been considered impossible, ethically inappropriate, or both, to identify experimental and control groups essential for hypothesis testing for the conduct of scientific randomized controlled clinical trials.

Objective: The aim of this study was to identify a number of performance and outcome indicators and define optimal disaster response and management decision-making for various disaster scenarios using simulation optimization.

Methods and Results: A system model of medical disaster management was designed, and victim models and performance and outcome indicators were developed. Various mass-casualty and large-scale disaster scenarios were developed, including: (1) a hospital emergency incident/disaster; (2) a CBRNE incident; (3) an airplane crash and airport disaster; (4) a mass gathering; and (5) a military battlefield mass casualty. Using "Discrete Event Driven Simulation", multiple replications were made for different decision-making modalities, different resource allocations, and different disaster response procedures. Statistical analysis and optimization techniques were applied to achieve the best available setting of parameters of the simulation model. In such a way, the "Medical Disaster Management Simulator" runs the "missing experimental studies" in a simplified artificial simulated disaster environment.

Conclusions: Simulation optimization is an adequate tool for judging and evaluating the effectiveness and adequacy of health and relief services provided during disaster medical response. Evidence-based recommendations and codes of best practice were formulated for optimal medical disaster and military battlefield management in different large-scale event scenarios as well as for teaching, training, and research in medical disaster management.

Prehosp Disaster Med 2011;26(Suppl. 1):s41–s42
doi:10.1017/S1049023X11001464

(A146) Disaster Patient Tracking – Local, State and Federal Interoperability during a Multi-Hospital Evacuation Exercise

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Introduction: Associated with hospital evacuation is the need to track multiple patient evacuees from point of origination to final hospital reception. Patient tracking, a component of the hospital emergency operations plan, is vital to patient care; family association, resource management, financial reimbursement, risk management, and repatriation. Tracking strategies and plans can include a variety of vendors, hardware, software, and coordination issues. Hospital evacuee tracking plans and platforms exist at multiple jurisdictional levels but may not be interoperable.

Methods: Three patient tracking platforms representing a local, state and federal application were used during a multi-hospital evacuation exercise, initiated in New Orleans, Louisiana, May 2010. Simulated patients were flown and tracked to multiple patient reception centers in the southern United States, including the Federal Coordinating Center in Shreveport, Louisiana, and receiving National Disaster Medical System hospitals. This review summarizes tracking operations, patient data characteristics captured and interoperability at the Shreveport reception location.

Results: 7 New Orleans hospitals entered 51 patients for evacuation into Louisiana's web-based, At-Risk-Registry (ARR) database including 8 patient identifiers each. ARR data was shared with federal and Louisiana Region 7 patient evacuee receivers for flight manifest construction and reception planning. 34 ARR evacuee patients were indicated for the Shreveport, Louisiana, reception site. 34 patients with 6 identifying characteristics were entered from ARR into EMTrack, the local patient tracking system. A C130 arrived with a TRAC2ES manifest of 20 simulated patients with 6 patient data characteristics. The local tracking system was reconfigured for the hardcopy manifest; simulated patients were received at the airport; transported and received at local hospitals.

Conclusions: Tracking system interoperability may be challenged by tracking technologies, jurisdictional requirements and degree of implementation at the local, state and federal level. Tracking should be standardized based on national recommendations with local systems remaining flexible for just-in-time requirements.

Prehosp Disaster Med 2011;26(Suppl. 1):s42
doi:10.1017/S1049023X11001476

(A147) Pediatric Medical Surge: An Exercise Evaluation Guide

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A guide was created by the Chicago Healthcare System Coalition for Preparedness and Response to help hospitals and health facilities design, implement, and evaluate emergency exercises following the US Homeland Security Exercise and Evaluation Program (HSEEP) format. The HSEEP provides a standardized policy, methodology, and terminology for exercise design, development, conduct, evaluation, and improvement planning. As a part of a toolkit for hospital use, the pediatric at-risk population is represented with an Exercise Evaluation Guide titled "Pediatric Medical Surge". Pediatric Medical Surge is defined as the rapid expansion of the capacity of the existing healthcare system in response to an event that results in an influx of children and an increased need for personnel (clinical and non-clinical), support functions (laboratory and radiological), physical space (beds, alternate care facilities), and logistical support (clinical and non-clinical equipment and supplies). The Exercise Evaluation Guide is fully customizable and includes the following activity sections: (1) Pediatric Pre-Event Mitigation and Preparedness; (2) Incident Command; (3) Pediatric Bed Surge Capacity; (4) Pediatric Surge Staffing Procedure; (5) Pediatric Decontamination; (6) Receive, Evaluate, and Treat Pediatric Surge Casualties; (7) Provide Pediatric Surge Capacity for Behavioral Health Issues; and (8) Demobilization. Each of these sections includes a number of exercise tasks and details the potential tasks/observation keys that are completely modifiable in an electronic format. All or a limited number of these activity sections can be used in an exercise. Following the Activity and Tasks, a section for Observations is provided, and

includes Strengths and Areas for Improvement. Upon completion of the Exercise Evaluation Guide, the findings are then utilized to complete the After Action Report for the exercise. This planning document is one tool to assure that children are not neglected in health care based exercises.

