

professionals and increasing the early retirement of experienced staff. It is time to begin the awareness campaign to both prepare new graduates and recognize it in senior staff. How much is enough for our nurses and doctors to give of themselves and their own lives in caring for others in emergency and traumatic life events?

Keywords: compassion fatigue; coping silent witnesses; vicarious traumatization

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Database as an Evidence Base—Lessons Learned from Terrorism-Related Injuries among Israeli Civilians

Kobi Peleg,¹ Israel Trauma Group²

1. Gertner Institute for Epidemiology and Health Policy, Ramat Gan, Israel
2. Israel National Center for Trauma & Emergency Research, Ramat Gan, Israel

Introduction: Terrorist attacks have become a worldwide threat. Many theories and papers have been published as principles for mass-casualty incident (MCI) management. This presentation will analyze these principles to determine if they are evidence based.

Methods: Data on terrorist-related MCIs in Israel registered by the Israel National Trauma Registry between October 2000 and December 2005 were analyzed.

Results: Between October 2000 and 30 June 2003, 1,661 patients were hospitalized and recorded in the Israeli National Trauma Registry due to terrorist-related injuries, and 55,033 were hospitalized due to other trauma. Among terrorist victims, 55% were between the ages of 15 and 29 years, compared to 22% in this age group for non-terrorist-related trauma patients. The results examined the following questions: (1) Arrival and hospitalization patterns: Do severe injuries arrive first?; (2) Triage: Has triage changed due to new mechanisms of penetrating injuries, such as shrapnel, nails, and bolts included in explosives?; and (3) Differences in resource consumption by casualties due to terrorist attacks.

Conclusions: While theories and papers have been published as principles for MCI management, they do not always match the evidence-based data.

Keywords: evidence base; injuries; Israel; research; terrorism

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Comparison of Disaster Response Approaches in Canada and the United States: Ontario's EMAT vs. Florida 1 DMAT

David G. McCann

Assistant Professor, Department of Family Medicine, Hamilton, Ontario Canada

Introduction: Approaches in disaster response differ between the US and Canada. Since the late 1980s, the US has developed and maintained the National Disaster Medical System that has responded to numerous disasters within the United States. Since the terrorist attacks in New York on 11 September, Canada has taken an interest in disaster response. The province of Ontario has developed a deployable Emergency Medical Assistance Team (EMAT), modeled in large part on the Disaster Medical Assistance Teams (DMATs) in the US. The author is both the Chief

Medical Officer of Florida One DMAT in Fort Walton Beach, Florida and an Incident Commander of the Ontario EMAT, giving him a unique perspective on the similarities and differences in disaster response and preparedness between the US and Canada.

Methods: The paper will be a qualitative comparison of the Ontario EMAT and Florida One DMAT based upon the author's work with the two teams.

Results: Florida One DMAT is an experienced, full DMAT in existence since the late 1980s and based upon three deployable teams of 35 persons each (total 105), whereas the Ontario EMAT normally deploys as a single team of >100 personnel. The DMAT is self-sustaining for a minimum of 72 hours in austere conditions, while the Ontario EMAT depends on existing infrastructure to support its operations (living quarters, food, and water must be available at the deployment site). The DMAT is deployable "anytime, anywhere", while the EMAT is primarily intended for surge capacity to assist overwhelmed existing health facilities. There are other notable differences that will be discussed along with a number of similarities.

Conclusions: The US and Canada have chosen different styles for their disaster response teams. Both models have their advantages and disadvantages but seem to work for the needs of their respective countries.

Keywords: Canada; comparison; disaster medical assistance teams; emergency medical assistance teams; response; United States

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Hospital Emergency Department Referral Patterns in a Disaster

Michael J. Reilly; David S. Markenson

New York Medical College, Center for Disaster Medicine, Valhalla, New York USA

Introduction: During the past 30 years, the emergency medical services (EMS) system has developed into an effective means of delivering prehospital medical care and transporting ill or injured victims to definitive medical care. A main presumption in most hospital disaster planning is that patient arrival will be through a directed EMS response and distributive transport system allowing for the orderly triage of arrivals and the control of numbers arriving at each hospital serving disaster victims. In spite of these systematic strengths, case reports in the literature and major incident after-action reports have shown that most patients who present at a healthcare facility following a disaster or other major emergency do not necessarily arrive via ambulance.

Purpose: If these reports of arrival of patients outside of an organized transport system are accurate, hospitals and EMS systems should be planning differently for a mass convergence of patients on the healthcare system. Hospitals may need to consider alternative patterns of patient referral including self-referral when performing major incident planning and methods to divert non-critical patients to alternate locations.

Methods: A 25-year retrospective review of published data was conducted to identify reports of patient care during disasters or major emergencies that included the categorization of the patient's method of arrival. Data were aggregated and analyzed using a structured mechanism.

Results: Almost all of the reports discussed the importance of the prehospital emergency care system. However, many suggest that only a fraction of the patients who are treated arrive via ambulance, particularly during the early post-incident stages of a disaster.

Conclusions: Hospitals should develop emergency plans that consider alternative referral patterns of patients during a disaster. Hospital staff should be proficient in triage, decontamination, and safety and security procedures should they encounter a patient surge on their facility.

