

**Discussion:** We found HCPs had a lower prevalence of PTSD compared with earthquake survivors (Chou 2007), and physicians had longer working years and lower DTS-C scores. The professional training may help HCPs going through psychological impacts during the disaster. HCPs with 6–10 years of experience in the emergency department were found to have a higher risk of developing PTSD. Most of them were taking the responsibility of a team leader during the MCI, which may cause significant stress to these staff. Adequate training regarding MCI management could help to relieve tension and frustration, hoping to prevent the development of PTSD. Based on our study, PTSD among HCPs is an ignored issue, and we should follow-up HCPs' psychological condition in the future.

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### Incident Command Adaptations during Sustained Mega-Shelter Medical Clinic Operations during 2017 Hurricane Harvey Response in Dallas, Texas

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**Introduction:** The Dallas Convention Center received over 3800 evacuees because of the unprecedented flooding caused by Hurricane Harvey. A multidisciplinary medical clinic was established onsite to address evacuee needs for medical evaluations, emergency care, chronic disease management, pharmaceuticals, durable medical equipment, and local health services integration. To operate efficiently, the Dallas Mega-Shelter Emergency Operations Center (EOC) worked with the Mega-Shelter Medical Clinic (MMC) under a fluid incident command (IC) structure that was National Incident Management System (NIMS) compliant. Iterations of MMC IC demonstrated maturations in organizational structure while supporting MMC operations that varied from rigid NIMS doctrine.

**Aim:** To explore the use of a fluid IC structure at a large evacuation medical shelter after Hurricane Harvey.

**Methods:** We observed evolutions of IC organizational charts and operational impacts.

**Results:** Modifications through just-in-time iterations of the IC organizational chart were posted and reviewed with MMC IC and EOC sector chiefs. Changes in the organizational chart were noted to improve identification of logistical needs, supply delivery, coordinate with other agencies, and to make decisions for resource typing and personnel utilization. Adaptations also improved communication, which led to timely situational awareness and reporting accuracy.

**Discussion:** MMC medical services were improved by allowing modifications and adaptations to NIMS compliant MMC IC organizational roles and duty assignments. The fluidity of IC structure with ability for just-in-time modifications directly impacted the provision of disaster medical services. Unique situational awareness, coordination of care pathways within the local innate health infrastructure, compliance with health service regulations, and personnel resource typing all

contributed to and benefitted from these IC modifications. MMC and EOC IC collaboration facilitated effective communication and maintained an appropriate span of control and efficient activity reporting.

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### Influenza Vaccine Uptake and Associated Factors in Aged Care Facilities

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**Introduction:** Influenza vaccine is recommended for high-risk populations in Australia (including those aged over 65 years) but is less effective in the elderly due to a progressive and predictable age-related decline in immune function, referred to as immunosenescence. Aged care facilities (ACF) are known to be at high risk of explosive outbreaks of influenza (even in highly vaccinated populations) and may reflect a higher intensity of transmission within the closed setting of ACF, as well as lower immunity and immunosenescence in the frail elderly.

**Methods:** To measure the impact of influenza in aged-care staff (ACS) and residents as well as vaccine effectiveness, a prospective observational epidemiological study was conducted in collaboration with an aged-care provider with multiple sites from March to October 2018. Weekly active surveillance on influenza-like symptoms and questionnaires were used to collect data on two groups: ACS and residents. A range of variables was examined against their 2018 influenza vaccination status in statistical analysis.

**Results:** Vaccination rates were high in residents and consistent with other studies. Vaccine rates in aged-care staff were lower and consistent with other studies.

**Discussion:** Residents and relatives are unlikely to change their minds about vaccination from year to year unless there is targeted effort to persuade them to so, and negative perception of the vaccine is likely to persist. Workplace influenza vaccination programs targeted at staff could be an effective method of raising vaccine uptake.

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### Innovating Disaster Health and Medical Emergency Responses for an Emerging Global Threat

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**Introduction:** The global health threat posed by the ongoing deterioration in natural ecosystems and damage to our physical environment is growing at a rapid pace. Less recognized is the threat from natural hazard disasters, which concentrate contaminants from the damaged environment and expose large vulnerable populations to life-threatening medical conditions and disease. Currently neither international nor any national

health and medical emergency response protocols or programs have prepared health responses to protect the health of communities in such events.

