challenge is to obtain clarity and understanding around just what knowledge is required and how it should be evaluated. Some suggestions for a specific undergraduate disaster nursing model will be presented in order to ensure that students have the foundational knowledge that they require and that our educators are prepared to teach them.

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OCEANIA CHAPTER

A Primary Care Role in Building Local Capacity Following Volcanic Activity in Vanuatu

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Introduction: Vanuatu is situated in the Pacific Ring of Fire. In July 2018, there was increased volcanic activity on Ambae, an island with a population of 11,000 people. Due to the destruction of food sources, contamination of water supply, and respiratory issues caused by ash fall, an immediate compulsory evacuation was ordered by the government.
Aim: To describe the role of the primary care team response to urgent and ongoing healthcare needs of evacuees following volcanic activity.
Methods: A non-governmental organization (NGO) primary care team of a general practitioner, nurse practitioner, and two healthcare assistants undertook the initial assessment of a group of newly arrived evacuees. This allowed the identification and management of urgent care needs. Over the subsequent weeks, the primary care clinic provided care to the evacuees. A prospective database of anonymized case files was undertaken to monitor evolving primary healthcare needs of the evacuees.
Results: Twenty-five patients were assessed initially. Two patients required urgent transfer to a hospital for acute management. Six diabetic patients required medication supplies. There were eight hypertensive patients. Two patients required urgent BP reduction and four required medication supplies. Over the following two weeks, 104 patients were reviewed at the clinic. During this time, 45 patients were treated for respiratory tract infections. Medication supplies were replenished for antihypertensives and diabetic medications for seven patients. Opportunistic cardiovascular and diabetes risk reviews were performed and follow up arranged for nine patients.
Discussion: The primary care team role was part of a local services collaborative approach initiated by the government. Involving local primary care clinicians in disaster management builds local capacity. Patients are able to receive continuity of care for acute and ongoing medical problems. Clinicians are able to evaluate evolving care needs and gain an improved understanding of the impact of displacement on the community.

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Earthquake, Tsunami, and Liquefaction in Central Sulawesi, Indonesia: How Far is Our Disaster Health Management Progress?

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Introduction: Located in the Pacific Ring of Fire, Indonesia is prone to natural hazards, such as earthquakes, tsunamis, floods, and volcanic activity. Management in the health sector is a necessary foundation for dealing with a disaster. Management lessons and essential experiences identified from disasters are often forgotten. The faculty of Medicine, Public Health, and Nursing Universitas Gadjah Mada has been developing disaster health management since 2009 after Padang Earthquake, followed by Merapi Volcano Eruption (2009), Pidie Jaya Earthquake (2016), and Lombok Earthquake (2018). The latest series of earthquakes that struck Central Sulawesi has revealed management problems with respect to the communication process, the development of coordination, and information and data synchronization.
Aim: To show the importance of effective management in a health cluster, including what went well, what went poorly, and what will happen from the acute phase until the transition phase.
Methods: Disaster health management implementation was compared from Padang to the Central Sulawesi' earthquake. Then health cluster management was compared in Lombok and Central Sulawesi. Indicators were coordination, communication, data information, and organization.
Discussion: There has been good progress for disaster health management in Indonesia. The health cluster approach makes coordination, data collected, and communication much easier. However, it also needs to focus on disaster planning, training, or simulation for the district health office while enhancing district response capacity. Although the challenges have changed in the last few decades, additional research is planned to limit management difficulties in the health cluster.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

OSTEOPATHIC MEDICINE

The Forgotten Patients in Cyclones: The Continuation of Opioid Replacement Therapy Program

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Introduction: Cyclones are expected to increase in frequency and intensity, significantly impacting communities and healthcare services. During these times, those with chronic diseases such as opioid dependence are at an increased risk of disease exacerbation due to treatment regimen interruptions. Disruptions to the continuity of the opioid replacement therapy (ORT) service can be detrimental to both clients and the community which can potentially lead to relapse, withdrawal, and risky behaviors.
Aim: To explore the impacts of cyclones on opioid treatment programs within community and hospital pharmacies in Queensland.
Methods: Qualitative research methods were used in this study with two methods of data analysis employed: the text analytics software, Leximancer®, and manual coding. Interviews were conducted with five hospital and five community pharmacists and four Queensland opioid treatment program (QOTP) employees. Participants worked in Mackay, Rockhampton, Townsville, and Yeppoon in a community impacted by a cyclone and involved with ORT supply.
Results: The themes developed in the manual coding were "impact on essential services," "human experience," "healthcare infrastructure," "preparedness," and "interprofessional networks." These themes were aligned with those identified in the Leximancer® analysis. The community pharmacists focused on client stability, whereas, the hospital pharmacists and QOTP employees focused on the need for disaster plans to be implemented.
Discussion: The greatest concern for participants was maintaining the stability of their clients. Communication amongst the dosing sites and ORT stakeholders was most concerning. This led to a lack of dosing information in a timely manner with pharmacists being hesitant to provide doses and takeaways due to legislative restrictions. A review of coordinated efforts and the legislative constraints is recommended to ensure continuity of ORT supply during cyclones.

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Using Geographic Information System Analysis to Understand West Virginia's Growing Opioid-Overdose Epidemic - What Are We Missing?

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Introduction: The opioid epidemic is overwhelming communities across the United States. West Virginia (WV) has been devastated, heralding a 86% increase in deaths from 2012-2016, and over 1,000 deaths last year as per WV Health Statistics Center. Treatment centers and providers have emerged throughout the state to provide medication-assisted treatment (MAT). The impact of these clinics on the opioid abusing population is not yet fully understood.
Aim: Utilizing Geographic Information System (GIS), a comparison of MAT provider locations versus regions of historical overdoses can indicate areas of deficiency. If no providers emerge in underserved counties, overdose deaths in those areas will continue to rise.
Methods: Maps were created using current DEA-X licenses in WV registered through Substance Abuse and Mental Health Services Administration (SAHMSA). Overdose death rates were taken from WV Public Health Records from 2010-2017. Two maps and corresponding data were compared for overlap or lack thereof.
Results: Of the 338 locations of DEA-X licenses registered, 17.5% are in Cabell County, which led the state in overdose deaths in 2017. Only 2.5% of the total providers are currently in Wayne County, which had the second highest overdose death rate. Berkeley County, which was 3rd highest, has a mere 6.5% of total providers. Comparatively, Kanawah County, home to the state's capital, has over twice this number of providers despite consistently having at or below the state average of overdose rates. Resources are pulled towards population-dense areas or university centers, where the epidemic is present but misses counties with higher overdose rates.
Discussion: Results show a lack of MAT providers in many of WV's devastated counties. Treatment centers exist throughout the state but are concentrated in regions with large cities or academic centers. This distribution limits accessibility to a marginalized patient population, making improvements unlikely in WV's future opioid-overdose death rates.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

PALLIATIVE CARE

Palliative Care Training for Work in an Austere Environment After a Natural Disaster

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Introduction: Healthcare professionals working in a disaster face destroyed physical infrastructures, scarce supplies, and a limited-in-training peer group. During a mass casualty event, disaster victims are triaged to the "expectant" category of care because either their injuries are not survivable or the resources needed to care for them are not available.
Aim: To examine the challenges that disaster responders face in caring for dying patients in the field, and advocate for basic palliative care training prior to deploying to a disaster.
Methods: The world's literature was reviewed to identify challenges for disaster teams in providing compassionate end-of-life care and to find training exercises for pre-deployment competency building.
Results: Training Topics in Palliative Care Prior to Disaster Deployment include the following:

1. Symptom Management Protocols:
   - Pain
   - Anxiety
   - Respiratory distress
   - Delirium
   - Nausea and Vomiting
2. Spiritual Management
   - Grief
   - Identify meaning
3. Cultural Training specific to the location of the disaster
   - The meaning of death in the culture
   - Who are the decision makers in the family
4. Training for difficult conversations
   - Delivering Bad News
   - Managing a grieving family
5. Self-Care Training
   - Develop a system for debriefing
   - Develop a buddy system
   - Self-care exercises: deep breathing, prayer, meditation, yoga

Discussion: Challenges to the care of the dying during a disaster include a loss of medical infrastructure and scarce medical or physical resources. Palliative care training for non-palliative care specialists can be instructive for the development of palliative care training for medical care responders after disasters. Applying standards, identifying goals of care for the expectant patient, communication to the patient and family members, if available, can help reduce suffering of this group of devastatingly vulnerable patients. In addition, peer support, on-site discussions and debriefing, and problem-solving when resources are limited will help alleviate moral distress among the providers.

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Unsuccessful, Unwanted, and Unwarranted Resuscitation: Exploring Ambulance Personnel Preparation and Support for Death in the Field

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Introduction: In many countries, ambulance personnel are authorized to start or stop resuscitation efforts in accordance with clinical guidelines. Research shows that decisions to withhold or terminate resuscitation and manage patient death scenes can be particularly challenging.
Aim: To identify preparation and support mechanisms for ambulance personnel who are authorized to withhold or terminate resuscitation efforts, and manage patient death in the field.
Methods: A scoping review provided an overview of international research in this area. A qualitative exploratory study was then undertaken. Focus groups were held with senior ambulance personnel currently working in clinical education, managerial, or pastoral support roles across New Zealand.
Results: Well-supported clinical experiential learning and resolved personal experiences with grief and death were considered most useful to increase self-efficacy and coping with patient death. Participants felt some of the personal and interpersonal skills needed to manage death in the field were difficult to teach. Relatively little time is spent preparing ambulance personnel for the non-technical skills associated with resuscitation decision-making, particularly communicating with family and bystanders. Ambulance personnel responses and support-needs during or after the event are idiosyncratic. Ambulance personnel appear to primarily rely on

colleagues and managers checking in and offering informal debriefing.

Discussion: Results from this study identify opportunities for improvement in the preparation and support of ambulance personnel faced with managing patient death in the field. Clinical experience with supportive mentoring may provide the best opportunities for learning, but novices may not get exposure to patient death in this context. Ambulance personnel may benefit from training, which includes opportunities to role-play death notification and communication with family and bystanders at the scene of a patient death. Ambulance employers should allow downtime to facilitate personalized peer and managerial support where needed.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

PANDEMIC

Development and Implementation of First Hospital-Based Epidemic Outbreak Management Plan: Lessons Learned from Nepal

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Introduction: Patan Hospital, located in Kathmandu Valley, Nepal is a 400-bed hospital that has a long history of responding to natural disasters. Hospital personnel have worked with the Ministry of Health (MOH) and the World Health Organization (WHO) to develop standardized disaster response plans that were implemented in multiple hospital systems after the earthquake of 2015. These plans focused primarily on traumatic events but did not account for epidemics despite the prevalence of infectious diseases in Nepal.
Aim: To develop and test a robust epidemic/pandemic response plan at Patan Hospital in Kathmandu that would be generalizable to other hospitals nationwide.
Methods: Using the existing disaster plan in conjunction with public health and disaster medicine experts,we developed an epidemic response plan focusing on communication and coordination (between the hospital and MOH, among hospital administration and staff), logistics and supplies including personal protective equipment (PPE), and personnel and hospital incident command (IC) training. After development, we tested the plan using a high-fidelity, real-time simulation across the entire hospital and the hospital IC using actors and in conjunction with the MOH and WHO. We adjusted the plan based on lessons learned from this exercise.
Results: Lessons learned from the high-fidelity simulation included the following: uncovering patient flow issues to avoid contamination/infection; layout issues with the isolation area, specifically accounting for donning/doffing of PPE; more sustained duration of response compared to a natural disaster with implications for staffing and supplies; communication difficulties unique to epidemics; need for national and regional surveillance and inter-facility planning and communication. We adjusted our plan accordingly and created a generalizable plan that can be deployed at an inter-facility and national level.
Discussion: We learned that this process is feasible in resource-poor hospital systems. Challenges discovered in this process can lead to better national and system-wide preparedness.

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The Development of a Community-wide Primary Health Comprehensive Planning and Response Coordination Group to Plan for and Manage Seasonal Influenza and Possible Pandemic Response

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Introduction: The Canterbury Primary Response Group (CPRG) was formed following the threats of severe acute respiratory syndrome (SARS) and avian influenza worldwide. The possible impact of these viruses alerted health care professionals that a community-wide approach was needed to manage and coordinate a response to any outbreak or potential outbreak. In Canterbury, New Zealand, the CPRG group took the responsibility to coordinate and manage the regional, out of hospital, planning and response coordination to annual influenza threats and the possible escalation to pandemic outbreaks.
Aim: To outline the formation of a primary health and community-wide planning group, bringing together not only a wide range of health providers, but also key community agencies to plan strategies and responses to seasonal influenza and possible pandemic outbreaks.
Methods: CPRG has developed a Pandemic Plan that focuses on the processes, structures, and roles to support and coordinate general practice, community pharmacies, community nursing, and other primary health care providers in the reduction of, readiness for, response to, and recovery from an influenza pandemic. The plan could reasonably apply to other respiratory-type pandemics such as SARS.
Results: A comprehensive group of health professionals and supporting agencies meet monthly (more often if required) under the chair of CPRG to share information of the influenza-like illness (ILI) situation, virus types, and spread, as well as support strategies and response activities. Regular communication information updates are produced and circulated amongst members and primary health providers in the region.
Discussion: Given that most ILI health consultations and treatments are self or primary health administered and take place outside of hospital services, it is essential for providers to be informed and consistent with their responses and

knowledge of the extent and symptoms of ILI and any likelihood of a pandemic.

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Using the MCRISP Network to Study Acute Gastroenteritis and Influenza-Like Illness Outbreaks in Child Care Centers Compared to Statewide Epidemics

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Introduction: Biosurveillance is critical for early detection of disease outbreaks and resource mobilization. Child care center (CCC) attendance has long been recognized as a significant independent predictor for respiratory and gastrointestinal diseases, but CCC surveillance is currently not part of the statewide disease surveillance system. The Michigan Child Care Related Infections Surveillance Program (MCRISP) is an independent, online reporting network with >30 local CCCs that was created to fill this surveillance gap.

Aim: To describe the capability of a novel CCC biosurveillance system (MCRISP) to report pediatric Influenza-Like Illness (ILI) and Acute Gastroenteritis (AGE) illness over three years to (i) assess both the timing and magnitude of epidemics in CCCs and (ii) compare CCC outbreak patterns with those of the state database.

Methods: MCRISP collates real-time syndromic reports of illness from local county CCCs. The statewide Michigan Disease Surveillance System (MDSS) collects reports of diagnosed illness from designated laboratories, clinics, and hospitals statewide. We assessed epidemic curves based on MCRISP incidence rates and MDSS case counts for ILI and AGE over three seasons (2014-7).

Results: A total of 4,627 MCRISP cases (2,425 ILI and 2,202 AGE reports) were reported during the three years of study surveillance. Epidemic patterns (seasonal peaks, troughs, and breadth) for both ILI and AGE in CCCs mirrored those reported at county and state levels, respectively. Two distinguishing features of CCC ILI outbreaks were noted in all three seasons: MCRISP ILI rates remained elevated after MDSS influenza counts abated, and MCRISP rates consistently peaked prior to MDSS influenza peaks. Neither of these phenomena were observed in comparing AGE outbreaks between surveillance systems.

Discussion: ILI and AGE incidence rates from the MCRISP network appeared to broadly mirror epidemics from the established state surveillance system. MCRISP may act as a sentinel system for larger community outbreaks of respiratory disease.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

PEDIATRICS

Are There Adequate Policies and Programmes in Place to Protect Infants and Young Children During Emergencies?

