sheltering in place activities. Mass-casualty incident (MCI) preparedness systems also are compared by discussing alert systems, patient routing to hospitals (from an MCI scene) and within hospitals (emergency department flow), staffing, triage, patient identification, tracking and discharge, volunteer tracking, and overall security systems adaptability and flexibility.
**Methods:** Researchers were hosted by Israeli emergency management experts and were provided with organizational overviews via slide presentations, extensive question-and-answer sessions, and tours of individual organizations. The comparative analysis was augmented by extensive literature reviews of the three national systems.
**Conclusions:** Adequate planning for sufficient security measures plays a vital role in healthcare mitigation planning as it applies toward MCIs. National systems can benefit from developing best practices that reflect a variety of approaches from differing international regions. While undeniable cultural and systematic differences are present among differing nations, the global healthcare security communities can benefit from developing best practices as an approach for security mitigation planning.
**Keywords:** emergency preparedness; healthcare; hospital; incident management; mass casualty incident; mitigation; prevention; regional; safe hospitals; security
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### Risk Assessment for Healthcare Facilities: A Practical Tool

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**Introduction:** To be prepared to deal with emergencies, healthcare facilities must engage in a process with their community to determine specific risks and vulnerabilities. They also must prioritize planning activities to ensure that they are prepared for the highest risk events and the ones with the potential for greatest impact.
**Methods:** The emergency management, emergency medicine, and emergency response literature was systematically reviewed to identify models that have been proposed for assessment of hazards, risk and vulnerability in all settings. A model specific to healthcare settings was developed and pilot tested in an acute care hospital.
**Results:** No existing model was found in the literature that combines a quantifiable probability estimate and multiple components of impact for healthcare facilities into one formula. Also, no published models had been tested for usability or outcome. Using the concept of "risk = probability x impact", a probability rating was developed for healthcare facilities. Impact was defined along three key domains: (1) human impact; (2) property impact; and (3) business impact. Risk was defined as "probability x sum of impact rating" in these domains. The risk rating for each type of threat was referenced to a matrix and determined to have one of sixteen possible categories, which were further divided into four levels of risk: (1) high; (2) moderate; (3) low; and (4) very low. The model was pilot tested and was felt to be practical.
**Conclusions:** The model was relevant and useful for facilities to identify and prioritize planning activities for emergencies.
**Keywords:** competencies; education; healthcare facilities; preparedness; risk assessment; training; vulnerabilities
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### Earthquake Preparedness in Tehran

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**Introduction:** Iran is an earthquake-prone country. If an earthquake occurs in a large city like Tehran, the damage will be severe. Therefore, exercises and drills are needed to prepare the country.
**Methods:** A earthquake measuring 5.5 Richter was simulated in Sina hospital. The use of equiment, medical staff, and medication were measured.
**Results:** There was enough equipment, medication, and staff, but cooperation with police and fire officials was not good.
**Discussion:** Regardless of necessary material during a disaster, if there is not strong coordination, not all efforts would be useful.
**Keywords:** drill; earthquake; Iran; safe hospital
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## *Poster Presentations—Safe Medical Facilities*

### (S104) Longitudinal Expandable Shelter for Health Emergency Response during Disasters

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**Introduction:** During local emergencies, hospitals are the final destination of the rescue process. Therefore, effective health mobile structures hmust be inserted between hospitals and the place of the event in order to provide the best treatment (using appropriate and easy to use equipment) for safer and faster evacuation to hospitals.
**Methods:** A literature review national and international disaster medicine standards were the basis for this study to provide clinical, hygienic, and organizational needs to satisfy for the emergency structure design. Project requirements were obtained by analyzing the structural and clinical processes. The structure must be able to be installed on every type of ground, be resistant to every weather condition, and be transported easily and quickly. Technological equipment is obtained from clinical evaluation for patient stabilization.
**Results:** This structure is a Longitudinal Expandable Shelter (LES) for health emergency responses and is organized in three internal sub-areas. The possibility of expandability facilitates rapid transportation and easy deployment. The sub-organization provides three clinical areas: diagnostic, therapeutic and pre-evacuation monitoring.

Furthermore, longitudinal expandability supports the basic rules that facilitate the unidirectional flow of casualties from dirty to clean areas.

**Conclusions:** A LES is an answer to the requisites of disaster medicine standards and guidelines. It provides an effective and efficient area for sanitary aid in response to disasters or emergencies.

**Keywords:** disaster health; disaster health structure; medical shelter; medical unit

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### (S105) Water Supply: Damage to Hospitals during Two Earthquakes in Japan, 2007

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**Introduction:** Lifeline functions are vital to maintain the function of medical treatment facilities. Patient survivability during disasters is dependent on the viability of lifelines functions, especially on a water supply system. This report deals with the water supply damage of hospitals after the Noto Peninsula and Niigataken Chuetsu-oki Earthquakes of 2007 in Japan.

**Methods:** The water supply management of three hospitals impacted by the two earthquakes was investigated using a field survey and interviews administered to hospital personnel. The assessment included water supply systems during normal operations and after the damage.

**Results:** Hospital A was damaged seriously. The water supply was disrupted completely for three days. Water was stored for only one day. This hospital depended completely on water wagons for the exceeded demand. Hemodialysis patients had to be sent to other hospitals for treatment.

Hospital B suffered little damage to its water tank.

Hospital C suffered serious damage. The water supply was disrupted completely for two weeks. The hospital held four days worth of a water supply, including a rainwater pool. The rest of its water demand was fulfilled by water wagons from the Self Defense Force.

**Conclusions:** Since hemodialysis consumes significant quantities of water, these patients were transferred for dialysis. Many were elderly and resisted evacuation. Keeping enough water in hospitals is vital to prevent hospital disruption due to a water shortage during disasters. Even nonpotable sources like rainwater can be used.

**Keywords:** earthquakes; hospitals; Japan; water supply;water systems

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### (S106) Evacuation Exercise of an Intensive Care Unit

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**Introduction:** A 14-bed intensive care unit (ICU) was moved to a new part of the hospital, allowing for the unique opportunity to perform an evacuation drill of an ICU. Patients in the ICU are not only endangered by their disease, but also by their dependence on mechanical life support. Because a collapse of that lifesaving infrastructure is seldom, this scenario often is not considered and therefore, is underestimated.

**Methods:** For the drill, ten volunteers were dressed as ICU patients. Four of the ten patients were placed in a hot zone so that they could not be reached by the hospital staff and only could be rescued by the firefighters working with self-contained breathing protection. The danger in the hot zone was simulated using a smoke generator.

**Results:** The personnel worked together efficiently. The hospital staff benefited from the experience. The patients were evacuated from the ICU in 17 ±9 minutes, the hot zone was cleared in 21 ±10 minutes, and the patients were transferred to another ICU or to emergency medical services within 52 ±21 minutes. Many team members made suggestions on how to modify and improve the response to such an incident.

**Conclusions:** Organizing and performing an evacuation drill was difficult, but also a beneficial experience for all those involved. It is difficult to compare these data with other institutions, however there was much to learn for everybody involved in the drill.

**Keywords:** drill; evacuation; exercise; intensive care unit; safe hospital

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## *Oral Presentations—Civil-Military Collaboration*

### Potential Roles of Military-Specific Response to Natural Disasters—Analysis of the Rapid Deployment of a Mobile Surgical Team to the 2007 Peruvian Earthquake

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The August 2007 earthquake in Peru resulted in the loss of critical health infrastructure and resource capacity. A regionally located United States Military Mobile Surgical Team was deployed and operational within 48 hours. However, a