

service. Only nine articles reported on patients presenting to hospital.

**Conclusion:** There is minimal research focusing on the impact of mass gatherings on in-event and external health services, such as ambulance services and hospitals. A recommendation for future mass gathering research and evaluation is to link patient-level data from in-event mass gatherings to external health services. This type of study design would provide information regarding the impact on health services from a mass gathering, to more accurately inform future health planning for mass-gatherings across the health care continuum.

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### Interagency Collaboration in Mass Gatherings: The Case of Public Health and Safety Organizations in the 2012 London Olympic Games

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**Study/Objective:** Mass gatherings pose unique challenges for inter-organizational collaboration. The diverse public health and safety organizations involved in a mass gathering, such as the Olympic Games, are a good empirical example of the challenges involved in this process. This study used the 2012 London Olympic Games as the empirical setting, to examine the inter-agency collaboration among the multiple public health and safety organizations involved in a mass gathering.

**Background:** Mass gatherings often bring together organizations that collaborate irregularly, or have never engaged in a joint working activity. They often involve interaction and collaboration among multiple and diverse agencies, aiming at delivering a service to a large clientele.

**Methods:** A single, holistic, and exploratory case study design was used, and data were collected before, during, and after the Games; utilizing 39 semi-structured interviews with key informants, direct observations of field exercises, and documentary analysis. Data collection commenced in May 2011, which was 14 months before the actual Games, and was completed in October 2012, two months after the completion of the Games. Template analysis was used to thematically analyze the interviews' transcripts, the fieldnotes from observations, and the documents.

**Results:** Findings discuss inter-agency collaboration in mass gatherings along three main activity domains: leadership, communication, and learning. In each domain, a number of challenges and facilitators emerged as influential to collaboration. The analysis suggested that the lack of engagement of the leading organization, the ambiguous decision-making processes across organizations, and the complex structure of the involved agencies negatively influenced organizations' collaboration. The study found that shared micro-level leadership, the use of linkages, and experiential learning enabled the development of collaboration.

**Conclusion:** The findings in this study provided a deeper understanding of how inter-agency collaboration was formed, before and during a mass gathering, through the interplay of the three domains of leadership, communication, and learning.

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### Heat Stroke Patients of a Mass Gathering Festival in Japan- Kishiwada Danjiri Festival

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**Study/Objective:** A mass gathering.

**Background:** Kishiwada Danjiri Festival is famous in Japan for its brave characteristics of rushing around in the city area. It has been held in every mid-September for about 300 years. Over 500,000 visitors and players gather in a small area downtown (about four square kilometer). We have introduced an admission criteria for "heat stroke:" CK  $\geq 10,000$  U/L or s-Creatinine  $\geq 2.0$  mg/dl. We evaluated the heat stroke patients who were transferred to our emergency center during these festival days.

**Methods:** A total of 88 patients were transferred by ambulance to our emergency center during September 17-18, 2016. Among them, 53 cases were players of the festival. Excluding 28 cases of injuries, there were 25 cases of heatstroke and dehydration brought in by ambulance.

**Results:** Eleven cases (seven by ambulance and four by walk-in) of heat stroke were admitted during the two festival days. On the other hand, 18 patients were able to be back at home after receiving liters of fluid infusion. There were no dead cases. All cases were male and comparatively young (age 24.5 [SD = 7.2] years). Continuous renal replacement therapy was introduced to one case because of acute kidney injury, but the other 10 cases were successfully treated by crystalloids infusion and discharged within two or three days.

**Conclusion:** Among the traditional festival players in Japan, mild heat stroke or collapsed patients due to dehydration and running are frequently seen. Though most patients easily recover, severe cases with AKI have to be treated intensively. To prepare for a mass-gathering disaster, "festival in hot circumstances," it is useful to introduce simple criteria for heat stroke and dehydration.

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### Medical Support for the Special Olympics Canada 2014

#### Summer Games: Unique Requirements for a Mass Participation Event with a Specific Population

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**Study/Objective:** To describe the patient presentation rates and range of injury and illness observed, as well as the medical support required for a large scale multi day event serving a distinct population.