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Introduction: In emergencies, infants and young children are disproportionately affected due to specific food and fluid requirements, immature immune system, susceptibility to dehydration, and dependence on others. Provision of safe food and water to infants and young children is critical. However, it is challenging in the emergency context. Specific planning is vital to support infant and young child feeding in emergencies (IYCF-E).
Aim: To identify the extent to which Australian emergency management plans and guidance account for the needs of infants and young children.
Methods: An audit of Australian emergency management plans and guidance was conducted as a part of the 2018 World Breastfeeding Trends Initiative assessment of Australian infant feeding policies. All national and state/territory emergency preparedness plans, and a sample of local government area preparedness plans, response plans, and other guidance were identified and searched for content related to the needs of infants and young children. Plans and guidance were searched for content related to the needs of animals as a comparison.
Results: Vulnerability of infants and young children was commonly noted. However, content related to supporting the specific needs of infants and young children through appropriate IYCF-E was almost totally absent. In some cases, the guidance that did exist was misleading or dangerous. No agency at the federal, state/territory, or local government level was identified as having met the responsibility for ensuring the needs of infants and young children. The absence of any coordinated response for the needs of infants and young children is in stark contrast to consideration of animal needs, which have a delegated authority, plans, and guidance at all levels of government.
Discussion: Planning for the needs of infants and young children in emergencies in Australia is dangerously inadequate. Action should be taken to ensure that appropriate plans exist at all levels of government.

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A Comprehensive Coalition Based Regional Approach to Pediatric Disaster Planning

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Introduction: Children, who comprise 25% of the US population, are frequently victims of disasters and have special needs during these events.
Aim: To prepare NYC for a large-scale pediatric disaster, NYCPDC has worked with an increasing number of providers that initially included a small number of hospitals and agencies. Through a cooperative team approach, stakeholders now include public health, emergency management, and emergency medical services, 28 hospitals, community-based providers, and the Medical Reserve Corps.
Methods: The NYCPDC utilized an inclusive iterative process model whereby a desired plan was achieved by stakeholders reviewing the literature and current practice through discussion and consensus building. NYCPDC used this model in developing a comprehensive regional pediatric disaster plan.
Results: The Plan included disaster scene triage (adapted for pediatric use) to transport (with prioritization) to surge and evacuation. Additionally, site-specific plans utilizing Guidelines and Templates now include Pediatric Long-Term Care Facilities, Hospital Pediatric Departments, Pediatric and Ob/Newborn/Neonatal Intensive Care Services and Outpatient/Urgent Care Centers. A force multiplier course in critical care for non-intensivists is provided. An extensive Pediatric Exercise program has been used to develop, operationalize and revise plans based on lessons learned. This includes pediatric tabletop, functional and full-scale exercises at individual hospitals leading to citywide exercises at 13 and subsequently all 28 hospitals caring for children.
Discussion: The NYCPDC has comprehensively planned for the special needs of children during disasters utilizing a pediatric coalition based regional approach that matches pediatric resources to needs to provide best outcomes.

The NYCPDC has responded to real-time events (H1N1, Haiti Earthquake, Superstorm Sandy, Ebola), and participated in local (NYC boroughs and executive leadership) and nationwide coalitions (National Pediatric Disaster Coalition). The NYCPDC has had the opportunity to present their Pediatric Disaster Planning and Response efforts at local, national and International conferences.

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Development of a Model for Admitting Pediatric Trauma Casualties in the Emergency Department

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Introduction: Pediatric trauma is one of the leading causes of child mortality and morbidity and is a major challenge for healthcare systems worldwide. Treatment of pediatric trauma requires special attention according to the unique needs of children, especially in children affected by severe trauma who require life-saving treatments. It is essential to examine the preparedness of Emergency Departments (EDs) for admitting and treating pediatric casualties.
Aim: To develop a model for admitting and treating pediatric trauma casualties in EDs.
Methods: Seventeen health professionals were interviewed using a semi-structured qualitative tool. A quantitative questionnaire was distributed among general and pediatric EDs' medical and nursing staff. Following the qualitative and quantitative findings, another round of interviews was performed to identify constraints, to construct a "Current Reality Tree," and develop a model for admission and management of pediatric casualties in EDs. The model was validated by the National Council for Trauma and Emergency Medicine.
Results: Lack of uniformity was found regarding age limit and levels of injury of pediatric patients. Most study participants believe that severe pediatric casualties should be concentrated in designated medical centers and that minor and major pediatric casualties should be treated in pediatric rather that general EDs. Pediatric emergency medicine specialists are preferred as case managers for pediatric casualties. Significant diversity in pediatric-care training was found. Based on qualitative and quantitative findings, a model for the optimal admitting and managing of pediatric casualties was designed.
Discussion: To provide the best care for pediatric casualties and regulate its key aspects, clear statutory guidelines should be formulated at national and local levels. The model developed in this study considers EDs' medical teams and policy leaders' perceptions, and hence its significant contribution. Implementation of the findings and their integration in pediatric trauma care in EDs can significantly improve pediatric emergency medical services.

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The Illinois EMSC Pediatric Preparedness Checklist - An Innovative Approach to Improving Pediatric Disaster Planning and Preparedness in Chicago

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Introduction: The Illinois EMSC Pediatric Facility Recognition Program was implemented in 1998. The objective was to identify the capability of a hospital to provide optimal pediatric emergency and critical care. Beginning in 2004, steps were taken to integrate pediatric disaster preparedness into the facility recognition process.
Aim: The goal of this study was to identify strengths and areas for improvement in pediatric disaster preparedness in participating Chicago hospitals.
Methods: The impact of the EMSC Pediatric Preparedness Checklist was assessed during the 2016 Pediatric Facility Recognition hospital site surveys. The following components were surveyed as they relate to pediatrics: Overall Emergency Operations Plan (EOP), Surge Capacity, Decontamination, Reunification/Patient Tracking, Security, Evacuation, Mass Casualty Triage/JumpSTART, Children with Special Health Care Needs/Children with Functional Access Needs, Pharmaceutical Preparedness, Recovery, Exercise/Drills/Trainings. All survey items were extracted, collated, and reviewed.
Results: Fourteen Chicago hospitals participated in the survey. Almost all hospitals (93%) surveyed indicated that they consult staff with pediatric expertise when updating their EOP, incorporate pediatric trained mental health professionals into their disaster call lists (93%), and integrate staff with pediatric focus into their incident command system/emergency operation center during a disaster (79%). Almost all of the hospitals (93%) had an infant/child abduction plan and all hospitals (100%) were testing the process at least once per year. Finally, almost all of the hospitals (93%) had incorporated a patient connection program into their tracking and reunification plan. However, not all hospitals included drills for pediatric surge, decontamination, and evacuation. Less than one-third of the hospitals had pediatric components in their alternate treatment site plans. Half of the hospitals did not have pediatric components incorporated into their decontamination plans.
Discussion: Integrating the EMSC Pediatric Preparedness Checklist surveys into the recognition process is an innovative approach to improve pediatric disaster planning and preparedness in hospitals.

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The Illinois EMSC Pediatric Preparedness Checklist Does Impact Pediatric Disaster Planning and Preparedness in Chicago: A Comparison of 2012 and 2016 EMSC Facility Recognition Surveys

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Introduction: The Illinois EMSC Pediatric Facility Recognition Program was implemented in 1998. The objective was to identify the capability of a hospital to provide optimal pediatric emergency and critical care. Beginning in 2004, steps were taken to integrate pediatric disaster preparedness into the facility recognition process.
Aim: The goal of this study was to identify the impact of the EMSC Pediatric Preparedness Checklist across time in Chicago hospitals undergoing Pediatric Facility Recognition.
Methods: Chicago hospitals were evaluated during the 2012 and 2016 Pediatric Facility Recognition Program. The following components were surveyed as they relate to pediatrics: Overall Emergency Operations Plan (EOP), Surge Capacity, Decontamination, Reunification/Patient Tracking, Security, Evacuation, Mass Casualty Triage/JumpSTART, Children with Special Health Care Needs/Children with Functional Access Needs, Pharmaceutical Preparedness, Recovery, Exercise/Drills/Trainings. Data from 2012 and 2014 checklist categories were compared and p-values were computed utilizing Fisher's Exact Test. A p-value <0.05 was considered statistically significant.
Results: Stockpiling of staging areas or having ready access to resuscitation supplies increased 46% ($p < 0.05$), testing of pediatric surge capacity in previous 24 months decreased 43% ($p < 0.05$), maintaining warmed water source for decontamination decreased 43% ($p < 0.05$), and having familiarity of evacuation procedures in ED, pediatric, and nursery personnel decreased 42% ($p < 0.05$). Although not statistically significant, the training of pediatric staff with JumpSTART triage increased 59%, EOP containing a pediatric reunification process increased by 36%, the presence of specific staff plans to allow care of dependents increased for children (29%), elderly (32%) and pets (35%), integration of a pediatric component into hospital EOP increased by 29%, and identification of an alternate treatment site for children decreased by 25%.
Discussion: Integrating the EMSC Pediatric Preparedness Checklist surveys into the facility recognition process impacts pediatric disaster preparedness and planning, and identifies areas of improvement in hospitals.

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Lessons Learned from an Obstetrics/Newborn/Neonatal Intensive Care Full-Scale Exercise

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Introduction: Children are frequently victims of disasters. However, gaps remain in disaster planning for pediatric patients. The New York City Pediatric Disaster Coalition (NYCPDC) is funded by the New York City Department of Health and Mental Hygiene (DOHMH) to prepare NYC for mass casualty incidents that involve large numbers of children.
Aim: On April 26, 2018, the NYCPDC conducted a first full-scale exercise with the New York Fire Department (FDNY) testing evacuation, patient tracking, communications, and emergency response of the obstetrics, newborn, and neonatal units at Staten Island University Hospital North. The goal of the exercise was to evaluate current obstetrics/newborn/neonatal plans and assess the hospital's ability to evacuate patients.
Methods: The exercise planning process included a review of existing obstetrics/newborn/neonatal plans, four group planning meetings, specific area meetings, and plan revisions. The exercise incorporated scenario-driven, operations-based activities, which challenged participants to employ the facility's existing evacuation plans during an emergency.
Results: The exercise assessed the following: communication, emergency operation plans, evacuation, patient tracking, supplies, and staffing. Internal and external evaluators rated exercise performance on a scale of 1-4. Evaluators completed an exercise evaluation guide based on the Master Scenario Event List.

An After Action Report was written based on the information from the exercise evaluation guides, participant feedback forms, hot wash session, and after-action review meeting. Strengths included the meaningful improvement of plans before the exercise (including the fire department) and the overall meeting of exercise objectives.
Discussion: Lessons learned included: addressing gaps in effective internal and external communications, adequate supplies of space, staff, and equipment needed for vertical evacuations in addition to providing staging and alternate care sites with sufficient patient care and electrical power resources. The lessons learned are being utilized to improve existing hospital plans to prepare for future full-scale exercise and or real-time events.

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The Pediatric Disaster Mental Health Intervention: Meeting the Primary Care Special Needs of Children in the Aftermath of Disasters

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Introduction: 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 age and parental/community response. Pediatric primary healthcare providers require the psychosocial skills necessary to work in disaster zones and to care for children in disasters.
Aim: Pediatric Disaster Mental Health Intervention (PDMHI) was initially developed in response to Superstorm Sandy's impact on children and their families in New York City. The objective was to develop training for primary care providers in pediatric disaster mental healthcare and to study its impact on the trainees.
Methods: A faculty of experts in pediatric mental health, psychiatry, psychology, and disaster preparedness was convened to develop curriculum. The faculty developed a four-hour intervention to equip healthcare 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. A total of 67 providers were trained. Of these, there were 31 pediatricians, 18 nurses, 8 social workers, 4 psychologists, 2 psychiatrists, and 4 others. Pre- and post-tests measured knowledge before and 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. 81% would be willing to work in a disaster zone and felt prepared to treat patients with disaster mental health issues.
Discussion: 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 willingness to participate in future disasters.

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Review of Disaster and Emergency Preparedness Among Summer Camps in the United States: Updates and Challenges

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Introduction: More than 14 million children in the United States attend summer camps yearly, including many special medical needs children. Summer camps are at risk for multiple pediatric casualties during a disaster. The American Camp Association, in the 2017 critical issues report, identified emergency preparedness as the top critical health and safety issue. Camps, compared to school-based settings, face unique challenges when planning for disasters, but research has been challenging because of the lack of access to camp leadership and data.
Aim: Provide a targeted up-to-date synopsis on the current state of disaster preparedness and ongoing collaborative research and technology interventions for improving preparedness among summer camps.
Methods: Researchers partnered with a national health records system (CampDoc.com) and American Academy of Pediatrics disaster experts to review results from a national camp survey. Main themes were identified to assess gaps and develop strategies for improving disaster preparedness.
Results: 169 camps responses were received from national camp leadership. A substantial proportion of camps were missing 4 critical areas of disaster planning: 1) Most lacked online emergency plans (53%), methods to communicate information to parents (25%), or strategies to identify children for evacuation/reunification (40%); 2) Disaster plans failed to account for special/medical needs children (38%); 3) Staff training rates were low for weather (58%), evacuation (46%), and lockdown (36%); 4) Most camps (75%) did not plan with disaster organizations.
Discussion: Collaboration with industry and disaster experts will be key to address the gaps identified. Current research and interventions include the recent release of a communication alert tool allowing camps to send mass text emergency notifications. Additionally, a recent pilot to incorporate disaster plans into the electronic health records platform emphasizing communication, evacuation, and identification of local experts has begun. Efforts to develop a unified disaster tool kit for summer camps remains a challenge.

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Validation of the Pediatric Physiological and Anatomical Triage Score in Pediatric Patients with Burn Injuries

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Introduction: Triaging plays an important role in providing suitable care to the largest number of casualties in a disaster setting. We developed the Pediatric Physiological and Anatomical Triage score (PPATS) as a new secondary triage method.
Aim: This study was performed to validate the accuracy of the PPATS in pediatric patients with burn injuries.
Methods: A retrospective review of pediatric patients with burn injuries younger than 15 years old registered in the Japan Trauma Databank from 2004 to 2016 was conducted. The PPATS, which was assigned scores from 0 to 22, was calculated based on vital signs, anatomical abnormalities, and need for life-saving intervention. The PPATS categorized the patients by their priority and defined the intensive care unit (ICU)-indicated patients as those with PPARSs more than 6. This study compared the accuracy of prediction of ICU-indicated patients between the PPATS and Triage Revised Trauma Score (TRTS).
Results: Among 87 pediatric patients, 62 (71%) were admitted to the ICU. The median age was 3 years (interquartile range: 1 to 9 years old). The sensitivity and specificity of the PPATS were 74% and 36%, respectively. The area under the receiver-operating characteristic curve was not different between the PPTAS [0.51 (95% confidence interval: -0.51–1.48) and the TRTS [0.51 (-1.17–1.62), p=0.57]. Regression analysis showed a significant association between the PPATS and the Injury Severity Score (ISS) (r2=0.39, p<0.01). On the other hand, there is no association between the TRTS and the ISS (r2=0.00, p=0.79).
Discussion: The accuracy of the PPATS was not superior to that of current secondary-triage methods. However, the PPATS had the advantage of objectively determining the triage priority ranking based on the severity of the pediatric patients with burn injuries.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

PHARMACY

Pharmacists Transcend Disaster Health "Silos"

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Introduction: Weather-related natural disasters are increasing in frequency and intensity, severely impacting communities. The patient demographic requiring assistance in a disaster is changing from acute traumas to chronic disease exacerbations. Adequate management requires a multidisciplinary healthcare approach. Pharmacists have been recorded in various disaster roles in literature. However, their roles within these disaster health teams are not well-established and do not fully utilize their skill sets.
Aim: To identify where pharmacists roles are within the four phases of a disaster – prevention, preparedness, response, and recovery (PPRR), and to determine the barriers to pharmacists being better integrated into disaster teams.
Methods: Semi-structured interviews were conducted with 28 international key stakeholders and pharmacists. Interviews were transcribed and analyzed using both open and axial manual coding, as well as the text-analytics software Leximancer®. The use of these two methods provided triangulation of methods for reliability of results. This research project was covered by QUT ethics approval number 1700000106.
Results: The themes identified were community, government, "disaster management," "pharmacy," and "barriers and facilitators." The Leximancer® analysis compared the different disaster perspective and experience levels of the participants. The more experienced disaster health professionals who had worked closely with pharmacists believed they were capable of undertaking more roles in a disaster.
Discussion: Pharmacists have been placed in the logistics "silo" for their role in disaster management supply chain operations. However, pharmacists have the expertise, knowledge, and skills which transcend this "silo" to work across the multiple health roles in disasters. Pharmacists are identified as a critical piece to the puzzle in the disaster management throughout the PPRR cycle. They are capable of undertaking more roles in disasters in addition to the established logistics role. The barriers identified need to be addressed for the better integration of pharmacists into disaster teams.