Prehosp Disaster Med 2011;26(Suppl. 1):s42–s43
doi:10.1017/S1049023X11001488

(A151) Non-Traumatic Out-of-Hospital Arrests: Initial Cardiac Arrhythmia, Circadian Differences and Cause of Death

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Background: Out-of-hospital cardiopulmonary arrest (OHA) is an international health issue. There is an urgent need to better understand the key factors that affect OHA survival. Epidemiological surveillance is the first step towards scientific understanding of the problem. This study looks at the profiles of patients who suffered an OHA.
Methodology: In this retrospective study, the medical records of all patients who died upon arrival at Tan Tock Seng Hospital, Emergency Department (TTSH ED) between 1st January 2009 and 31st December 2009 were reviewed. The outcomes include patient demographics, pre-hospital management and the cause of death.
Results: Within the study period, there were a total of 275 OHA, 5 (1.8%) traumatic and 270 (98.2%) non-traumatic cases. Emergency Medical Service (EMS) conveyed 247 (91.5%) of OHA and 23 (8.5%) arrived by self-transport. The incidence of non-traumatic OHA was 14 per 10,000 ED attendees, predominantly male (72.2%). Male were significantly younger than female (63 vs 70 years, $p = 0.002$). The commonest initial cardiac arrhythmia recorded on scene by paramedics was asystole (54.1%), pulseless electrical activity (34.8%) and ventricular fibrillation (11.1%). One hundred sixty-one (59.6%) patients collapsed during the day (0600 – 1759 hours). Patients found in ventricular fibrillation on scene peaked in the morning (1020hours). All OHA were started on cardiopulmonary resuscitation, intubated with laryngeal airway mask, given intravenous adrenaline, and all ventricular fibrillation was electrically defibrillated enroute by the paramedics. Despite continued resuscitative efforts in the ED, all remained in asystole. The State Coroner reviewed 266 (96.7%) OHAs, of which, 96 (36%) were subjected to post mortem. Among patients with asystole at scene, acute coronary syndrome (55.2%), hypertensive heart disease (13%) and bronchopneumonia (5.2%) were the three commonest cause of death. The commonest cause of death for ventricular fibrillation at scene was acute coronary syndrome (76.7%), of which 10 (43.5%) had no pre-existing medical conditions.
Conclusion: In our study population, majority of patients had asystole as their presenting arrhythmia at scene. OHA with ventricular fibrillation demonstrated significant circadian differences and the underlying cause of death was acute coronary syndrome. This knowledge will allow EMS to devise future strategies that have the greatest potential to improve survival outcomes.

Prehosp Disaster Med 2011;26(Suppl. 1):s43
doi:10.1017/S1049023X1100149X

(A152) Comparison of Load Distributing Band and Standard Cardiopulmonary Resuscitation in Patients Presenting with Cardiac Arrest to Emergency Department

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Objective: To compare resuscitation outcomes before and after switching from manual cardiopulmonary resuscitation (CPR) to load-distributing band (LDB) CPR in a multi-center Emergency Departments (ED) trial.
Methods: This is a phased, prospective cohort evaluation with intention-to-treat analysis of adults with non-traumatic cardiac arrest. The intervention is change in the system from manual CPR to LDB-CPR at two Urban EDs. The main outcome measure is survival to hospital discharge, with secondary outcome measures of return of spontaneous circulation (ROSC), survival to hospital admission and neurological outcome at discharge.
Results: A total of 1,011 patients were included in the study, with 459 in the manual CPR phase (January 01, 2004, to August 24, 2007) and 552 patients in the LDB-CPR phase (August 16, 2007, to December 31, 2009). In the LDB phase, the LDB device was applied in 454 patients (82.3%). Patients in the manual CPR and LDB-CPR phases were comparable for mean age, gender and ethnicity. Rates for ROSC were comparable with LDB-CPR (manual 22.4% vs. LDB 35.3%; adjusted odds ratio [OR], 1.07; 95% confidence interval [CI], 0.63-1.83). Survival to hospital admission was increased, Manual 14.2% vs. LDB 19.7%; adjusted OR, 2.50; 95% CI, 1.05-6.00. Survival to hospital discharge was increased Manual 1.3% vs. LDB 3.3%; adjusted OR, 3.99; 95% CI, 1.06-15.02. The number of survivors with Cerebral Performance Category 1 (good) (Manual 1 vs. LDB 12, $p < 0.01$) and Overall Performance Category 1 (good) (Manual 1 vs. LDB 10, $p < 0.01$) was also increased. The Number Needed to Treat (NNT) for 1 survivor was 52 (95% CI, 26-1000).
Conclusion: A resuscitation strategy using LDB-CPR in an ED environment was associated with improved survival to admission and discharge in adults with non-traumatic cardiac arrest.

Prehosp Disaster Med 2011;26(Suppl. 1):s43
doi:10.1017/S1049023X11001506

(A153) Analysis of Chest Compressions: Measured Using the Quality Compression Index and Performance Disparities among Demographic Characteristics

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Introduction: Cardiopulmonary resuscitation (CPR) guidelines throughout the world stress the importance of high quality chest compressions soon after cardiac arrest as the most significant factor in determining survival. Little evidence exists, internationally, documenting the quality of compressions provided by healthcare providers. In this study investigators sought to determine the