**Background:** The Special Olympics Canada Summer Games held in Vancouver BC in July 8-12, 2014 with over 2,000

athletes, coaches and staff participating. These games are distinct since all athletes possess intellectual or developmental disabilities and a high prevalence of comorbidities.

**Methods:** A prospective observational study of all patient encounters during the Games. Standardized patient encounter forms were completed by medical staff at all event venues and are reported.

**Results:** Approximately 2,000 athletes and coaches attended and participated in 11 events over 6 days. The games were held on the University of BC campus allowing for accurate collection of all medical treatment encounters during the games. Temperatures ranged from 15–28 C (50–80 F). In total, 314 patient encounters were documented, of which 88% involved athletes. Of these, 75% were due to event related injury and 25% due to illness. There were 14 patients (5.2%) transferred to hospital for assessment and/or management, 2 via Ambulance and others via non-emergency vehicles. Track and Field competitions had the highest number of incidents of all the sporting events (29.7%), and limb extremity pain was the most common patient (chief) complaint (26.4%).

**Conclusion:** A large scale mass participation event with athletes possessing developmental disabilities and a high prevalence of comorbidities, can be safely cared for with an appropriately designed medical support system, and not overburden local resources. This paper reviews historical injury and illness data that form the basis for planning in this population.

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### Mass Gathering Medicine Tabletop Game - A Systems

#### Approach to a Major Planned Event, Health Services Planning

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**Study/Objective:** The creation of an interactive learning activity to explore knowledge domains required for planning a robust event, health services response.

**Background:** We created three interactive board game-based, tabletop exercises to enhance systems learning for Major Planned Events (MPEs).

#### Methods:

Literature synthesis of potential effects of gamification on learning. Development of knowledge domains (7 steps) core to the creation of an effective health services response at MPEs, and face validity was addressed.

'Rules of engagement' were created (eg, cooperative versus competitive play, optimum size of each tabletop team 6–8 players, duration of play 90–120 minutes).

Conceptualization of chronology including pre, during, and post-event phases.

'Character' cards were implemented to represent the diverse stakeholders involved in MPE health planning.

Illustration of 'field of play' through creation of three, individual game boards (ie, obstacle adventure course, endurance running event, multi-day music festival) and depicting a detailed map of the specific event and the course (as applicable).

Generation of a series of scenarios used to create a set of event-specific 'Bonus', 'Challenge', and 'Patient' cards, each presenting an issue to be addressed by the players through collaborative 'free-play.'

**Results:** To date, the tabletop gaming exercises have been deployed at three workshops and have received extremely positive reviews. Formal evaluation has recently been pursued through a summer student research project. Thus far, a convenience sample of 28 event race directors and 44 medical students have been surveyed before and after the tabletop exercise. Mean and median comfort in all of the knowledge domains assessed improved. Qualitative feedback has been organized in themes.

**Conclusion:** The use of a facilitated mass gathering in a health tabletop exercise is an effective and engaging delivery modality for the transmission and integration of knowledge, related to the planning and delivery of health services for MPEs.

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### Development of a Mass Gathering Triage Tool: An Australian Perspective

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**Study/Objective:** This project aimed to outline the existing literature relating to triage in the mass gathering environment, and develop a mass gathering triage tool applicable to the Australian context.

**Background:** Many health service organizations deploy first responders and health care professionals to mass gatherings, to assess and manage injuries and illnesses. Patient Presentation Rates (PPR) to on-site health services at a mass gathering range from 0.48–170 per 10,000 participants. Transport to Hospital Rates (TTHR) range from 0.035–15 per 10,000 participants. Triage practices at mass gathering events vary.

**Methods:** A search of various online databases was undertaken to identify existing triage tools. This included a search of grey literature to identify the Australian contextual triage tools.

**Results:** A triage tool was developed based on the principles of triage, previous mass-gathering triage tools, existing Australian triage systems, and Australian contextual considerations. The triage tool is designed to be appropriate for use by first responders.

**Conclusion:** Further research should be conducted to test the validity and reliability of this Australian mass-gathering triage tool. In the absence of any other triage tool for the Australian mass-gathering environment, this triage tool should be considered for implementation for future clinical practice at Australian mass gatherings, where first responders are providing clinical assessment and management of patients presenting for on-site care.

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