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Primary Care Pharmacist Interventions in Risk Reduction for the Zika Virus Epidemic: A Study in Campa Grande, Mato Grosso do Sul, Brazil

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Introduction: Pharmaceutical services for public health emergencies, such as the Zika virus (ZIKV) epidemic, are relevant for service effectiveness in the Brazilian health system. Pharmacists can act strategically in risk reduction. However, official guidelines do not consider pharmaceutical services when approaching health emergencies.
Aim: To identify and understand primary healthcare pharmacist interventions in risk reduction for the recent ZIKV epidemic in Brazil.
Methods: The study took place in Campo Grande, Mato Grosso do Sul, in November 2017. A semi-structured questionnaire was developed, including general issues related to knowledge of Zika, risk communication, and the pharmacist's role in patient care for ZIKV disease. The instrument was pre-tested. Primary healthcare center (PHC) pharmacists were subsequently interviewed. Aspects related to knowledge, risk reduction measures, and role were categorized and analyzed. The project received approval from the Institutional Review Board (IRB) at the Sergio Arouca National School of Public Health.
Results: Forty-two of the 48 PHC pharmacists in Campo Grande were interviewed. Risk reduction measures were cited by most interviewees. Among these strategies, 92% were collective measures, such as making information available for the population (30%) and for the health workers (8%), and vector control strategies (43%). Use of mosquito nets was the most cited individual risk-reduction strategy. Only one pharmacist cited risk for pregnant women and suggested birth control as a strategy. Another pharmacist pointed to ZIKV "treatment." No interviewee mentioned measures related to preparedness of pharmaceutical services.
Discussion: PHC pharmacists do not place themselves at the frontline of risk reduction for the ZIKV epidemic. In the face of potential hazards and consequences of this disease, action by pharmacists is deemed critical. This study highlights

pharmacist's misconceptions and lack of focused knowledge, pointing to the need for training and capacity-building in order to increase quality of care and positive management of future epidemics.

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The Verdict is In: Pharmacists Do Have a Role in Disasters and It is Not Just Logistics

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Introduction: The pharmacist's role in disasters is just as important as in everyday practice. Lack of access to health care services and interruptions to continuity of medication care are the major concerns for chronic disease patients during disasters. Pharmacists' responsibilities during crises is undefined and their skills and knowledge are underutilized.
Aim: To convene an expert panel to discuss the role of pharmacists in disasters and the specific roles they could be undertaking in a disaster, prioritizing the roles in order of importance.
Methods: There were 15 key opinion leaders identified as experts in their knowledge of pharmacists' roles and the disaster health management field who agreed to participate in the three rounds of surveys. The first round provided the panelists with a list of 46 roles identified from previous research conducted and the literature. The panelists were asked to rank their opinion of pharmacist's capability of undertaking each role on a 5-point Likert scale and consensus was set at 80%. There were three rounds of surveys with the final round presenting the results for the panel to provide qualitative comments on the results and roles. The roles were broken up into the four phases of disaster management – prevention, preparedness, response, and recovery (PPRR).
Results: Out of the 46 roles provided to the panelists, consensus was reached on 43 roles with 80% of panelists being in agreement. The experts identified pharmacists had roles across the entire PPRR cycle. The roles included pharmacists being further integrated into disaster teams and managing low-acuity patients requiring chronic disease medications.
Discussion: This Delphi study begins the process of defining roles for pharmacists in disasters. It can assist policymakers in providing changes to legislative frameworks to allow pharmacists to undertake the roles identified as being beneficial to a community in a disaster.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

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.

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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.

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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.

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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.

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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

submerged vehicles, which is the most common scenario during urban and small stream flash flooding.

Aim: To present a new SWR strategy for urban and small stream flood response.

Methods: Water rescue strategies and tactics were mapped against the SWR CONOPS to determine which ones are most likely to be successful in the rescue of victims trapped in submerged vehicles.

Results: Rescue should be attempted via high water vehicles (HWVs) whenever possible, followed by watercraft and "go rescues" using advanced line systems techniques and/or tethered rescuers, dependent on incident characteristics. Positioning HWVs at the incident site permits rescuers to access victims quickly from the rear or sides of the vehicle, thereby reducing rescuer time in floodwaters. Multiple sequential rescues can be made since victims are held and medically monitored in the cargo area rather than transporting them to shore individually.

Discussion: SWR from submerged vehicles is unique among emergency incidents because neither shelter-in-place nor self-evacuation are tenable options until the water recedes. "Reach" and "throw" rescue attempts are only possible if the victim is close to shore. Watercraft operations, whether motorized or manually pulled, can be technically complex, require numerous rescuers, and typically take 30-60 minutes per vehicle. Use of HWVs meets the CONOPS for SWR on flooded roadways since this strategy facilitates the rescue of multiple victims quickly while reducing the time rescuers spend in the water.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

PRIMARY HEALTH CARE

The Future of Disaster Medicine is Based on Primary Care Involvement

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Introduction: When disasters happen, people experience broad environmental, physical, and psychosocial effects that can last for years. Researchers continue to focus on the acute physical injuries and aspects of patient care without considering the person as a whole. People who experience disasters also experience acute injury, exacerbations of chronic disease, mental and physical health effects, effects on social determinants of health, disruption to usual preventative care, and local community ripple effects. Researchers tend to look at these aspects of care separately, yet an individual can experience them all at once. The focus needs to change to address all the healthcare needs of an individual, rather than the likely needs of groups. Mental and physical care should not be separated, nor the determinants of health. The person, not the population, should be at the center of care. Primary care, poorly integrated into disaster management, can provide that focus with a "business as usual" mindset. This requires comprehensive, holistic coordination of care for people and families in the context of their local community.
Aim: To examine how Family Doctors (FDs) actually contribute to disaster response.
Methods: Thirty-seven disaster-experienced FDs were interviewed about how they contributed to response and recovery when disasters struck their communities.
Results: FDs reported being guided by the usual evidence-based care characteristics of primary practice. The majority provided holistic comprehensive medical care and did not feel they needed many extra clinical training or skills. However, they did wish to understand the systems of disaster management, where they fit in, and their link to the broader disaster response.
Discussion: The contribution of FDs to healthcare systems brings strengths of preventative care, early intervention, and ongoing local surveillance by a central, coordinating, and trusted health professional. There is no reason to not include disaster management in primary care.

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The Role of Primary Health Networks and General Practitioners in Disasters: Nepean Blue Mountains Primary Health Network's Preparedness Guide

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Introduction: Disasters are part of the Australian landscape. Bushfires, floods, cyclones, and drought reoccurring consistently across the continent. Primary Health Networks (PHNs) and general practitioners (GPs) are scattered across Australia and are inevitably involved when disasters strike their local communities. Limited guidance exists to guide their systematic involvement within the broader disaster response system. In October 2013, large bushfires swept through the NSW Blue Mountains. The response was unusual in its inclusion of NSW general practice networks within the response system, most crucially the local (now) Nepean Blue Mountains Primary Health Network (NBMPHN).
Methods: The lessons learned by GPs and NBMPHN during the fires highlighted the need for GP preparedness to improve recovery outcomes. This led to the development of a living discussion document "Emergency management: the role of the GP," created with input from the various GP groups. More recently, a PHN emergency preparedness guide aimed at strengthening communication and formalizing the role of the PHNs and GPs before, during, and after a natural disaster.
Results: Clarity and implementation of a process for disaster preparedness have enabled a more proactive and coordinated approach to local emergency management with a distinct role for both the PHN and local GPs when responding to a natural disaster.
Discussion: This presentation discusses lessons learned and the preparedness strategy now in place in the Nepean Blue Mountains PHN region, and launches the emergency preparedness guide that can be used and adapted by GPs and other PHNs across Australia.

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Technology Development for Disaster Planning and Response: The Development of an Interactive Website to Communicate and Coordinate Primary Health Providers for Planning and Response Purposes

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Introduction: The Canterbury Primary Response Group (CPRG) was formed to provide a community-wide approach to manage, coordinate, plan for, and respond to health emergencies in the prehospital setting. Original communications within the CPRG group and to the primary sector were via email and the use of other organizations' websites. These means were not easy to access and update content, and the group was depending on third parties.

Aim: To outline the development of a primary health interactive website, provide up-to-date planning and event information, and provide information and support in relation to emergency planning for major emergency and non-emergency health events.

Methods: The advancements of technology and planning practices have given CPRG the ability to develop information, planning, and operational reporting systems.

Results: CPRG has developed a web-based portal that is available to primary health care (including community pharmacy) to provide planning assistance and templates as well as information on current events, such as the influenza season. It includes access to the CPRG suite of emergency plans and is a document repository for the Emergency Operations Centre (EOC). A further development has been a response management system for use in the CPRG EOC to assess any health situation and status of providers to enable a continually up-to-date dashboard and situational awareness reports to be visible to those coordinating the response.

Discussion: Communication is a major factor, often the most criticized, when managing any response. The development of the CPRG website and system as described can alleviate this and provide accurate and consistent event and planning advice to those in the primary health sector.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

PSYCHOSOCIAL

Challenges and Opportunities for Interprofessional Collaboration within the Post-disaster Psychosocial Support Network in a Terrorism Scenario in the Netherlands: A Network Analysis

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Introduction: Post-disaster psychosocial support (PSS) is an indispensable element of disaster management. A variety of studies contributed to the development of guidelines, information about guideline implementation, and evidence-based practice, as well as the status of local PSS planning and delivery systems in different European regions. However, the multidisciplinary nature of the organization of post-disaster PSS requires interprofessional and inter-organizational collaboration, but is presently insufficient institutionalized on individual, organizational, and governmental levels, locally, within the region, and nationally.
Aim: Objective of this research is to map the existing post-disaster PSS network in the Netherlands in the context of a terrorism scenario, and to identify probable collaboration problems rooted in weak ties and lack of alignment between actors at different levels.
Methods: Focus groups were organized in Belgium, France, Norway, and the United Kingdom to learn from the inter-agency response to recent terrorist attacks. Next, social network analysis methods were used to analyze the structure of the collaborative network for post-disaster PSS in the Netherlands. A scenario-based questionnaire was distributed amongst relevant stakeholders through snowballing methods. Respondents were asked to identify organizations they collaborate with on different PSS activities during the preparedness, acute, and recovery phase.
Results: The international focus groups resulted in valuable lessons for the Dutch PSS network. Data collection for social network analysis is currently in progress. Based on previous research we expect limited ties between disciplines during the preparedness phase and during the "registration of affected persons" in the acute phase. Most of the interactions between agencies will be linked to one-stop-shop service delivery, and less to commemorations and health monitoring.
Discussion: Lessons from the focus groups, verification of whether or not the expectations are supported by the social network data, and reflections on opportunities for improvement will be presented at the conference in Brisbane.

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Code Orange: A Systematic Review of Psychosocial Disaster Response

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Introduction: Survivors of mass casualty incidents are vulnerable to both physical and psychological injuries. Hospitals need to triage the walking wounded victims, their loved ones, and witnesses for symptoms of emotional distress to ensure that those who are traumatized benefit from proactive psychological treatment. Hospitals must also manage the influx of searching family and friends, and be able to reunite them with their loved ones, to reduce chaos and prevent hospital skipping.
Aim: To analyze previous research on institutional psychosocial disaster response, what has or has not worked, and lessons learned in order to develop evidence-based future planning suggestions.
Methods: A literature search was conducted on the following electronic databases: (Medline 2007 to July 2018), (Embase 2007 to July 2018), (PsycInfo 2007 to July 2018). A combination of subject headings and free text keywords were used to perform the searches. After removing duplicates, abstracts were screened independently by two reviewers for the following inclusion criteria: 1) crisis intervention (in a disaster situation), 2) mention of psychosocial response or lack thereof and lessons learned, 3)relevant outcomes, 4) OECD countries, and 5) journal articles published 2007–Present. Review articles were excluded. Primary and secondary reviewers are in the process of discussing discrepancies. Data extraction will be conducted from all articles that meet the inclusion criteria. Key themes to be analyzed include psychological casualties, searching family and friends, and family reunification plans.
Results: The initial search yielded 6,267 results. 5,294 articles remained after duplicates were removed. Of the 4,890 reviewed thus far, 269 articles met inclusion criteria.

Discussion: Although a wealth of existing literature notes the need for an effective psychosocial response in mass trauma and disaster situations, no prior study has analyzed the efficacy of such interventions or laid out an evidence-based plan. This study will fill this much-needed gap in the literature.

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Recent Unprecedented Wildfires in British Columbia, Canada: Progression of a Grassroots Disaster Psychosocial Program

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Introduction: Psychosocial needs related to disaster are increasingly identified as a significant concern for both communities and responders. In response to the needs of travelers suddenly unable to leave Vancouver immediately after 9/11 in the United States, a network for the provision of volunteer mental health response at the time of a disaster was developed through the Provincial government within British Columbia (BC). Starting from less than 20 individuals primarily located within the Vancouver area, Disaster Psychosocial Services (DPS) now encompasses a network of over approximately 200 providers throughout the Province.
Aim: To showcase a successfully functioning DPS program modeled after a volunteer-based mental health network, the evolution undergone, its present operational framework, and future goals.
Methods: In response to the observed need for trained psychosocial intervention, we developed a framework for recruitment, education, deployment, and support of a volunteer network of mental health professional and paraprofessional providers.
Results: This approach has been found to be effective, significantly increasing our volunteer base and opportunities for deployment.
Discussion: This presentation will detail the grassroots development of BC's DPS Program as well as the current model in practice. It will provide an overview of how BC's DPS network of providers was stimulated and managed; issues related to volunteer management, including the selection of volunteers; methods of specialized training; and deployment. Multiple settings in which DPS is now utilized with increasing regularity will be described, including Emergency Operations Centers, Reception Centers, and Town Hall Meetings. Lastly, there will be a focus on the lessons learned, as well as future goals highlighting a focus on culturally-sensitive support, specifically with respect to British Columbia's indigenous populations for building community resiliency and knowledge across the province.

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Responding to Disasters: More Than Economic and Infrastructure Interventions

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Introduction: Natural disasters confront individuals, communities, and governments with the challenge of rebuilding and addressing psychosocial sequelae. With the increasing number of natural disasters, it is pertinent to evaluate the efficacy of interventions and strategies to address the mental health needs of individuals and the community.
Aim: The presentation will highlight the effectiveness of interventions post-disaster, and continued adverse outcomes five years post-event.
Methods: An evaluation of literature related to the psychosocial impact of natural disasters, treatment efficacy, and government strategies to confront the social and psychological impact of natural disasters for the period 1983 – 2016 was undertaken.
Results: Epidemiological studies following natural disasters, despite the use of differing psychological measures, demonstrate significant psychological morbidity – anxiety (7-42%), complicated grief (28-41%), depression (6.5-38%), post-traumatic stress disorder (11-89%), and substance misuse (1.3-24%). Intervention studies post-disaster demonstrate efficacy capability.
Discussion: The increase in the number and impact of meteorological and hydrological events since the 1980s and the psychological, social, and economic consequences of these events have resulted in the development and implementation of government policies to confirm the immediate and long-term adverse outcomes. The focus is typically on resources and infrastructure redevelopment with less focus on social and mental health interventions, with long-term evaluation of interventions uncommon. The consequence of natural disasters emphasizes the importance of developing strategies to ensure effectively evaluated psychosocial interventions are available across at-risk communities.

