

set customized for the respective rescue teams. The sets will be carried permanently in the rescue equipment by the organization manager of the rescue service team. The equipment is not dependent on electronic components. The cost per sticker set is approximately US\$50. Keeping track of the patient allocations is assured.

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### (P2-41) Emergency Medical Response Systems in a University Athletic Program: A Descriptive Analysis

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**Introduction:** Unpredictable environmental conditions, crowd dynamics, and a variety of medical emergencies create logistical and clinical obstacles when planning emergency medical response coverage for mass-gathering events. In a collaborative endeavor between a university athletics program and an academic division of Emergency Medicine, a stadium emergency medical response system was created consisting of hospital-based healthcare providers and pre-hospital healthcare providers.

**Objectives:** Provide descriptive statistics relevant to the nature and frequency of injury/illness, location of treatment within stadium confines, and resources used in the care of students, event staff, and spectators during collegiate football operations, to assist in future planning of mass-gathering events.

**Methods:** A continuously updated, quality assurance database of de-identified, aggregate statistics was utilized to analyze trends regarding aspects of medical operations.

**Results:** During a 7-game home football season, there were a total of 399 patients encounters, including 1 cardiac arrest (0.25%), 12 “life-threatening” (3.01%), 121 urgent (30.33%), and 266 routine (66.67%). Total season attendance was 201,248 attendees (28,749/game and 19.83 patients encounters per 10,000 in attendance). Twenty-eight patients were transported (1.39 per 10,000), with eight resultant hospital admissions. Encounters varied by complaint, with skin (42%) comprising the largest number of encounters. Other categories included: (1) heat-related (23.5%); (2) allergic (15%); (3) neurologic (10.3%); (4) cardiopulmonary (3.5%); (5) gastrointestinal (3.6%); (6) musculoskeletal (5%); and (7) other (5%). Encounters increased noticeably when the heat index was greater than 80 °F– (29.4 vs. 10.5 per 10,000 attendees).

**Conclusions:** The collaborative effort by a multi-level provider model adequately covered presenting medical conditions. Consistent with previously literature, a strong correlation existed between heat index and number of patient encounters deemed urgent and routine. Interestingly, the number of “life-threatening” encounters did not appear to vary much with the heat index. Further studies of medical presentations and provider/resource utilization could provide for predictive modeling of future staffing and supply models.

**Keywords:** athletics program; crowds; mass-gathering events; sporting events; stadiums

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### (P2-42) Mass-Gathering Risks in the Beijing Subway System

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**Introduction:** Mass gatherings pose a significant risk on health and safety. The mass gathering in the subway systems in Beijing represents a daily risk. An average of 4.52 million passengers rode the subway each day between 15 November and 30 November 2010, with the highest daily passenger number totaling 5.14 million. The purpose of this study is to identify the health and safety aspects of mass gatherings in Beijing subways, and proposes strategies that may mitigate these risks.

**Methods:** The methods included a literature review, field visitation of the subway systems, and interviews of 20 passengers and 10 management personnel from the subway system.

**Results:** Many safety and health measures has been taken by the Beijing Subway System, including emergency exit signs and other safety signs, prohibition of smoking, firefighting equipment and explosion-proof tanks, safety inspection of bags, and safety education in the subways. However, additional key health and safety aspects were indentified, including: (1) lack of strict flow control of passengers in interchange subway stations; (2) lack of platform safety gates in Line 1, Line 2, Line 13; (3) lack of passenger control during peak hours; (4) lack of biomedical monitoring systems in the subways; and (5) lack of health facilities and rescue equipments in the subways.

**Conclusions:** Mass gatherings pose great risks on subway passengers in Beijing, including psychosocial risks, biomedical risks, and environmental risks. Additional safety measures need to be taken to ensure the safety and health of passengers in subways in Beijing.

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### (P2-43) Utilizing a Unified Health Command Structure for Mass Gathering Preparedness and Response: Lessons Learned from the 2008 Pacific Arts Festival

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**Background:** The Pacific Arts Festival is a mass-gathering event occurring every four years in Oceania. The 10th festival in American Samoa, July 20 to August 2, 2008, brought 2200 performers and 2500 tourists (a 15% population increase) from 27 Pacific nations to the island. Anticipated healthcare concerns included hospital surge (175% in 2004), HIV/STI transmission, imported/communicable diseases, food/water/sanitation-borne illness, interpersonal violence, and healthcare resource utilization.

**Objective:** To describe the preparedness and response efforts for this mass gathering event by emergency medical services, the hospital, and the department of health.

**Methods:** A retrospective review of after-action reports, public health and emergency department surveillance records, and

key-informant interviews was conducted. Descriptive statistics were used to evaluate data.