Keywords: ambulance; disaster; emergency health; emergency

medical services; transportation

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Antioxidant Effect of N-acetylcysteine in Liver Ischemia-Reperfusion Injury following Hemorrhagic Shock

Ricardo M. Camelo,¹ Antônio O. Portella,¹

Márcia K. Koike,¹ Luiz F. Poli-de-Figueiredo,²

Edna F. Montero¹

1. Universidade Federal de São Paulo, São Paulo, Brazil

2. Universidade de São Paulo, São Paulo, Brazil

Introduction: Hemorrhagic shock (HS) is the main cause of early death in trauma and the reperfusion injury, secondary to large volume saline treatment, has been identified as an important factor leading to multiple organ dysfunction syndrome. N-acetylcysteine (NAC) is an antioxidant able to modulate the inflammatory response after ischemia-reperfusion harm. The aim of this study was to evaluate NAC effects on the liver during resuscitation of HS. **Methods:** Adult Wistar rats were used in two test groups and one control group was used. In the HS group (HSG), the rats underwent HS (mean arterial pressure of 35 mmHg) followed by resuscitation with Ringer's lactate solution and blood (n = 10). The same procedure was used for the second group (HNG) plus two doses of NAC 150 mg/kg, one during and another 30 min after resuscitation (n = 10). Both groups were compared to a control group (CG) (n = 6). Differences among the groups were analyzed by one-way ANOVA, followed by post-hoc tests.

Results: The addition of NAC did not affect arterial blood pressure. Hepatocyte necrosis was lower in the CG (4.8 ± 0.6%), intermediate in the HNG (9.7 ± 0.9%), and more frequent in the HSG (16.4 ± 0.8%; *p* < 0.001). Aspartate aminotransferase (AST) and alanine aminotransferase (ALT) levels were similar between the CG (255 ± 17 U/L and 56 ± 7 U/L, respectively) and the HNG (209 ± 19 U/L and 111 ± 13 U/L, respectively), but higher in the HSG (792 ± 102 U/L and 525 ± 89 U/L, respectively; *p* < 0.001 for both parameters). Thiobarbituric acid reactive substance concentrations were similar between the CG (70.3 ± 4.2 mol/g) and the HNG (66.8 ± 5.1 mol/g), but higher in the HSG (85.6 ± 3.3 mol/g; *p* = 0.016). Oxidized glutathione levels were different only between the CG (0.23 ± 0.12 g/g) and the HSG (0.06 ± 0.01 g/g; *p* = 0.025).

Conclusions: These data suggest that NAC could prevent liver cellular damage following hemorrhagic shock proba-

bly due to its antioxidative effect, even without modifying the arterial blood pressure.

Keywords: hemorrhagic shock; liver; N-acetylcysteine; reperfusion injury; trauma

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Analysis of the Clinical and Laboratory Features of Young Adults with Uncomplicated Dengue Hemorrhagic Fever at Philippine General Hospital—Is Hospitalization Needed?

Scarlett Mia S. Tabunar; Carlo I. Santella

Philippine General Hospital, Manila, Philippines

Introduction: Dengue is the most common and widespread arthropod-borne arboviral infection in the world today. Some 2.5–3 billion people live in areas where dengue viruses can be transmitted. It is estimated that each year, 50 million infections occur, with 500,000 cases of dengue hemorrhagic fever (DHF) and at least 12,000 deaths. In the Philippines, the Field Health Services Information System (FHSIS) reported that in 2007, dengue was one of the top 10 leading cause of morbidity with a total of 37,583 cases reported and 290 deaths mainly affecting children <15 years of age.

Methods: The medical records of the patients who were admitted to the University of the Philippines, General Hospital (UP-PGH) Emergency Department-Acute Care Unit (ED-ACU) from May to October 2008 who had a discharge diagnosis of dengue hemorrhagic fever were retrospectively reviewed. Data was analyzed using chi square and odds ratio with alpha of 0.05. The World Health Organization criteria will be used to reclassify all cases into dengue fever and dengue hemorrhagic fever.

Results: There were 36 patients with a mean age of 22 years; 81% were male. Among all cases, fever occurred in 100%; positive tourniquet test in 72%; petechia in 75%; myalgia 74%; leukopenia 100%; and thrombocytopenia 100%. After admission, fever lasted a mean of one day (range = 0–4 days). Hypotension occurred in 5% and no bleeding was reported. The mean time of platelet increase from platelet nadir to more than 50,000/uL was one day (0–4 days). No patients suffered epistaxis, gum bleeding, or gastrointestinal bleeding. The mean length of hospital stay was three days (3–5 days).

Conclusions: For young adults with uncomplicated dengue infections, morbidity was low and hospitalization may be unnecessary. Daily outpatient monitoring either at private clinics, private or public hospitals, with symptomatic treatment and medical leave, may be a safe and feasible alternative.

Keywords: dengue hemorrhagic fever; hospitalization; morbidity; patient; Philippines

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Strong Ion Gap is Better than Serum Lactate or Anion Gap at Predicting Intensive Care Unit Admission, In-Hospital Mortality, or Need for Transfusion or Vasopressor Support

Andrew C. Miller; Vineet Gupta; Nichlesh Patel;

Richard Sinert

State University of New York Downstate and Kings County Hospital Center, Brooklyn, New York USA

Introduction: Unmeasured plasma anions are important biomarkers for life-threatening conditions. Anion-Gap (AG) calculations are confounded by changes in pH, pCO₂ and other