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Supporting and Accompanying Young People After the Lac-Mégantic Train Derailment (Quebec, Canada)

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Introduction: In July 2013, a train transporting oil derailed and exploded in Lac-Mégantic, causing major human, environmental, and economic impacts. A community-based survey of people aged 10-25, conducted in 2017, revealed that many young people suffer in silence and report feeling isolated. These observations led to the conclusion that we must make room for young people, and that opportunities for engagement and participation must be provided within the community.
Aim: The Public Health Direction of Estrie aimed to identify strategies to promote health and wellbeing for young people living in and around Lac-Mégantic.
Methods: A collective reflection half-day was hosted with sixty key stakeholders (school board, other education institutions, health and social services, community sector, municipal/political sector, parents, youth). Throughout the event, participants were invited to build on and learn from accomplishments and experiential knowledge, and develop a common vision of the

solutions to be pursued or implemented. All qualitative data sources (verbal and written data from large- and sub-group activities) were analyzed through a content analysis.
Results: Several themes (i.e. potential solutions) emerged from the analysis: common venue, diversified activities, communication, collaboration, involvement, support for at-risk youth, intergenerational component, etc. Participants agreed on four priorities for action: 1) creating a gathering place, 2) establishing a Youth Committee, 3) supporting adults working with youth, and 4) fostering a better flow of information.
Discussion: Several positive outcomes of the collective reflection half-day were observed, including the mobilization of the participants who greatly appreciated the event, and many promising ideas launched by stakeholders. A social worker is now fully dedicated to supporting youth wellbeing and engagement in Lac-Mégantic. A Youth Committee has been established and projects by and for youth are being implemented. Bottom-up approaches to identify solutions to complex situations are not only effective but also respectful of the local culture.

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Tailoring Disaster Risk Reduction for Adolescents: Perspectives from China and Nepal

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Introduction: More than half of the world's youth live in the Asia Pacific region, yet efforts to reduce disaster risk for adolescents are hindered by an absence of age-specific data on protection, health, and engagement.
Aim: China and Nepal have faced a recent escalation in the number of climatic and geological hazards affecting urban and rural communities. We aimed to examine disaster-related threats experienced by adolescents and their caregivers in China and Nepal, determine the scope for adolescent participation, and elicit recommendations for improving disaster risk reduction.
Methods: Sixty-nine adolescents (51% female, ages 13-19) and 72 adults (47% female, ages 22-66) participated in key informant interviews and focus group discussions in disaster-affected areas of southern China and Nepal. Using inductive content analysis, several themes were identified as key to adolescents' needs.
Results: Security and protection emerged as a central issue, interlinked with preparedness, timely and equitable disaster response, psychosocial support, and adolescent participation. The mental health risks emerging from trauma exposure were substantial. Adolescents made extensive contributions to disaster response including involvement in rescue efforts and delivering first aid, rebuilding homes and caring for family members. Participants forwarded a number of recommendations, including investing in psychological support, skills training, and stronger systems of protection for those at risk of family separation, trafficking, or removal from school.
Discussion: The findings informed a multilevel, interconnected model for disaster risk reduction tailored to adolescents' needs. Supporting adolescents' recovery and long-term resilience after humanitarian crises will require coordinated efforts in preparedness, security, and mental health care.

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Towards Practical Guidelines for Mental Health and Psychosocial Support after Emergencies in the Western Pacific Region

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Introduction: The Western Pacific Region, comprised of 37 diverse countries and areas, is one of the world's areas most prone to be affected by disaster. Seven of the top ten countries most at risk of a natural disaster are in this region. The Regional Agenda for Implementing the Mental Health Action Plan 2013-2020 in the Western Pacific identifies mental health in disasters and emergencies as a priority area and calls for a social movement for action on mental health and well-being. To increase understanding of and need for mental health and psychosocial support in emergency situations, regional guidelines are necessary. It is unclear to what degree international guidelines are applicable in this region.
Aim: To synthesize the contents of available evidence-based guidelines and assess their potential to address the mental health and psychosocial needs of people in emergency settings in the Western Pacific Region.
Methods: A systematic literature review of existing guidelines for mental health and psychosocial support in disasters and emergencies was conducted. Using the Appraisal of Guidelines for Research and Evaluation II instrument, the quality of each guideline was determined covering the following: (1.) scope and purpose, (2.) stakeholder involvement, (3.) rigor of development, (4.) clarity of presentation, (5.) applicability, and (6.) editorial independence.
Results: The results provide an overview of the quality, number, and specificity of available guidelines. A framework was developed to categorize these guidelines on each stage of the disaster management cycle (prevention, preparedness, response, and recovery) while considering their guidance regarding coordination, monitoring, communication, human resources, and connection with regular health services.

Discussion: The framework and its implications for further research and development are presented at the conference. We will specifically focus on the question, "What is needed to move from a reactive to a more proactive stance in policy and practice?"

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Tragedy Meets GME: The Impact of the October 1st Mass Casualty Incident on Academic Attending and Resident Physicians

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Introduction: On October 1, 2017, a gunman fired on a festival in Las Vegas, Nevada, killing 58 people and wounding over 500. Multiple casualties were received at two nearby hospitals that sponsor residency programs: Sunrise Hospital and Medical Center and University Medical Center.

Aim: To evaluate the impact of the most lethal mass-shooting event in US history on graduate medical education (GME) at the involved hospitals.

Methods: Anonymized surveys were sent to 210 physicians at SMC and 110 physicians at UMC. Surveys incorporated 4 validated instruments: The Post Traumatic Growth Inventory (PTGI), The Impact of Events Scale-Revised (IES-R), The Multidimensional Scale of Perceived Social Support (MSPSS), and The Team Cohesion Factor (TCF).

Results: Sixty-six physicians completed the surveys (38 attendings; 17 residents). 10% of physicians scored in the likely posttraumatic stress disorder (PTSD) range and 15% found themselves avoiding or struggling with managing similar patients, though overall survey response rate was low. The majority of physicians did not believe the event impacted their specific GME activities. No attending physician rated the event as negative in terms of global impact on GME, and 34% rated it as positive. However, 12 of 17 residents rated the event as a hurdle in its GME impact. A regression model predicting the IES-R score demonstrated a trend that those with higher pre-event stress and lower social support reported more adverse impact ($p<0.06$).

Discussion: We believe our study is the first to examine the impact of mass casualty traumatic events on graduate medical education. Attendings and residents differ in their global perception of the impact, with attendings viewing it as a positive event and residents as a challenge. Pre-event level of stress and perceived social support predicted the impact of the event and may partially explain these results if residents and attendings vary on these parameters.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

PUBLIC AND ENVIRONMENTAL HEALTH

Averting 'Albo-Geddon': Challenges to Metro South Health Emergency Response to Invasive Mosquito Detections in a Complex Stakeholder Environment

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Introduction: Invasive mosquito species present significant organizational and health risks of covert disease outbreaks (dengue, Zika, or chikungunya) following an incursion into novel geographies. In Australia, detections at international First Points of Entry will trigger a multi-agency response to prevent escape into nearby urban environments that are largely unmonitored. Brisbane's mosquito surveillance and response systems were challenged in 2017-2018 by the unprecedented frequency of detections in imported oversized tires that stretched the biosecurity response with escape opportunities.
Aim: Describe the unique challenges to Metro South Public Health Unit within a complex stakeholder environment represented by federal, state, and municipal agencies.
Methods: We present as a case study of an invasive mosquito detection that escalated to a public health incident of statewide significance through an incident management team structure. We focus on describing the significant governance and logistic challenges to the emergency mobilization of Metro South Health staff.
Results: Since mid-December 2017 biosecurity have reported 12 detections of invasive mosquito species (Aedes aegypti, Ae. albopictus, Ae. japonicus) in infested tires arriving in Brisbane. Each emergency response was successful due to amendments to operational protocols and policy review. The legacy is a permanent enhancement of local mosquito monitoring, improved response systems, and greater operational preparedness.
Discussion: The organizational impact of invasive mosquitoes is likely to be underestimated and under-resourced in jurisdictions beyond their expected distributions. Our experiences demonstrate the value of a clear and shared understanding of interagency emergency frameworks to effectively integrate each response. Resolution of uncertainties around organizational roles and responsibilities, and interpretations of guidelines, implementation strategies for mosquito surveillance, and control in novel contexts will require organizational agility and robust partnerships. Strategic re-focus is recommended to embed robust preventative measures and review of policy to mitigate the risk and impact of emergency responses to future invasive mosquito detections.

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From Science to Policy and Practice: A Critical Assessment of Knowledge Management Before, During, and After Environmental Public Health Disasters

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Introduction: Canada, like many countries, increasingly faces environmental public health (EPH) disasters. Such disasters often require both short- and long-term responses, necessitate evacuation and relocation, cause major environmental impacts, and generate the need for specific knowledge and expertise (chemistry, epidemiology, risk assessment, mental health, etc.).
Aim: Given the importance of evidence-based, risk-informed decision making, we aimed to critically assess the integration of EPH expertise and research into each phase of disaster risk management in several Canadian and other jurisdictions.
Methods: In-depth interviews were conducted with 23 leaders in disaster risk management from Canada, United States, United Kingdom, and Australia, and were complemented by other methods (i.e. participant observation, information gathered from participation in scientific events, and document review). Three criteria were explored: governance, knowledge creation and translation, and related needs and barriers. An interview guide was developed based on a standardized toolkit from the World Health Organization. Data were analyzed through a four-step content analysis.
Results: Six cross-cutting themes emerged from the analysis. These themes are identified as critical factors in successful disaster knowledge management: 1) blending the best of traditional and modern approaches, 2) fostering community engagement; 3) cultivating relationships, 4) investing in preparedness and recovery, 5) putting knowledge into practice, and 6) ensuring sufficient human and financial resources. A wide range of promising knowledge-to-action strategies was also identified, including mentorship programs, communities of practice, advisory groups, systematized learning, and comprehensive repositories of tools and resources.
Discussion: There is no single roadmap to incorporate EPH knowledge and expertise into disaster risk management. Our findings suggest that beyond structures and plans, it is necessary to cultivate relationships and share responsibility for ensuring the safety, health, and wellbeing of affected communities while respecting the local culture, capacity, and autonomy. Any such

considerations should be incorporated into disaster risk management planning.

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Outbreak of Toxoplasmosis in the City of Santa Maria, Brazil

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Introduction: In the first months of 2018, there was an increase in the number of cases of fever possibly related to toxoplasmosis in the city of Santa Maria, Brazil, reaching significant values. Toxoplasmosis is an autoimmune acute infection usually asymptomatic in 80-90% of immunocompetent adults. In this outbreak, the intensity of the symptoms presented warrants attention.
Objective: To report cases of the toxoplasmosis outbreak in the city of Santa Maria, Brazil.
Methods: This is a cross-sectional study using data on the outbreak of toxoplasmosis in Santa Maria published in bulletins by the Municipal Health Department of Santa Maria, Rio Grande do Sul, Brazil.
Results: The outbreak of toxoplasmosis in Santa Maria was confirmed on April 19, 2018. Until June 14, 2018, 510 cases were confirmed. According to the most recent bulletin released by the State Health Department on June 8, 2018, 441 occurrences are people residing in Santa Maria. Five are residents of the districts and seven cases are patients residing in neighboring counties. In a bulletin published on May 25, 2018, 1,116 cases were reported to state epidemiological surveillance by the end of May. Of these, 766 cases were still suspected (fever, headache and/or myalgia accompanied by lymphadenopathy, weakness, arthralgia, or change in vision. In the other 460 cases, there was laboratory confirmation of acute toxoplasmosis, of which 35 were pregnant, with two fetal deaths (36 and 28 weeks), and two abortions. There are also 212 cases still pending laboratory confirmation.
Discussion: The results of this research show that the current outbreak of toxoplasmosis in the city of Santa Maria, Brazil, is the largest reported in Brazil and appears to be the largest in the world. The notification to authorities by physicians was very important for the identification of this outbreak.

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Pseudo Epidemic of Diarrhea Incidence: A Month Post Tsunami in Central Sulawesi, Indonesia

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Introduction: On Friday, September 28, 2018, the 7.4 Richter Scale earthquake hit Central Sulawesi and was followed by a tsunami. Within a month after the unpredictable earthquake and tsunami, a 773 aftershock earthquake was noted. These events took a major toll on the population in the affected areas. 2,086 people died and more than four thousand people were injured. 1.373 people went missing and 206.494 were evacuated. Surveillance data from November 4, 2018, to October 24, 2018, showed that an increased number of illnesses such as diarrhea was the second leading reported cases. Data showed that the number of diarrhea cases was 3.350 with two peaks of epidemic curves on October 10 and 22, 2018.
Aim: To verify the diarrhea outbreak after the tsunami in Palu, Donggala, and Sigi District.
Methods: Verification of medical records at six selected primary healthcare institutions with the highest number of cases of diarrhea.
Results: A pseudo-epidemic of diarrhea occurred. A high number of diarrhea cases occurred due to double reporting and misdiagnosed cases. Investigation reports showed that liquid defecation was considered diarrhea even though it occurred less than three times a day. The follow-up activity was contacting data entry managers to revise data, disseminate findings during the daily meeting of the health-related officers, and broadcasting findings through a WhatsApp group of provincial and district surveillance officers. Post-investigation, the number of diarrhea incidences was lower and the peak was not shown on the epidemic curve. It can be interpreted that a diarrhea outbreak did not occur in the tsunami-affected area in the Palu, Donggala, and Sigi districts.
Discussion: During a time of disaster, a chaotic situation led to improper data collection. Data verification should be conducted to assure the validity of reported data.

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Public Information, Education, and Communication (IEC) of Health: Active Participation of Health Practitioners in Urban Radio in a Low Resource Setting

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Introduction: Over the last two decades, Frequency Modulation (FM) radio has been established as the only form of sound broadcasting in Ghana. Radio is the most accessible of mass media. There are more than 40 operational radio stations in the Ashanti region of Ghana. Most stations are commercial, broadcasting in the local language (Asante-Twi). Many urban radio health slots discuss various diseases and their treatments mainly for the benefit of patients. Complementary and Alternative Medicine (CAM) practitioners who are able to pay for airtime dominate as 'experts' in most of these shows.
Methods: We identified an IEC gap regarding policies governing healthcare delivery, healthcare financing, training, ethics

and research, and environmental issues. In June 2015, orthodox medical practitioners collaborated with a private, local, English-speaking radio station to produce and host a weekly health show whose content was aimed at holistically discussing health from the viewpoint of practitioners, clients, policy makers, administrators, and financiers in a simplified language for the general public, including healthcare trainees.

Discussion: The show dubbed "Staying Alive" first aired on Tuesday, July 7, 2015, at 20:00 GMT and continues to air to date, appealing to a wide range of active listeners. "Staying Alive" to the best of our knowledge remains the only show with a holistic approach to health. Over the last 23 months, we have experienced challenges in sustaining sponsorship to fund the cost of production and airtime for the show, and the cost of effectively assessing the public health impact of the show. Orthodox medical practitioners can employ mass radio as an effective tool for advocacy, information dissemination, and education of clients or health trainees in low or middle-income urban settings through effective collaboration with media stations.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

QUALITY AND FINANCE

Ensuring Emergency Preparedness through Systematic Evaluations

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Introduction: Hospitals are required to maintain emergency preparedness 24/7. In order to maintain readiness, Israeli hospitals operate Emergency Committees comprised of medical, nursing, and administrative professionals who are responsible for capacity building including the development of plans, infrastructure, equipment, training, crisis management, and learning lessons. The Ministry of Health (MOH) and Home Front Command (HFC) conduct a comprehensive, structured evaluation of emergency preparedness in every hospital every two to three years.

Aim: To assess the impact of a periodical evaluation on levels of emergency preparedness over time in a level one trauma center.

Methods: Evaluation of emergency preparedness is conducted by approximately 12 evaluators from the MOH and HFC, encompassing mass casualty incidents (MCIs), mass toxicological/chemical incidents (MTEs), radiological and biological events, earthquakes and conflicts. Evaluations are based on objective parameters, relayed to hospitals prior to the evaluation. The hospital's level of emergency preparedness is graded and improvements that must be implemented are delineated. The grades of four evaluations conducted from 2011 to 2018 were compared to identify trends in preparedness.

Results: Mean levels of emergency preparedness in the 2018 versus 2011 evaluations presented an increase concerning all threats, including MCIs (92 vs. 90), MTEs (99 vs. 77, respectively), biological events (96 vs. 73, respectively), radiological events (91 vs. 79), earthquakes (87 vs. 60, respectively), and conflicts (95 vs. 74). The relative change in levels of preparedness was more noted concerning biological events and earthquakes.

Discussion: A periodical evaluation by governing authorities seems to motivate the hospital's administrations to invest efforts in building and maintain a high level of emergency preparedness. Systematic evaluations conducted bi-annually contributed to improved readiness for diverse emergency scenarios, including for threats that less frequently materialize.