**Aim:** This study performed a retrospective health risk assessment on two recent events where such impacts unfolded, namely the 2015 southeast Equatorial Asia smoke haze disaster and the 2016 Melbourne thunderstorm asthma epidemic. The primary objective was to test if the characterization of health risk could have been identified earlier and catastrophic levels of mortality and morbidity reduced.

**Methods:** The study employed a two-staged retrospective health risk characterization assessment. The first step applied the UNISDR (2017) framework for health risk disaster assessment combining a thematic and targeted word literature review to identify the level of health and medical risk knowledge prior to each event. The second stage applied a risk characterization matrix developed using ISO and Australian Health Department semi-quantitative health assessment standards.

**Results:** The 2015 southeast Equatorial Asia smoke haze disaster risk assessment was characterized as an extreme health risk and the 2016 Melbourne thunderstorm asthma epidemic characterized as a high health risk.

**Discussion:** Innovative medical response approaches are urgently needed to mitigate the growing health risk to whole populations from natural hazard disasters compounded by deteriorating natural ecosystems and the physical environment. This requires emergency medical and health teams to recognize the two-tailed human health risk from natural disaster hazards, along with investment in advanced planning, environmental risk surveillance, specialist training, technical guidance, and multi-sector coordination.

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### An Integral Hospital Response Protocol for Emergencies and Disasters from the Emergency Department

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**Introduction:** Mexico has suffered multiple social and natural events that tested its response capacity. Hospital units of the third level of care are an axis of response and a central reference. Guaranteeing their integral and organized response promotes risk prevention and mitigation strategy in emergencies and disasters.

**Aim:** To analyze the national and international regulations and the existing documents about emergency and disasters related to a hospital with the identification of the critical actors in the response.

**Methods:** This research consists of a cross-sectional and descriptive study with a mixed methodology (qualitative and quantitative), that generates a protocol for response in a third level care hospital. Quantitative analysis was carried out using central tendency measurements based on a surveys (training, knowledge) performed in the hospital services that provide a

critical response with the ED in emergencies or disasters (ED, ICU, Supplies, Nursing, Operating Room, Security, Hospital Admission, Crisis Committee). In the quantitative analysis, the staff were interviewed about their experience in responding to previous events (to the same critical services), recognizing importance and points of improvement with a discourse analysis methodology.

**Results:** With the information collected and based on the protocols of Safe Hospital program (PAHO/WHO) we generated a protocol organized by the ED that involves massive victims.

**Discussion:** Regulations oblige hospital units to have protocols of action in critical situations linked to Safe Hospital program, so it is a great tool for planning. All the surveyed personnel consider that it is important to have a plan that allows for immediate steps to ensure quality and timely patient care, considering it an ethical and social obligation. Analysis suggests that continuous training and the contribution of an operational plan per service provide security and better prognosis to the victims. The protocol includes all critical response services with a clinical practice guide.

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### Inter-Authority and Cross-Border Cooperation Using the Tetra Digital Radio Network

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**Introduction:** The Tetra digital radio network enables a secure and encrypted environment for verbal and minimal data (SDS, Unit Alert) communication. In Finland (population 5.6 million), the technology has been in use since 2002, and the network currently has close to 40,000 end-users representing several authorities including emergency medical services and health care, police, fire and rescue services, Border Guard, Customs, and defense forces. The national dispatch authority uses the network to dispatch and communicate with EMS, police, and rescue services, and inter-authority talk groups have been designed to enable direct communication between each or all actors as needed. On a daily basis, the network transmits more than 7.5 million messages and 150,000 verbal contacts. The system has proved to be extremely stable during mass casualty incidents needing simultaneous actions by hundreds of individuals representing several authorities. Finland, Sweden, and Norway have common borders in the north, which EMS units routinely cross on a daily basis responding to urgent missions. Both Sweden and Norway have nationally implemented the Tetra communication network, but are using different operators.

**Methods:** The need to facilitate communication between Tetra end-users in the Nordic countries using each other's networks resulted in an inter-system-interface (ISI) solution enabling network roaming. Between Finland and Norway, the mechanism was launched late in 2017 and is being implemented between Finland and Sweden in 2018.

**Results:** Pending configuration of necessary talk groups, the system will be functional and in use in 2019.