**Results:** A Unified Command structure was utilized for pre-/post-event response. Patient surveillance data was collected daily. During the festival 217 participants (42% female, 58% male, Average age 36) sought medical care. Acute illness ( $n = 166$ ), injury ( $n = 39$ ), other ( $n = 15$ ), routine follow up ( $n = 9$ ), chronic conditions ( $n = 6$ ), mental health ( $n = 1$ ), OB/GYN ( $n = 1$ ) were complaints addressed. Predominant acute illnesses included headache ( $n = 49$ , 23%), respiratory illness ( $n = 30$ , 14%), musculoskeletal pain ( $n = 26$ , 12%), and gastroenteritis ( $n = 17$ , 8%). One fatality occurred among delegates. No public health outbreaks were reported. Visits per healthcare venue demonstrated a decentralization of patient surge from the hospital setting (37.4% venue aid stations, 28.1% delegation medical staff, 24% DOH clinic, 10.6% hospital).

**Conclusion:** A unified health command structure was effective in responding to this mass gathering event. Surveillance data was rapidly gathered and utilized to direct healthcare resources. Efforts to decentralize healthcare from the hospital were successful. Public health emergencies were avoided.

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#### (P2-44) Use of Non-Traditional Technological Methodologies to Advance the Epidemiology & Management of Human Stampedes in Developing Countries: Case Series on Chinese School Stampedes

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**Objective:** Human-stampede events are emerging epidemics with large unplanned or impromptu mass gatherings. They are increasing in frequency worldwide, yet little is known of the epidemiology and other characteristics that would allow for communities to prepare, prevent and properly manage medical outcomes. We report a non-traditional methodology to identify a stampede's epidemiological characteristics using news reports, social networking, and systematic search of the internet. This hitherto unused technological dimension is a useful adjunct to obtain crucial data on mortality and morbidity, improve immediate understanding of the pathophysiology of the event, and provides opportunities to develop public education to remove potential bottlenecks and improve crowd control of these preventable tragedies.

**Method:** A LexisNexis search was followed by sequential searches of multiple internet-based English-language news agencies and the few research reports available in the scientific literature. Date, country, geographical region, time of occurrence, type of event, location, mechanism, number of participants, number injured, and number of deaths were recorded. Descriptive analysis was performed for deaths, injuries and location for this abstract.

**Results:** Following an extensive search of media accounts and research reports, a total of 263 human stampede events were identified worldwide between 1980 and 2011 resulting in 8,268 deaths and over 16,707 injuries. Major Religious assemblages,

particularly in India and the Middle East, accounted for the highest number of fatalities. Precipitants of stampedes follow a geographical pattern; In Africa, sporting and political events and in Europe, entertainment venues sparked stampedes. This case series reports 7 incidents in China. All cases occurred in the recess hour of schools, when students formed a bottleneck at narrow staircases, resulting in 27 deaths and 168 injured.

**Conclusion:** Understanding the triggers in mass gatherings for a human stampede have been greatly aided by advances in social networking, internet and video mobile phones. Particularly in difficult environments which were previously difficult to document. The patterns identified in this study can appreciably add to community level preparedness, prevention and improved clinical understanding and management at prehospital and hospital levels.

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#### (P2-45) Impact of Educational Intervention on Knowledge Regarding Disaster Management Among Nurses Working in Nepal

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**Objectives:** The purpose of this study was to find the change in knowledge regarding disaster management among nurses after educational intervention.

**Methods:** One group pretest and post test design was adopted for the study. The study was carried out in B.P. Koirala Institute of Health Sciences, Nepal. Forty Nurses were selected from emergency, orthopedics, medicine, and surgical ward by using non-probability convenience sampling technique. A self-administered semi-structured questionnaire was used to collect the data. Data was collected before and after the educational intervention. The collected data were analyzed using descriptive statistics (frequency, percentage, mean, standard deviation) and inferential statistics (Chi-square and Z test) were used to identify the difference in knowledge between pre-test and post-test, at 0.05 level of significance.

**Results:** Study findings revealed that in the pre-test, grand mean of the means of the nurses' knowledge on different aspects of disaster management as a whole was 2.39 with the standard deviation of 0.87. Similarly the grand mean of means of knowledge on different aspects of disaster management was 3.2 with the standard deviation of 0.47 in the post-test. The difference between pre-test and post-test in respondents' knowledge in different aspects of disaster management as a whole was calculated by using "Z" test ( $p < 0.05$ ) The result showed that the educational intervention was effective in bringing changes in knowledge in all aspects of disaster management.

**Conclusions:** Study findings revealed that there was significant increase in knowledge in the post-test after the educational intervention. Therefore, it can be concluded that education plays an important role in increasing awareness. It is recommended that awareness programs on disaster management should be carried out periodically as in-service education.

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