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The Quest for Quality and Performance Indicators in Mass Disasters

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Introduction: Indicators are used as a benchmark for the quality of disaster response. Desirable attributes of indicators include precision, clear definition, improvement opportunity, unbiased, flexibility, and validity. Due to a lack of universally acceptable, objective indicators, it is currently difficult to gauge improvements in mass casualty preparedness within a hospital.

Aim: To describe existing indicators relevant to hospital disaster response, and to explore the use of two new indicators (decanting and chain of command).

Methods: A structured literature search in indexed databases was used to identify articles related to the measurement of hospital performance in mass casualties using a matrix technique and snowballing. Relevant websites of disaster management organizations were also reviewed and local disaster management experts were interviewed. Proposed indicators were compared against attributes and some (triage time by category, notification time, time to adequate staff response, preventable deaths, decanting times and chain of command for intensive care unit, and emergency department) were tested and measured in two exercises involving more than 90 staff each, held at two Southeast Queensland hospitals in 2017 and 2018.

Results: Over 50 proposed indicators, including indicators within large sets, were identified. Measurement of some indicators was found to be highly subjective. The decanting and chain-of-command indicators emerged as most useful. Intensive Care Unit required 40 mins to decant beds by 50%, while ED required 25 mins to decant beds by 80%. With regards to the chain of command, ED and triage staff performed best, with 66.7% correctly identifying their immediate supervisor. Overall, staff members were able to correctly identify immediate supervisor better compared to team leaders (59.3% and 40% respectively).

Discussion: There is a need to narrow down, simplify, and objectify indicators for mass casualty performance. Baseline measurements from actual disasters will provide important comparative data.

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Defining and Operationalizing Disaster Preparedness of Hospitals: A Systematic Review of the Literature

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Introduction: Societies invest substantial amounts of resources on disaster preparedness of hospitals. However, the concept is not clearly defined or operationalized in the international literature.
Aim: This study seeks to contribute to the alignment of knowledge of disaster preparedness in hospitals based on a systematic review and analysis of definitions and operationalizations.
Methods: A systematic search was conducted in five databases: Scopus, Pubmed, Web of Science, Disaster Information Management Research Centre, and Safetylit. Peer-reviewed articles containing definitions and operationalizations of disaster preparedness in hospitals were included. Articles published in languages other than English, or without available full-text were excluded, as were articles on pre-hospital care.
Results: Of the 39 included publications, 14 defined disaster preparedness in hospitals and 26 operationalized the concept. Although the definitions differed, they also reflected similar elements. Based on an analysis of the operationalizations, 12 different components could be identified that generally were not studied in relation to each other. Moreover, where publications primarily focused on structure and process aspects of disaster preparedness, 4 articles described the preferred outcome.
Discussion: This review points at an absence of consensus on the definition and operationalization of disaster preparedness in hospitals. By combining the elements of the definitions and the components operationalized disaster preparedness could be conceptualized in a more comprehensive and complete way. A framework was developed that can guide future disaster preparedness research.

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Analysis of Disaster Related International Consensus Frameworks 2015-2017: Implications for WADEM

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Introduction: Between 2015 and 2018, a number of influential disaster-related International Consensus Frameworks evolved.
Aim: To locate these Frameworks and identify commonalities, potential interactions, and possible implications for WADEM.
Methods: A targeted literature review and thematic analysis.
Results: The review identified the following Frameworks: Sendai Framework for Disaster Risk Reduction 2015–2030; Sustainable Development Goals 2030 Agenda; Paris Climate Change Conference; WADEM Position Statement on Climate Change; World Humanitarian Summit; Core Humanitarian Standards; Sphere Handbook, Humanitarian Charter and Minimum Standards in Humanitarian Response; Habitat111 - the new Urban Agenda; Sphere Guidelines for Urban Disasters; Rockefeller Foundation's 100 Resilient Cities Project; New York Declaration for Refugees and Migrants; Dhaka Declaration on Disability and Disaster Risk Management; WHO Emergency Medical Teams and Accreditation; WADEM's Disaster Research and Evaluation Frameworks; ALNAP's Evaluation of Humanitarian Action Guide; and Evidence Aid's Use of Evidence in the Humanitarian Sector: A Practice Guide.
Discussion: All Frameworks used substantial theoretical and/or evidence-based underpinnings, and evolved from structured processes. One subset had major political and government influences while others reflected applied, professional influences. A number of the Frameworks further evolved during 2017-18, providing indicators, international reporting, and interpretative guidelines. Common themes included a desire to improve the quantum and quality of science, evidence-based and accountability, use of Resilience as a conceptual framework, commonalities, and interactions between the new generation humanitarian, development concepts, and traditional disaster concepts, particularly in the global influence of climate change and greater urbanization. Other themes included new paradigms (e.g. international influence of Rockefeller's Acute Shocks), Chronic Stressors concept, and the anchoring theme of the Sustainable Development Goals and capacity building. The ALNAP, Rockefeller, Sphere, and WADEM Evidence Aid Frameworks provide useful guidelines on how the objectives of these International Consensus Frameworks may be achieved and measured. All Frameworks have implications for the future direction of WADEM.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

RISK AND PLANNING

Comprehensive Safe Hospital Implementation in Rural Area of Indonesia

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Introduction: Located on the Pacific Ring of Fire, Indonesia has to cope with the constant risk of many disasters. Hospitals in Indonesia are very vulnerable. Around 1,300 hospitals suffered damage since the Aceh tsunami (2006), with losses reaching 3 billion USD. Muhammadiyah is an Indonesian non-governmental organization (NGO) that has more than 300 hospitals. It is one of the forerunners in the Safe Hospital Initiative in Indonesia and has implemented a program named Hospital Preparedness and Community Readiness for Emergency and Disaster (HPCRED), which strengthened PKU Muhammadiyah hospitals in Bima (West Nusa Tenggara), the only hospital in Bima City, and in Palangkaraya (Central Borneo), funded by the Australian government.
Methods: HPCRED improved the hospital through implementing two trainings (Hospital Disaster Management and Disaster Medical Officer), three workshops (Disaster Risk Management Policy, Hospital Emergency Response Plan, and Forming Hospital Disaster Management Committee and Disaster Medical Team), four exercises (Medical Skill Drill, Table Top, Command Post, and Full Scale). The improvement was evaluated through Muhammadiyah Safe Hospital Standard and Assessment Tool, which assessed four standards based on WHO Comprehensive Safe Hospital Framework (2015): (1) Management, (2) Human Resource, (3) Structure and Infrastructure, and (4) Integration and Cooperation.
Results: After two years of program, both hospitals improved significantly. The PKU Muhammadiyah Palangkaraya index improved from 53 to 331 while the PKU Muhammadiyah Bima Hospital index improved from 83 to 374.
Discussion: Before the program, hospitals were not ready to face disasters. The PKU Muhammadiyah Bima Hospital collapsed during a flash flood in December 2016. PKU Muhammadiyah Palangkaraya was overwhelmed during a haze disaster that occurred in April 2016. After the program, the hospitals were safe and ready to face similar disasters. They also already had the ability to respond to disasters on other islands, such as the earthquake in Lombok and Palu (2018).

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Consideration and Practice on Hospital Incident Command System During Mass Casualty Incidents in Chinese Hospitals

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Introduction: More and more hospitals are using the Hospital Incident Command System (HICS) for organizational management under emergency conditions. HICS is an incident management system based on principles of the Incident Command System (ICS), which assists hospitals and healthcare organizations in improving their emergency management planning, response, and recovery capabilities for unplanned and planned events. This study aims to explore how Chinese hospitals manage their organizations with HICS in Mass Casualty Incidents (MCI).
Aim: To explore the feasibility of HICS in Chinese hospitals under MCI.
Methods: A combination of literature analysis and empirical research was used in this study. Through case studies and experience summarization, the necessity and feasibility of the incident command system (ICS) and the emergency medical response system (EMRS) was demonstrated in the early stage of MCI. Based on this, a new "1 SECTION-5 GROUPS-10 TEAMS " model was proposed, and its value of practical application was discussed in MCI.
Results: Multiple resources must be mobilized In MCI, and it is necessary to establish an ICS and an EMRS as soon as possible in the early stages of MCI. The earlier ICS is set up, the more initiative can be taken. The "1 SECTION-5 GROUPS-10 TEAMS" model proposed in this study has a good effect on the practice of drills and rescues, indicating that this model has a certain promotion effect in the hospital's response to MCI.
Discussion: The "1 SECTION-5 GROUPS-10 TEAMS" model has high feasibility and can be further verified in the subsequent rescue practice.

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Implementation of a Disaster Coordination and Communication Plan in Nepal: Hub and Satellite Concept

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Introduction: One lesson learned from the 2015 Nepal earthquake was the need for a more coordinated effort between hospitals to improve disaster response. To improve the coordination, the concept of a hub and satellite system was introduced.
Aim: Describe the implementation of a hub and satellite system in the disaster management plan to improve coordination and communication between hospitals and the health system during a disaster.
Methods: A standard hospital disaster management plan was developed and validated with governmental and non-governmental agencies. Twenty-five hub hospitals within Nepal were identified. Smaller hospitals surrounding hub hospitals were identified as satellite hospitals. A plan was made to address communication and coordination between hub-satellite hospitals and ministry of health involving resource sharing, capacity analysis, and development of deployment teams in each hub. An output-based workshop was planned. Each hospital's existing plans were evaluated before the workshop with a checklist containing essential components of disaster management. Each hospital was oriented and allowed to fill up a standardized template of a disaster management plan, after which their disaster management plan was reevaluated. The newly developed plan was then tested with a tabletop exercise function. The trainings were conducted from September 2017 to October 2018.
Results: Disaster management plans were made in 110 hospitals, including nine hub hospitals and 101 satellite hospitals in three of seven provinces in Nepal. Evaluation of a pre-workshop score for the existing disaster plan was 18/32, and the score of the disaster plan post-workshop was 30/32 on average. The average score for hospitals for the tabletop exercise was 68.2% (53.8% to 84.6%).
Discussion: A hub-satellite system-based disaster management plan has been developed and implemented in more than 100 hospitals in Nepal. Workshops for these hub and satellite hospitals improved their communication, coordination, and planning to improve disaster preparedness and future response.

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Life Expectancy Negatively Correlates with Disaster Risk Index

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Introduction: Sendai Framework for Disaster Risk Reduction 2015-2030, for the first time, describes how disaster affects the health of people. Japan is prone to natural hazards, but at the same time, Japan has achieved one of the highest life expectancies (LE) in the world. After experiencing many disasters, Japan seems to have achieved resilience against disasters. Thus, we tested a hypothesis that high LE correlates with low disaster risk.
Methods: We compared LE from the World Health Organization's (WHO) Global Health Observatory and the Index for Risk Management's (INFORM) disaster risk index, or World Risk Index (WRI), of each country using JMP software. INFORM risk index varies from 0-10, while WRI varies from 0-1, where a higher value means higher disaster risk in both systems. INFORM risk index considers hazard and exposure, vulnerability, lack of coping capacity, and lack of reliability. WRI considers exposure, susceptibility, lack of coping capacity, and lack of adaptive capacity, including logarithmized LE as a part of adaptive capacity.
Results: The overall INFORM risk index was negatively correlated with LE ($p<0:0001$). Although natural hazard did not correlate with LE ($p=0.7$), the human hazard, vulnerability, and lack of coping capacity negatively correlated with LE ($p<0.0001$, respectively). Health-related indicators, which confirm the vulnerability and lack of coping capacity, were negatively correlated with LE. Cluster analysis of LE and INFORM risk of six categories resulted in four clusters of countries, suggesting that health development and disaster risk reduction are independent determinants. WRI also correlated with LE, but there are many outliers compared to the INFORM risk index.
Discussion: High LE can be a good complementary indicator of low disaster risk. Strategies to achieve better health that contribute to high LE are also effective and important strategies for disaster risk reduction.

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Medical Coordination Rescue Members' and Ambulance Nurses' Perspectives on Emergency Mass Casualty and Terrorism Preparedness in the Netherlands - A Qualitative Study

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Introduction: Mass casualty incidents, specifically incidents with chemical, biological, radiological, and nuclear agents (CBRN) or terrorist attacks, challenge medical coordination, rescue, and ambulance care. Recently in the Netherlands, a new model for emergency preparedness for large-scale mass casualties and a specific approach dealing with terrorist attacks was introduced (2016).
Aim: To provide insight into the first experiences with this approach in order to identify strengths and pitfalls.
Methods: The study had a qualitative design and was performed between January 2017 and June 2018. A semi-structured interview included topics that were selected based on available literature. All interviews were typed out verbatim and were analyzed using a structured approach of labeling and clustering of the response.

Results: The main issues raised by the respondents included the following:

- The interpretation of definitions introduced in the new model for the mass casualty preparedness model and the terrorist attack approach differed among respondents.
- All respondents supported the six points of departure in the CRBN and terrorist attack approach.
- Awareness of optimal personal safety ('safety first principle') specific for CBRN and terrorism is lacking.
- Respondents reported that several rescue workers did not feel competent to perform specific newly introduced tasks, such as the command and control of the first ambulance arriving at the scene and the coordination task of emergency transport by the dispatch nurse.
- Current regional differences in preparedness may complicate interregional collaboration.

Discussion: As the approach is new and experience is primarily based on the outcome of exercises, the systematic planning and evaluation of exercises, and sharing of opinions and knowledge, as a result, is important to ensure an unambiguous approach in a real situation.

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Relating the All Hazard Approach of Hospitals to that of Public Authorities

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Introduction: Hospitals and the healthcare sector suffer from chronic work overload and personnel shortages in many nations. This poses strong incentives to rationalize all activities not directly related to care, such as the preparations for disasters and other hazards. One such rationalization is to turn from a rule-based to a risk-based approach. However, the risk landscape of hospitals and the relationship to the risk landscape of public authorities are ill-defined. Health Care Coalitions (HCCs) are in a good position to fill this gap and serve as an intermediary. We developed a scheme for defining the risk landscape of HCCs and its members and performed a prioritization process.
Aim: Objectives were to develop a knowledge platform of hospitals on risk assessment, promote integrated risk management by the HCC and its members, and determine the limiting (response) state for all relevant hazards.
Methods: We put maximum effort in limiting the time consumption for hospitals and align with the regular practices in hospitals for business continuity management. Strong points included the cooperation with the public authorities for safety and for health, a stepwise development of risk awareness and stepwise guidance for the assessment by hospitals, and formalization of the scenario-selection and choice of priorities by the HCC board.
Results: A gross list of (>230) safety hazards was produced along with a netlist of (>80) hazards relevant to health care. In addition, an impact-scale for the continuity of care serving as a measurement stick for all health care sectors was developed. Risk diagrams were developed to present the results in a simple and clear format.
Discussion: The HCC risk landscape served its purpose in improving the mutual understanding with the public authorities. The formal assessment provides a solid basis for operational planning, education, training, and future investments.

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Safer Hospitals in North Queensland - Assessment of Resilience

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Introduction: Hospitals are fundamental infrastructure, and when well-designed can provide a trusted place of refuge and a central point for health and wellbeing services in the aftermath of disasters. The ability of hospitals to continue functioning is dependent on location, the resilience of buildings, critical systems, equipment, supplies, and resources as well as people. Working towards ensuring that the local hospital is resilient is essential in any disaster management system and the level of hospital resilience can be used as an indicator in measuring community resilience. The most popular measure of hospital resilience is the World Health Organisation's Hospital Safety Index (HSI) used in over 100 countries to assess and guide improvements to achieve structurally and functionally disaster resilient hospitals. Its purpose is to promote safe hospitals where services "remain accessible and functioning at maximum capacity, and with the same infrastructure, before, during and immediately after the impact of emergencies and disasters." It identifies likely high impact hazards, vulnerabilities, and mitigation/improvement actions.
Aim: The HSI can be a valuable tool as part of the 2015-2030 Sendai Framework for Disaster Risk Reduction. However, to date, it has been used infrequently in developed countries. This project pilots the application of the HSI across seven facilities in a North Queensland health service (an area prone to cyclones and flooding), centered on a tertiary referral center, each providing 24-hour emergency health services.
Results: Key indicators of resilience and the result of the audit will be discussed within geographical and cultural contexts, including the benefits of the HSI in augmenting existing hospital assessment and accreditation processes to identify vulnerabilities and mitigation strategies.
Discussion: The research outcomes are to be used by the health service to improve infrastructure and provide anticipated community benefits, especially through the continuation of health services post disasters.

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SIMULATION

Implementation of Periop Disaster Response Exercise Program at Gold Coast Health

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Introduction: With the move into Gold Coast University Hospital, a new disaster plan was developed in 2017. To assess preparedness for the Commonwealth Games (April 2018), a number of mass casualty exercises were conducted, including a large multi-agency exercise with Queensland Police and Ambulance Services. During this preparation phase, senior clinicians from the perioperative area clarified their sub-plans and developed a novel model of periop response.
Aim: This study assesses this model of response and evaluates it within the context of periop disaster exercises.
Methods: The periop response model evolved through multidisciplinary key stakeholder engagement into a defined model of surgical, anesthetic, and periop nursing responses with dedicated roles and parallel communication streams from ED to OR by the respective specialties. Throughout different disaster exercises, this model of response was tested, refined, and evaluated by formal post-exercise debriefs and group meetings.
Results: Since May 2017, seven different mass casualty exercises with periop response were performed; firstly, a table-top (EmergoTrainSystem) format was used, which revealed communication and logistical deficiencies. After model refinement, further exercises were accomplished, all within the clinical environment, including movements of mock patients from ED to OR. These exercises generated improvements in communication, coordination, and logistics. Every exercise was also used to test more detailed information, communication, and organizational tasks of the various involved craft groups, such as notification, call-in lists, whiteboard structure, transport facilitation, and many more. Overall, our newly developed periop response model proved to be robust and successful, even with rotating personnel through different roles.
Discussion: Apart from the success of the periop response model, other hospital areas (ICU, bed and ward management) became involved. With growing interest and staff turn-over a regular periop disaster response exercise program has now been established. This model of periop response has potential for use in other health systems.

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Preparing for Mass Casualties: Improving Staff Preparedness and Hospital Operations through Multidisciplinary Simulation Training in Disaster Management

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Introduction: World events continue to compel hospitals to have agile and scalable response arrangements for managing natural and instigated disasters. While many hospitals have disaster plans, few exercise these plans or test their staff under realistic scenarios.
Aim: This study explores changes in perceived preparedness of multidisciplinary hospital-wide teams to manage mass casualty incidents.
Methods: Two Emergo Train System (ETS) mass casualty exercises involving 80 and 86 "victims," respectively, were run at two southeast Queensland hospitals: one large teaching hospital and one smaller regional hospital. Pre- and post-exercise surveys were administered, capturing participants' confidence, skills, and process knowledge anonymously on 5-point Likert scales. A waiver of ethics review was obtained. Changes in individuals' pre- and post-scores were analyzed using paired t-tests. Open-ended questions and a "hot debrief" occurring immediately post-exercise allowed for capture of improvement ideas.
Results: Nearly 200 unique healthcare staff (n=193) participated in one exercise. At least one survey was returned by 159 staff (82.4%). Pre- and post- surveys were available for 89 staff; two-thirds (n=59) were nurses or doctors, and 46% overall were emergency department clinicians. Ninety-seven percent reported the exercise was valuable, also recommending additional simulations. Analysis of the 89 matched-pairs showed significant ($p<.001$) increases in self-confidence, skills, and knowledge (point increases on a five-point Likert scale (95% confidence intervals): 0.8 (0.6-0.9) for confidence and 0.4 (0.2-0.5) for both skills and knowledge. The exercise was critically appraised and a summary of operational learnings

was developed. The most common criticism of ETS was its lack of real patients.

Discussion: Involvement in simulated exercises (e.g. ETS) can increase confidence, knowledge, and skills of staff to manage disasters, with the biggest improvement in confidence. Whilst validating and testing plans, simulations can also uncover opportunities to improve processes and systems.

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The Use of Simulation Games and Tabletop Exercises in Disaster Preparedness Training of Emergency Medicine Residents

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Introduction: Emergency physicians play a frontline role in hospital disaster responses and require appropriate training.

Aim: The aim of the current study was to pilot and compare the effectiveness of two emergency preparedness teaching interventions: the first employing traditional lecture-based instruction (LEC) and the second utilizing interactive simulation/game-based teaching (SIM).

Methods: A two-group randomized pre- and post-test design was implemented into the didactic curriculum of the Emergency Medicine (EM) Residency Training Program at the San Lucas Episcopal Hospital in Ponce, Puerto Rico. Residents (n=23) completed either a LEC (control) or SIM teaching module (single day, one to two hours) focusing on emergency preparedness concepts, disaster-related clinical decision-making, and physician responsibilities during hospital disaster protocols. Knowledge-based multiple-choice exams and scenario-based competency exams were administered at three different time points: one-week pre-intervention, immediately post-training, and two-weeks post-training. Test scores were compared between groups at each time point using the Mann-Whitney U test.

Results: Following the teaching interventions, no significant differences were found between the LEC group versus the SIM group in knowledge-based exam performance (LEC 81.1%[9.4] vs. SIM 74.9%[12.1]; U=42.50, p=0.15) and scenario-based exam performance (LEC 80.0%[9.7] vs. SIM 80.2%[9.2]; U=62.00, p=0.83), suggesting both teaching methods were similarly effective. Indeed, knowledge-based exam scores improved two-fold and scenario-based exam scores improved by over 50% immediately following training relative to baseline exam scores. Two-weeks post-training, a significant decrease in scenario-based exam performance was found in the LEC group relative to the SIM group (LEC 63.1%[11.6] vs. SIM 75.4%[11.5]; U=91.50, p=0.036), suggesting residents who train with simulations show greater retention of scenario-based concepts compared to those who train with lecture-based training alone.

Discussion: The current study highlights the potential dual value of incorporating simulation training in EM emergency preparedness curriculums in improving both knowledge and concept retention of physician disaster responsibilities.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

STUDENTS IN DISASTERS

DisasterSISM: A Multi-Level Blended Learning Program in Disaster Medicine for Medical Students

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Introduction: Disaster medicine has been identified as a fundamental discipline for health professionals. In Italy, the role of physicians during disaster response is officially recognized by the Italian Code of Medical Ethics and by the Ministry of Education. Nevertheless, few Italian medical schools include this discipline in their curricula.
Aim: With the aim of teaching basic knowledge of disaster medicine to Italian medical students, Research Center in Emergency and Disaster Medicine (CRIMEDIM) and Italian Medical Students' Association (SISM) developed DisasterSISM, a nationwide training project in disaster medicine.
Methods: DisasterSISM consists of three courses: Basic, Advanced, and Train-of-Trainers (ToT). The Basic courses are managed by medical students who are trained during the one-week intense ToT. All courses are delivered using innovative training methodologies, such as e-learning, peer education, table-top exercises, and virtual reality simulations.
Results: From 2012 to 2018, a total of 122 courses (111 Basic, 5 Advanced, and 6 ToT) have been delivered. DisasterSISM reached 37 out of 45 Italian medical schools, training more than 2,500 students. A survey conducted after the end of each course showed that participants considered the knowledge in Disaster Medicine essential for their future profession, regardless of the specialty chosen. Students also expressed their appreciation about the blended-learning approach, with a predilection for virtual reality simulations. The comparison between the entrance and the final exam scores showed a significant increase in knowledge.
Discussion: In six years, DisasterSISM reached the majority of Italian medical schools, providing disaster medicine knowledge to hundreds of undergraduates. Considering the fast growth and diffusion of the project, the significant increase of knowledge, and the positive feedback received from participants, we suggest that the DisasterSISM model be implemented in other countries to widely disseminate information about prevention and disaster preparedness among medical students and health professionals.

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Exploring the Preparedness of Student Paramedics for the Mental Health Challenges of the Paramedic Profession

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Introduction: The mental health challenges encountered by paramedics have received much attention in recent years. This attention has particularly focused on high rates of stress, depression, anxiety, and post-traumatic stress disorder. This heightened awareness of the high incidence of mental illness, which has at times tragically resulted in the suicide of serving and former paramedics, is stimulating the address of mental health within the paramedic profession. It is now time to call on paramedic educators to prepare student paramedics for the mental health challenges associated with a career in the emergency medical services.
Aim: To explore the preparedness of student paramedics for the mental health challenges of the paramedic profession and identify the coping strategies used by veteran paramedics to successfully meet these challenges.
Methods: Twenty semi-structured interviews with veteran paramedics from Australia and New Zealand were conducted.
Results: Advice from veteran paramedics was comprised of three key themes: support, health, and the profession.
Discussion: The findings of the study indicate that the preparation of student paramedics for the mental health challenges of the paramedic profession throughout the undergraduate curriculum could be advantageous. The advice offered by veteran paramedics can be included within undergraduate paramedic curricula and delivered by sharing the personal experiences of the veteran paramedics. These experiences are highly credible and sharing them offers an opportunity for veterans to contribute positively to the future of paramedicine. Guidelines for their inclusion in the undergraduate paramedic curriculum should be prepared to facilitate knowledge translation and to encourage the development of conscious coping strategies by student paramedics during their learning phase. Further research is needed to raise awareness in this area, with a specific focus on preparing paramedic students to cope with mental health challenges related to undergraduate degree programs, and how they feel about commencing their career as a paramedic.

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Improving Emergency Department Surge Capacity in Disasters - Conception of a Medical Student Disaster Volunteer Corps

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Introduction: Civil emergencies occurring with little warning can quickly produce mass casualties. To develop an Emergency Department's surge capacity, medical student involvement in the disaster response has been advocated. Duke-NUS Medical School in Singapore is located in proximity to Singapore General Hospital (SGH) and represents an untapped manpower resource. With appropriate training, medical students can be leveraged upon as ready and reasonably qualified manpower.

Aim: This review provides a snapshot of the conceptualization and setting up of the Disaster Volunteer Corps (DVC) program. We discuss the overall strategy and benefits to stakeholders, emphasizing the close symbiotic relationship between academia and healthcare services.

Methods: Duke-NUS medical students will be recruited to receive training from SGH emergency physicians. The frequency of training will be four times yearly, with ad hoc participation in disaster simulation exercises. A call-tree will be employed for DVC activation. The DVC curriculum includes disaster response principles, HAZMAT, crowd control, marshaling, logistics, psychological support, and basic first aid. Teaching methods include didactic lectures, case discussions, involvement in event medical cover, and participation in disaster simulation exercises and response planning.

Results: To date, there are 10 medical students and four emergency physician faculty volunteers involved in the program. Support is provided by adjunct instructors from nursing, nuclear medicine, social work, and security, for training in decontamination, radiological disasters, psychological first aid, and crowd control measures respectively. Assessment by faculty will be conducted to ensure the quality of training and competency of skills.

Discussion: The DVC provides a unique way of teaching medical students disaster medicine principles in a hands-on experiential format, while simultaneously enhancing the operational readiness of the hospital in times of disaster. This model of close collaboration between university educational and healthcare services provides a feasible model of structured volunteerism that could be replicated in other similar settings.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

TECHNOLOGY

A Backup System for Clinical Information after the Great East Japan Earthquake and Tsunami

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Introduction: On March 11, 2011, the Great East Japan Earthquake and Tsunami hit the northeastern part of Japan, causing 15,895 deaths and 2,539 missing persons as of March 1, 2018. Moreover, many medical facilities were destroyed, resulting in the loss of medical information stored in paper records or on servers in hospitals and clinics.
Aim: To highlight the need for a backup system for saving all clinical information during disaster preparation.
Results: In 2012, a prefectural medical network system - the Miyagi Medical and Welfare Information Network (MMWIN) - introduced a cloud backup data storage service for disasters. This system facilitates the sharing of clinical data among hospitals, clinics, pharmacies, and other care facilities. The backup system is based on the Standardized Structured Medical Information Exchange (SS-MIX), which enables data from medical record systems, developed by different vendors, to be stored in a common format. By the end of September 2018, the total backed up clinical data, including patients' basic information, disease names, blood tests, and prescription list, reached 370 million items from 11.2 million persons. We renewed the system last year and initiated an image data sharing service this year. The number of facilities within the MMWIN was 948, while the number of opt-in patients exceeded 80,000.
Discussion: Although the project was financed by the government, a usage fee was collected from the participating facilities. To sustain this project, it is crucial to improve the balance between cost and income by increasing the number of participating facilities and decreasing maintenance cost. Thus, our clinical information backup system for disasters facilitates information sharing among medical facilities.

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Exploring the Feasibility of Wearable Technologies to Provide Interactive Telepresence Sub-Specialist Support to Remote Clinicians Treating Patients with Traumatic Injuries

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Introduction: Some patients presenting to rural or regional hospitals may be deteriorating so rapidly that emergency procedures might be necessary before transfer to specialist facilities. Such interventions might include placement of an ICC, establishing a surgical airway, evacuation of an EDH, laparotomy, or intra-abdominal packing. The treating clinician may have had little or no experience in the procedure. Interactive telepresence technology offers further point of care support to the treating clinicians through the virtual presence of a specialist from a major trauma center.
Aim: To explore the feasibility of wearable interactive telepresence technology that can provide sub-specialist support to remote clinicians treating patients with traumatic injuries.
Methods: Thirty-seven wearable near-field display devices and annotation software applications were tested against a set of pre-specified technical and user experience requirements. A shortlist of three devices and two software applications underwent usability evaluations with a convenience sample of 24 junior clinicians and sub-specialists. The junior clinicians trialed the wearable devices and the sub-specialists trialed the annotation applications in three simulated trauma scenarios. Measures included participants' ratings of acceptance and workload, technical issues encountered (e.g. frequency of call drop-outs), and anecdotal comments.
Results: Participants' subjective ratings of the solutions and anecdotal feedback were positive. However, there was no clear solution that satisfied the functionality and ease-of-use requirements for all participants. For example, the solutions that were rated more favorably by the junior clinicians were rated less favorably by the sub-specialists, and vice versa.
Discussion: This work provided preliminary evidence of the feasibility and usefulness of interactive telepresence technology in healthcare. A second phase of usability testing is currently underway to explore additional device and software combinations, including those with augmented reality functionality. Future phases of the project will evaluate the solutions under higher-fidelity conditions followed by in-situ trials across selected regional centers.

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Feasibility and Accuracy of a Wearable Biosensor Device for Vital Sign Monitoring in Septic Emergency Department Patients in Rwanda

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Introduction: Low and middle-income countries (LMICs) bear a disproportionately high burden of sepsis, contributing to an estimated 90% of global sepsis-related deaths. Critical care capabilities needed for septic patients, such as continuous vital sign monitoring, are often unavailable in LMICs.
Aim: This study aimed to assess the feasibility and accuracy of using a small wireless, wearable biosensor device linked to a smartphone, and a cloud analytics platform for continuous vital sign monitoring in emergency department (ED) patients with suspected sepsis in Rwanda.
Methods: This was a prospective observational study of adult and pediatric patients (≥ 2 months) with suspected sepsis presenting to Kigali University Teaching Hospital ED. Biosensor devices were applied to patients' chest walls and continuously recorded vital signs (including heart rate and respiratory rate) for the duration of their ED course. These vital signs were compared to intermittent, manually-collected vital signs performed by a research nurse every 6-8 hours. Pearson's correlation coefficients were calculated over the study population to determine the correlation between the vital signs obtained from the biosensor device and those collected manually.
Results: 42 patients (20 adults, 22 children) were enrolled. Mean duration of monitoring with the biosensor device was 34.4 hours. Biosensor and manual vital signs were strongly correlated for heart rate (r=0.87, p<0.001) and respiratory rate (r=0.74 p<0.001). Feasibility issues occurred in 9/42 (21%) patients, although were minor and included biosensor falling off (4.8%), technical/connectivity problems (7.1%), removal by a physician (2.4%), removal for a procedure (2.4%), and patient/parent desire to remove the device (4.8%).
Discussion: Wearable biosensor devices can be feasibly implemented and provide accurate continuous vital sign measurements in critically ill pediatric and adult patients with suspected sepsis in a resource-limited setting. Further prospective studies evaluating the impact of biosensor devices on improving clinical outcomes for septic patients are needed.

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Hospital Information Technology Considerations for No Notice Disasters

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Introduction: Modern hospital systems are highly dependent on computerized information technology (IT) systems. The integration of laboratory and radiology ordering and resulting cannot be easily replicated with a "paper" processes. This poses challenges for no-notice events, where the rapid registration of patients is a must for effective clinical care. This weakness in hospital response has been demonstrated in events such as the Boston Marathon bombing, the Aurora Theater (to be discussed), and Las Vegas shootings.
Aim: To discuss lessons learned in configuring IT systems for disasters.
Results: A integrated system of IT system preparation was implemented at the University of Colorado Hospital. This system has been demonstrated to be effective in multiple real-world events.
Discussion: Four areas of IT preparedness are needed for hospital IT response to disasters. First is rapid disaster registration with prepared disaster medical record numbers and packets. The medical records must be active in the hospital IT environment, and a visit or case number must be preassigned or rapidly generated. The medical record number alone in the IT environment will allow the initiation of test ordering. The packet should include preprinted labels, a demographic data sheet, and downtime charting and ordering forms. The second item for response is templated order sets to allow rapid ordering of multiple studies such as laboratory, and especially radiology, without having to reenter clinical information. The third is a method of patient care charting scalable, from paper to electronic, depending on the patient volume, acuity, and workstation access. The fourth is a method for patient care in the IT downtime in a disaster setting. Simple inexpensive measures will allow rapid placement of patients in the IT environment and therefore allow rapid and accurate test ordering and resulting.

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Prehospital Advanced Resuscitation with Video Direct Medical Control Using Mobile Smart Device

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Introduction: The prognosis for out-of-hospital cardiac arrest (OHCA) remains controversial if a smart device or video is used. In this study, a system was used that provides advanced cardiac life support (ACLS) with direct medical control through remote video calls for OHCA patients. The study investigated how this system will improve survival.
Aim: The effect of video remote direct medical control using a mobile smart device for cardiac arrest was the main objective of this research.
Methods: Medical origin OHCA patients over 18 years old for one year were included in the video remote direct medical attempt. Trauma, intoxication, environmental origin, and family disagreement were excluded. The advanced field resuscitation was performed by paramedics with video communication-based medical direction, who were dispatched simultaneously by two ambulances. Video communication was performed by a mobile

application or video call. The results and opinions were recorded in a mobile application and a specific website. We analyzed the general characteristics and outcomes of the prehospital ACLS using video communication.
Results: A total of 11,054 consecutive out-of-hospital cardiopulmonary resuscitation cases were recorded, and 3,352 underwent prehospital ALS using video call. Prehospital ROSC was 23.3%, survival upon hospital arrival was 13.6%, survival admission was 19.5%, survival discharge was 10.6%, and survival with good neurologic outcome was 6.0%. The reasons for no prehospital ALS included no request from a provider (29.1%), cardiac arrest during transport (20.9%), communication failure (11.6%), and family refusal (11.1%).
Discussion: As a result of providing prehospital ACLS with direct medical direction through remote video calls to cardiac arrest patients, the prehospital ROSC rate, survival admission, and discharge rate improved. Advantages of this type of medical control by video communication were ease of control of the patient`s family, more precise communication with paramedics, and continuous confirmation of the real patient's status and monitoring parameters.

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Red Cross and Red Crescent Health Information System (RCHIS): Functional Design and Usability Testing Protocol

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Introduction: The Red Cross and Red Crescent Health Information System (RCHIS) combines the functionality of an Electronic Medical Record (EMR), Health Information System (HIS), as well as Human Resource and stock management system. Its purpose is to facilitate patient quality of care, early warning for outbreak detection, accountability/reporting, and resource management. Short-term, emergency medical teams and support staff responding to acute clinical needs in a humanitarian context are the intended end users.
Aim: To explain the functional design principles and usability testing protocol implemented in initial RCHIS design and development phases to ensure technological fit within the humanitarian medical context.
Methods: RCHIS development followed the patient-user journey, with each patient/staff interaction encapsulated by a microservice. The integration of multiple microservices enabled RCHIS to mimic various patient journeys. The functional scope of each microservice was designed by medical end-users and was further used for access management. The value and variable design, including validation rules, were led by health informaticians and existing medical standards. Intuitiveness and ease of use guided User Interface design, with targeted medical end-user feedback collected on a twice-monthly basis in addition to early design workshops, field immersion, and post-development pilot testing.
Results: Support and implementation of RCHIS were not inherently guaranteed. As such, the process of co-designing with end users had the primary benefit of ensuring effective scope and technological fit given the humanitarian context, but also the secondary benefit of improving internal acceptability and advocacy.
Discussion: The added value of digital health records as a quality assurance mechanism is well documented. However, the increased workload and reduced employment satisfaction affiliated with the rise of EMRs illustrated a need to re-evaluate current design and use within clinical settings. The design and development approach taken for RCHIS is one attempt to improve human-computer interaction in the clinical setting.

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Stroke Prehospital Informed Decision-Making Using EEG Recordings (SPIDER)

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Introduction: The acute care of stroke involves the administration of a clot-dissolving drug (thrombolysis) and/or its removal using endovascular clot retrieval. Earlier intervention results in significantly improved patient outcomes. Clinical assessment scores have limitations, and studies have shown that even the most robust scores have a reported false-negative rate of >20% for large vessel occlusive strokes that may be eligible for clot retrieval, while inappropriate bypass may delay delivery of thrombolysis.[1] Quantitative Electroencephalography (QEEG) has been shown to have a very high sensitivity and specificity in the identification of acute stroke versus matched controls in an in-hospital setting.[2,3]
Aim: The SPIDER study commenced in Brisbane, Queensland on September 3, 2018, and is investigating the use of an EEG recorder to gather data on acute stroke patients presenting to a metropolitan ambulance service.
Discussion: The data collected will guide the development of a simple numerical output reference to guide decision making. The data may aid in identifying large vessel occlusive stroke and patients eligible for endovascular intervention. The QEEG will provide a more accurate and cost-effective tool for the prehospital clinician over other imaging technologies and can guide early destination decisions. This presentation discusses the implementation of a pre-hospital research platform, integration with the clinical dispatch matrix, staff engagement, patient recruitment, and the success of the project so far.

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Tracking Patients in an Earthquake Response: The Bad, the Better, and the Best

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Introduction: Tracking patients through health systems is fundamental to coordinated care provision. However, it is an inconsistent element of emergency preparedness. This presentation presents findings of a study undertaken after the 2011 Christchurch Earthquake, and the resultant nationally implemented changes.
Aim: The intent was to investigate options to improve patient tracking in a mass casualty event. By looking at one scenario involving a mass casualty presentation with the central responder disabled by electricity loss, standards of practice were outlined and made scalable to meet the needs of various events.
Methods: Clinical and clerical staff involved in the event's patient tracking were interviewed. Data were analyzed using thematic analysis and reported using the structure, process, and outcomes framework.[1]
Results: Structures were material and human resources. Material resources were identification number systems, technological requirements, disaster-specific documents, minimum data for entry, digital/paper/hybrid registration systems, and digital-paper integration. Human resources were role allocation, and familiarity of plans, roles, processes, tools, and facilities. Process identified the activities to manage unidentified patients, triage, registration, and ongoing tracking processes. Outcomes were management of patient flow, patient-care provision, and patient-family reunification.

Initial implementation was local. Structures and processes were agreed upon, with varying response levels according to the incident scope, while staying as close to business as usual for familiarity. National implementation followed via a Ministry of Health working group involving different district health boards. The group developed a consensus on the minimum data to be entered and the process to merge patient identities of initially unidentified patients. Written tools were shared for standardization.
Discussion: With inter-agency and inter-organization emergency response, standardized processes and information are required. Collaboration prior to events can mitigate issues when an event occurs.

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Use of a Novel Electronic Patient Care Record System at Mass Gathering Events by St. John Ambulance Victoria

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Introduction: The growing number of mass gathering events (MGEs) in Victoria has seen an increase in demand for event health services and the need for real-time reporting of medical incidents at these events.
Aim: Since 2016, St. John Ambulance Victoria has introduced an electronic patient care record (ePCR) system with the aim of improving patient care and satisfaction. It appears that this ePCR system is the first of its kind to be trialed at MGEs by a volunteer organization.
Methods: A qualitative study was conducted to determine strengths and limitations of the ePCR system by compiling results of surveys and interviews and through anonymous feedback from volunteers and patrons (event organizers, patients). This study is ongoing.
Results: It was found that the use of ePCR:

1. Allowed for collection of relevant data to assist in future planning of MGEs
2. Aids the overall coordination of first aid delivery at MGEs
   faster relaying of patient information to event commanders
   reduction of paperwork
   improved ability to locate first aid crews using GPS tracking
3. Received positive feedback from first aiders, event organizers, and patrons
4. Was deemed easy-to-use (4/5), acceptable (4.3/5), and helpful (4.1/5) by our members

Discussion: These experiences demonstrate that ePCR is well-received, easy to use, and leads to improved patient satisfaction and treatment outcomes at MGEs. Furthermore, the ability to collect and analyze real-time data such as GPS location tracking, incidence heat maps, and patient demographics facilitate future event planning and resource allocation at MGEs. It is acknowledged that this study is preliminary, and the trialed use of an ePCR system has been limited to metropolitan areas and MGEs with <1 million patrons. The intent is to continue this study and explore the use of ePCRs at larger MGEs and events in rural or regional areas.

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Watching to Save Lives

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Introduction: As Israel's National Emergency Medical Services (EMS) provider, Magen David Adom (MDA) is

constantly looking for ways to improve the response to mass casualty incidents (MCIs). Previous research has shown that in an MCI situation, the demand for resources is disproportionate to the available resources, thus creating a dilemma of how to triage and treat the patients, as well as how to best prioritize and treat the critical patients.

Aim: Smartwatches have become an integral part of society. MDA constantly looks for ways to integrate new technologies into their emergency response protocols. Smartwatches were used in this experiment to determine if in an MCI, relaying live information to the dispatch center would improve the time it takes for emergency crews to effectively treat and transport critical patients.

Methods: A drill and scenario were designed to simulate an MCI in which there were 3 severe, 2 moderate, and 5 lightly wounded patients. There were then different colored smartwatches placed on each victim. The watches transmitted real-time blood pressure, pulse, and oxygen saturation readings to the dispatch center. The live information was transferred directly to responding teams. A second drill was conducted using the same scenario, same number of patients, but without watches to examine the differences in response times.

Results: MDA found that the use of smartwatches directly improved the times (by 3.27 minutes) in which emergency teams were able to reach the most severely wounded patients and evacuate them to the hospital in a timely manner.

Discussion: Using smartwatches to transmit live information to the dispatch center allowed for effective treatment and transport of patients in an MCI. Use of such information allows the dispatch center to direct teams to provide accurate treatment to the patients according to their needs.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

TRAUMA

Efficacy of Novel Commercial Tourniquet Systems in Extremity Hemorrhage Control - An Ultrasound and Generated Force Study

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Introduction: Tourniquets (TQ) save lives. Although military-approved TQ are more effective than improvised TQ in controlling exsanguinating extremity hemorrhage, their bulk may preclude every day carry (EDC) by civilian lay-providers.
Aim: The purpose of the current study was to compare the efficacy of 3 novel commercial TQ to a military-approved TQ.
Methods: A convenience sample of EM residents was utilized. Four different TQ were evaluated: Gen 7 Combat Application Tourniquet (CAT; control), Stretch Wrap and Tuck Tourniquet (SWAT-T), Gen 2 Rapid Application Tourniquet System (RATS), and Tourni-Key (TK). Popliteal artery occlusion was determined using a ZONARE ZS3 ultrasound. Steady-state maximal generated force was measured for 30 seconds with a thin-film force sensor (Singletract). Opinions were solicited at the conclusion of the study.
Results: Nine residents participated in the study (7 male, 2 female). Success rates for complete arterial occlusion were 89% CAT, 67% SWAT-T, 89% RATS, and 78% TK (H 0.89, p = 0.83). Mean (± SD) times to achieve occlusion were 10.4 ± 1.7 sec CAT, 23.1 ± 9.0 sec SWAT-T, 11.1 ± 3.8 sec RATS, and 20.0 ± 7.1 sec TK (F 9.71, p < 0.001). Steady-state maximal forces were 29.9 ± 1.2 N CAT, 23.4 ± 0.8 N SWAT-T, 33.0 ± 1.3 N RATS, and 41.9 ± 1.3 N TK. Participants felt that the CAT was easiest to apply (61%), followed by the RATS (33%). Participants were most likely to select the TK (44%) for EDC, followed by the RATS (33%).
Discussion: In this small convenience sampling, all novel TQ systems were non-inferior to the military-approved CAT TQ. Mean application times were less than 30 seconds. The size and unique nature of these novel TQs may make them more conducive to lay-provider EDC, thereby improving the response to high threat events.

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Efficacy of Video-Based Instructions for Laypeople Bleeding Control Education

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Introduction: The Stop the Bleed campaign in the United States aims to teach bleeding control techniques, such as tourniquets, to the public. Educational consortium guidelines advocate using brief web- or video-based material. Another option is posters or flyers distributed at, for example, workplaces or public spaces.
Aim: The aim of the current study was to evaluate the relative efficacy between a flyer and a video to teach tourniquet application skills to members of the public in Sweden.
Methods: A total of 38 participants (27 male, 11 female) from the general public completed the study. Their ages ranged from 19 to 73 (M=32, SD=14). None had prior experience with tourniquet applications. One group (n=18) received tourniquet instructions on a flyer and one (n=20) received a 5-minute video instruction. Both groups completed pre- and post-questionnaires and a practical tourniquet application test.
Results: Independent samples t-tests showed that the video-based instructions resulted in fewer application errors (M=1.40 out of 10, SD=1.19) compared to the flyer group (M=3.61, SD=2.40), t(36)=3.651, p=0.001, and higher post-task satisfaction (M=3.89 out of 5, SD=0.74 compared to M=3.39, SD=1.15). However, the flyer-group was faster (M=86.22 seconds, SD=27.28) compared to the video group (M=112.25, SD=42.22), t(36)=2.229, p=0.032.
Discussion: Video instructions appear superior to flyers in terms of teaching correct tourniquet application to the general public. The longer total application time includes steps taken after bleeding control has been achieved (e.g. securing tourniquet straps and time notation), which may have contributed to the application time difference. The results support the educational guidelines that suggest video-based instructions for teaching basic tourniquet skills to laypeople are more effective.

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A Framework for Planning for High-Volume High-Acuity Traumatic Mass Casualty Incidents

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Introduction: In response to the Pulse Nightclub and Las Vegas mass shootings, staff from our Emergency Department (ED) at University Medical Center New Orleans designed a mass casualty incident (MCI) protocol aimed at preparing the entire hospital for high-volume, high-acuity incidents of unprecedented proportions. As we researched this effort, we discovered that no publically available framework currently exists to assist hospitals with creating their own comprehensive, functional MCI protocol.
Aim: To develop a framework to assist hospitals with creating MCI plans tailored to fit the needs of their individual facility.
Methods: Our hospital spent several years creating and refining an MCI protocol that is both comprehensive in addressing each service's needs and efficient for the staff expected to use it. Upon achieving the desired outcome of a well-functioning and tested protocol, the main contributors of the project met to create a consensus document on how we would approach the task with the benefit of hindsight.
Results: Our document is meant to serve as a framework for hospitals looking to build their own plan. It is not a template, but rather a guide on how to build an individualized plan that includes critical components that are key for success. It breaks the process down into manageable steps that are presented in an order that maximizes efficiency and includes important points to consider for each step. It encourages the user to tailor the protocol to their own unique needs.
Discussion: By sharing a framework based on our own best practices and lessons learned, we hope to make it easier for other hospitals to create MCI protocols and to open a dialogue with hospitals that have additional or differing opinions to share. Most importantly, we hope to inspire hospitals to work together as we race to prepare for worst-case scenarios of increasing magnitude.

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Hemorrhage-control Tourniquets: How Intuitive are They?

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Introduction: According to the Federal Bureau of Investigation (FBI), there were fifty active shooter incidents in 2016 and 2017. In the first five months of 2018, there have been 23 school shootings where someone was injured or killed. Hemorrhage-control tourniquets have proven their life-saving capability in the military and civilian EMS. Now, they are being advocated for use by civilians – the true "first responders." Since Combat Application Tourniquets (CATs) are strap-and-windlass devices, the question remains whether a naïve population can intuitively apply them efficaciously.
Aim: To determine the efficacy (speed, correct placement) of a CAT by an interprofessional group of healthcare students naïve to tourniquet hemorrhage control.
Methods: Consenting students attempted to apply a CAT to a standardized patient with a simulated hemorrhaging brachial artery. No instruction was given except for the directions included in the package. Timing began upon removal of the tourniquet from the package and ended when the participants stated they completed their attempt. Errors in application were documented. Afterward, students received education and an opportunity to properly re-apply the tourniquet. The completion times of the students were compared to ten emergency medical technicians (EMT-P), serving as subject matter experts. Errors in application were categorized.
Results: 50 students from the following professions participated: Medicine, Nursing, Public Health, and Respiratory Therapy. The mean time of tourniquet application was 96.16 seconds (range: 25.12-226.31). This was statistically different from the EMT-Ps' time of 42.83 seconds (range: 23.89-82.94). Additionally, only five (10%) placed the tourniquet correctly. Errors included improper location and windlass misuse or non-use. The instructions were frequently critiqued for being difficult to read and containing confusing graphics.
Discussion: Provision of commercial tourniquets in public access areas must be accompanied by civilian education and the creation of CAT instructions that are simplistic, comprehensible, and suitably graphic.

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Lessons from the Brussels Terrorist Attack

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Introduction: On March 22, 2016, the capital of Europe was hit by two terrorist attacks. As terrorism becomes more and more violent, it is critical to learn and share experiences in order to enhance effectiveness in saving lives.
Methods: A field perspective and experience feedback from the Emergency Medical Response.
Results: The first attack hit the departure hall of the airport, which, due to its strategic role, relies upon a dedicated emergency plan. However, it focuses on airplane crashes and not on explosions in a crowded terminal. The second attack hit the subway at rush hour. An attack in such a confined environment is particularly challenging for the rescue teams, as injuries are worsened, access hindered, and exits numerous.

Eleven medical teams were sent in order to perform triage and provide vital care. The medical response was organized by two disaster response teams. Advanced Medical Posts were set up and the mass casualty plans of all hospitals were activated. Managing war injuries for civilian teams was challenging. On-site care consisted essentially in prehospital damage control and burn care in order to ensure rapid evacuations for haemostatic surgery. 313 victims were dispatched to thirty hospitals. Another challenge was safety. Several threats were apparent and explosives were found on both sites. Lessons from Paris had prompted a review of our multiple sites Emergency Plan. One single way of communication was used and the evacuations

were managed centrally. Finally, the key factor that helped limit the number of casualties was the acquaintanceship between emergency workers and non-medical teams built during exercises, allowing them to adapt and blend in as one team.

Discussion: Lessons from previous attacks were crucial to improve our management of the medical response. These should be shared around, as another attack may always occur anywhere and at any time.

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Remote Highschool Hemorrhage Control (RHHECON) - Methods of a Randomized Control Trial

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Introduction: Uncontrolled bleeding is a leading cause of preventable death in trauma. The "Stop the Bleed" campaign has trained over 130,000 lay people in the US to act to control bleeding. Current hemorrhage control courses, the most well-known being the American College of Surgeon's Basic Bleeding Control (ACS B-con) course, require in-person training. Scaling this course nationwide is time and resource intensive. Furthermore, groups have advocated that young people, who are disproportionately affected by physical trauma, be universally trained in hemorrhage control.

Aim: Compare the effectiveness of teaching the ACS B-con course to high school (HS) students utilizing three different delivery mechanisms: in-person live, video-recorded, and virtual-live training.

Methods: 432 students (aged 15-18) will be recruited from two HS settings: 300 from a local HS and 132 from a national online HS platform. Local HS students will be randomized into two arms: a control arm (in-person live training) and virtual training through a pre-recorded lecture. Online HS students will undergo virtual-live training. The primary outcome is correct tourniquet application following training. Secondary outcomes are the acquisition of personal resilience-associated traits using a validated instrument, motivation for further training, and perception of the importance of live training. Tourniquet application data will be assessed using a non-inferiority design using two pairwise comparisons of the intervention arms to the control (in-person). Pre- to post-training survey data will be assessed using paired univariates tests. Sub-analysis of the impact of demographic variables on these relationships will be assessed.

Discussion: In addition to integration of cardiopulmonary resuscitation courses into HS curricula, there is momentum to develop effective programs to educate HS students to provide care for the injured and control bleeding before first responders arrive. This trial will help determine the most effective delivery mechanism to teach a hemorrhage control course to HS students at scale.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

VULNERABLE GROUPS

Disaster Planning for the Urban Homeless Population in the United States

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Introduction: Homeless individuals may be dependent on social services for nutrition, shelter, and protection. These services are susceptible to disruption in disasters. Individuals are often frequent utilizers of emergency health care services, and an increase in emergency medical services utilization may be predictable. Disaster planners should anticipate and plan for the needs of these special populations.[1]
Methods: A review of disaster planning in US cities with high rates of homelessness was conducted. Utilizing homelessness census data, the five cities with the largest homeless population were chosen for analysis. Publicly available disaster plans specifically targeting at homeless were identified. Planning for nutritional support, shelter, protection, and emergency healthcare utilization was identified.
Results: Planning specifically addressing the needs of the homeless was variable. Planning items surrounding nutrition and shelter were identified, but those around protection and use of emergency services were more limited.
Discussion: Recent disasters in the United States have demonstrated the increased vulnerability of populations with high utilization of emergency services during a disaster.[2] Homelessness is common throughout the United States, and appear to be underrepresented at the city disaster planning level.[3] Resources to assist planners are available, but increased adoption is indicated.

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Discovering Best Practice for Establishing Evacuation Centers for Vulnerable Populations: Findings from an Australian Pilot Study

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Introduction: 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 Queensland flood disaster affected central and southeast Queensland, resulting in 2.5 million people being adversely affected. Seventy-two local government areas disaster were activated under the Natural Disaster Relief and Recovery Arrangements, which was more than 99 percent of Queensland. The issues regarding the role and responsibility across governments relating to planning, setup, and management of evacuation centers will be discussed.
Aim: This paper will report the preliminary findings of a pilot study undertaken with local government officials and humanitarian agencies in Australia concerning their involvement in planning for, setting up, and managing evacuation centers for vulnerable populations in Australia during the Queensland floods in 2011. The objective is to illuminate the challenges officials faced, and the resolutions and lessons learned in the preparation of evacuation centers through this event.
Methods: The study involved interviews with local government and relevant agencies' officials who have been involved in establishing evacuation centers for vulnerable populations during the 2011 floods. Six officials were recruited from local government areas affected by the disaster in Queensland, Australia. Semi-structured phone interviews were audio-recorded and thematic analysis was conducted using NVivo software.
Results: Three core themes emerged: 1) understanding of the importance of preparation, 2) challenging evacuation center environments, and 3) awareness of good governance principles.
Discussion: This pilot study demonstrated that communication with stakeholders during the preparation period prior to a disaster is essential to best practice for evacuation center management. Understanding and being aware of good governance is

also an important element to establish evacuation centers effectively.

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Hunger in Latin America: What Can We Do?

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Introduction: Hunger is a global problem and has increased in recent years. In Latin America, hunger continues in high numbers. Although the level of hunger is relatively low compared to other regions, this increase in Latin America is mainly explained by the economic slowdown in South America. Also, climate changes are already weakening the production of the main crops in tropical and temperate regions.
Aim: Report the numbers of hunger in Latin America.
Methods: A cross-sectional study with reports of the World Health Organization's hunger figures, September 2018.
Results: The number of hungry people in the world has increased for the third consecutive year and affects 821 million people, according to a report released by UN agencies. This corresponds to one in nine people in the world. In Brazil, the figures indicate that more than 5.2 million people spent a day or more without consuming food by 2017, which corresponds to 2.5% of the population. In Latin America and the Caribbean, hunger has also increased and affects some 39 million people.
Discussion: Hunger is a catastrophic problem in Latin America. Involving professionals in food and nutrition to try to reduce these numbers appears to be a good strategy because just as the doctor treats the disease, the involvement of other specialists to address the cause of the problem can bring long-term benefits. A social project for this purpose that mobilizes chefs and nutritionists is in progress in Brazil.

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Measuring the Health Impact of Natural Disasters – The Attribution Challenge Facing the Medical Community

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Introduction: Published reports on health impacts from natural disasters causing injuries, poisonings, infectious disease, chronic illness, and NCDs continue to grow exponentially. Simultaneously, calls for the improvement in scientific rigor to improve causal links, strength of association, and efficacy of interventions are increasing. At the heart of this challenge is demonstrating mortality and morbidity risk across a time continuum, where the health effect is not detected for weeks, months, or years after the disaster event. In some circumstances, the presence and acuity of illness are not apparent until after an insidious or cumulative point has been reached. Notwithstanding medical observations or disaster-attributed morality classification matrices being available for 20 years, natural disaster mortality continues to be measured narrowly, on those confirmed dead (acute physical trauma, drowning, poisoning, or missing). There has been little effort to expand mortality assessment beyond this historical lens. For example, it fails to consider suicide in drought and was not redefined when the Indonesian fires caused the highest mortality in 2015. Tens of thousands of lives were lost from smoke exposure.
Aim: This study sought to test the progress of two decades of published medical and scientific literature on natural disaster mortality reporting.
Methods: A retrospective analysis of natural disaster impact reports for the past ten years was performed on three of the world's largest disaster databases, including CRED, Sigma, and ADRC.
Discussion: WADEM members must commence a strategic process to expand the recognition of health impacts from natural disasters. Global and domestic advocacy is required for building evidence through improved systematic collection of data and especially reporting patient continuum of care as a minimum standard. Without this leadership, disaster health impacts will continue to be underestimated and emergency health program responses and financial resources will fall short in protecting those most at risk.

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Risk of Retrogression in Social Rights and Reduction of Brazilian Public Policies

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Introduction: Brazil has 200 million descendants of African, Portuguese, Indigenous, German, Italian, and other peoples who have built their identities. The Federal Constitution was rewritten in 1988 to include a Social Protection System. Between 2000 and 2016, the federal government was governed by the Workers' Party. This party invested in the creation of inclusive public policies and affirmative actions built through collective processes of citizenship that guaranteed better living conditions for the population. In one decade, it went from being underdeveloped to developing. In 2016, the elected president of the Workers' Party was withdrawn from power through impeachment. In the next election, right-wing conservatives excluded speech, attacked minorities (e.g. LGBT population), and defended the traditional family.
Aim: To understand the retreat of Brazilian public policies in a country that set public social policies, compensatory policies, and affirmative actions guaranteeing citizenship of men and women.
Methods: Qualitative research with analysis and reflection on the regression of universalist public policies and affirmative policies with the creation of quotas.
Results: The creation of affirmative actions was guaranteed. Vacancies in public tenders for the black population led to the establishment of 50% quotas for blacks in universities, and the creation of a universal health system, or universal expanded

health indicators. The federal government created a group of SUS analysis by reducing actions.

Discussion: Social inequality in Brazil is one of the worst in the world. 16 million people live below the poverty line (OXFAM, 2017). In recent decades, the population that was expanding and strengthening access to services, health, education, and social assistance network has seen a reduction of public policies. The importance of research that points to this reduction of rights is fundamental for documenting what has already been achieved.

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The Social Determinants of Health in Disaster Risk Reduction

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Introduction: The rationale for undertaking this study was to investigate how characteristics of population health relate to and impact disaster risk, resilience, vulnerability, impact, and recovery. The multi-disciplinary environment that contextualizes disaster practice can influence determinants of health. Robust health determinants, or lack thereof, may influence the outcomes of disaster events affecting an individual or a community.

Aim: To investigate how the social determinants of health inform community perceptions of disaster risk.

Methods: Community perception of disaster risk in reference to the social determinants of health was assessed in this study. Individual interviews with participants from a community were conducted, all of whom were permanent community residents. Thematic analysis was conducted using narrative inquiry to gather firsthand insights on their perceptions of how characteristics of population health relate to and impact an individual's disaster risk.

Results: Analysis demonstrated commonality between interviewees in perceptions of the influence of the social determinants of health on individual disaster risk by determinant type. Interviewees sensed a strong correlation between low community connection and disaster risk vulnerability. Specific populations thought to have low community connection were perceived to be socially isolated, resulting in low knowledge or awareness of the surrounding disaster risks, or how to prepare and respond to disasters. In addition, they had reduced access to communication and support in time of need.

Discussion: The importance of a strong social community connection was a feature of this research. Further research on how health determinants can enable disaster risk awareness and disaster risk communication is warranted.

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Abstracts of Oral Presentations-WADEM Congress on Disaster and Emergency Medicine 2019

WILDERNESS MEDICINE

A Fresh Look at Whether the Human Appendix Should Be Considered "Friend or Foe" in the Context of Long-duration Remote Expeditionary Medicine (Benivolem aut Insidiator?)

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Introduction: Traditional belief holds that the human appendix is a vestigial organ devoid of any purpose, and consequently, surgical appendectomy has been the "gold standard" treatment for suspected appendicitis. Prophylactic (preventative) appendectomy remains the policy of the Australian Antarctic Division for wintering medical practitioners and has been discussed in the context of long-duration non-orbital space flight.

Aim: New research around appendiceal function, increasing adoption of non-surgical treatment modalities for acute appendicitis, and emerging research on the long-term consequences of appendicectomy have recently enabled researchers to challenge this paradigm.

Methods: This novel project set out to test the hypothesis that a "one size fits all" prophylactic appendectomy policy may not be in the best interest of individual expeditioners, and utilized a "mindmap" to identify several key areas for a scoping literature review. This enabled disparate research to be drawn together in an innovative way.

Results: A growing body of research has discovered that the appendix plays an important role in the gut immune system and maintaining gut health. It acts as a reservoir of good bacteria that repopulates the gut after pathogenic challenge. This is particularly important for people with impaired immune systems, such as those that occur in extreme environments. Appendicitis can often be successfully treated with intravenous antibiotics. Prophylactic appendectomy is not without risk, as 1:4 to 1:3 people will encounter some sort of postoperative complication. After an appendectomy, there is an increased risk of many serious medical conditions, including intra-abdominal adhesions, ischaemic heart disease, inflammatory and irritable bowel diseases, rheumatoid arthritis, and many others.

Discussion: The increased morbidity and mortality associated with appendectomy is costly for individuals (the burden of disease) and society (health economics). It also poses a currently unappreciated health risk for long-term off-world expeditions.

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Use of Solar Power Production for Point-of-Care Ultrasound: A Comparative Analysis

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Introduction: Use of Point-of-Care Ultrasound (US) has grown considerably in resource-limited and wilderness environments because of a combination of features, including portability, durability, and safety. However, the optimal method of powering US devices in such environments is not well established.

Aim: This project has the following aims:

1. Develop a solar power generation and storage system that maximizes power capacity and minimizes weight while being easily transportable by a single person.
2. Test the system in a real-world environment to evaluate actual performance relative to stated performance.
3. Determine the approximate US scan-time where solar systems would outperform pre-charged batteries with respect to weight.

Methods: We developed multiple solar collecting systems using a combination of polycrystalline, monocrystalline, and thin-film solar arrays paired with different powerbanks and tested them using a variety of US systems. From this, the duration of usage was calculated, which makes the solar power generation system a superior option to pre-charged batteries.

Results: Lithium-ion energy storage was found to be superior to lead-acid batteries for multiple reasons, most prominently, weight. Several models of US systems were tested revealing that portable US systems consume between 30 to 50 watts. Tri-fold monocrystalline solar panels coupled with lithium-ion

powerbanks provided the best combination of weight and transportability. Total weight of the combined solar array, powerbank, and US system is 10 kilograms and easily packs into a backpack carrier. It was found that systems using solar generating capacity become superior to pre-charged powerbanks in regard to weight at approximately 14 hours of scanning time.

Discussion: While these results are not fully generalizable due to seasonal and geographic variability as well as the type of US system used, use of solar generating capacity to power US systems is optimal for extended durations of use in resource-limited environments.

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