

successfully transmitted and considered of sufficient quality to identify acute illness.

Method: Four UAVs equipped with high resolution cameras were deployed at two predefined high-risk areas for medical incidents located within the last 800m of the race. The video footage was transmitted in real-time during four consecutive hours to a remote viewing station where four research assistants monitored it on large screens. Interruptions in live feed transmission and moments with inadequate field of view on runners were documented.

Results: On September 25, 2022, 8,577 athletes registered in the Montreal marathon and half marathon. Out of the eight hours of video footage analyzed (four hours per high-risk area), 91.7% represented uninterrupted live video feed with an adequate view of the runners passing through the high-risk areas. The total interruption time was 22 minutes and 19 seconds, and the field of view was considered inadequate for a total of 17 minutes and 33 seconds. Active surveillance of drone-captured footage allowed identification of two race participants in need of medical attention. Appropriate resources were dispatched, and UAV repositioning allowed for real-time viewing of the medical response.

Conclusion: Live video transmission from UAVs for medical surveillance of runners passing through higher-risk segments of a marathon race for four consecutive hours is feasible. Live feed interruptions and segments with an inadequate field of view could be minimized through practice and additional equipment redundancy.

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Prevention and Preparedness for Mass Gathering Disasters: Our Efforts and Successes in Hyogo, Japan

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Introduction: Both prevention and preparedness are essential to avoid casualties and deaths in mass gathering disasters (MGDs). What countermeasures should be taken?

Method: Retrospective analysis of a MGD at Akashi City Fireworks Festival in 2001; discussion of countermeasures at Kobe Luminarie, an annual light festival to commemorate the Great Hanshin Earthquake. Retrospective analysis of mass casualty incidents (MCIs) between 2003 and 2022 in which the alert function of EMISHP (Emergency Medical Information System in Hyogo Prefecture) was activated. Duration from emergency call to activation of alert function (activation time), number of casualties, and number of destination hospitals were evaluated.

Results: More than 200 persons were injured and eleven people died in the Akashi Fireworks crowd crush. The main cause of this MGD was lack of gateway control and one-way flow control of visitors. With such measures in place, no MGD has occurred at Kobe Luminarie. In the past nineteen years in Hyogo, the alert function has been activated for 288 MCIs, such as vehicle accidents and fires. Activation time ranged from

1 to 73 minutes (median value=12). The casualty count ranged from 0 to 662 (median value=5). The number of destination hospitals ranged from 0 to 54 (median value=2). In all cases, emergency medical coordinators at Hyogo Emergency Medical Center, a principal hub hospital for disasters, directly or indirectly contributed to the medical response, e.g. securing hospital capacity, dispatching doctor-attending cars/helicopters and other medical teams to the scene, sharing information on the MCI between fire departments and hospitals.

Conclusion: Prevention of MGDs requires taking proactive measures, such as gateway restriction and one-way flow control without bottlenecks. Preparedness is made possible by the alert function of EMISHP; it enables smoother patient transport to hospitals and contributes much in securing sufficient time and resources for medical response in MCIs, including MGDs.

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Standards of Medical Planning and Response for Emergency Medical Teams During Mass Gatherings: A Systematic Review

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Introduction: Mass gathering events (MGE), organized or unplanned, can attract sufficient attendees to strain the planning and response resources of the host community, state, or nation, thereby delaying the response to emergencies. MGEs also have the potential to cause a mass casualty incident. But MGE can also lead to improvements in the organization of local emergency medical services or public health that form the legacy of that MGE. Emergency medical teams (EMTs) could be deployed to ensure health security as a surge in MGE. But these EMTs should be built on guiding principles and core standards. However, to the best of our knowledge, there are no standards on medical planning and response during any type of MGE (e.g., sports, religious, or festivals).

Method: A systematic review was performed in accordance with current guidelines, using six databases, namely Medline (via the PubMed interface), Scopus, Embase, Cochrane Library, ScienceDirect, and CINAHL, as well as literature sourced by Google Scholar and The Journal of Prehospital and Disaster Medicine. Studies published on minimum standards or medical planning and response during MGE from 2002-2022, written in English, were selected and assessed for eligibility by two reviewers.

Results: From a total of 20,159 articles, 138 were screened, and 32 were assessed for eligibility. Two were only abstracts, and the others did not contain any description of minimal standards available for medical planning or response in different types of MGE.

Conclusion: No studies were found that describe any form of standards for medical planning and the response of emergency medical teams in different types of mass gathering events (e.g., sports, religious, festivals). There is a need for minimum standards for emergency medical teams deploying as a surge in mass gathering events.

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How the Deadliest Nightclub Fire in History Improved Medical Interventions and Regulations and Impacted Legal Enforcement

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Introduction: This presentation is a continuation of a WADEM presentation from 2013 entitled: *Fires in Social Settings: An Examination of Prevention Strategies*.

Method: Nightclubs should be a place of fun and frivolity, but sometimes they become a place of death and destruction. The fire at the Coconut Grove in Boston Massachusetts, USA, in November, 1942 was the deadliest nightclub fire worldwide with a death toll of 492 and over 130 injured. Since that tragedy, regulations that could prevent or mitigate lethal incidents at nightclubs continue to be unenforced globally. This presentation will describe not only elements leading up to the Coconut Grove fire, but the resulting advances that have improved the lives and safety of the public.

Results: The discussion begins by examining the general environment within the U.S. in fall of 1942. Appointed and elected officials tasked with protecting the public to reduce occurrences for such disasters failed in their performance of their respective roles. Groundbreaking medical advances used to treat the victims include the use of penicillin, methods of treating cutaneous burns, the use of electrolyte balance to aid in determining the ongoing treatment of burn victims, as well as other medical advances improved directly as a result of the fire. Additionally, the first systematic study of grief and survivors' guilt and the recognition of what is now called Post Traumatic Stress Disorder commenced.

Conclusion: Finally the divergent theories of the sources of the fires, how fire codes have changed in the aftermath as well as how the parties that were directly or indirectly responsible for the fire were disciplined by the judicial system will be reviewed.

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Stadium Disasters

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Introduction: Stadiums are an important part of the entertainment and sporting cultures of communities around the world, but the combination of outdated infrastructure with poor safety planning, large numbers of people gathering within a confined

space, and the high frequency of such events have led to a number of significant disasters in the past.

This is a descriptive analysis of stadium disasters occurring between 1901–2021 which may provide useful insight for event safety personnel and disaster medicine specialists to better prevent and mitigate the effects of potential future stadium disasters.

Method: Data was collected using a retrospective database search of the Emergency Events Database (EM-DATS) for all stadium-related accidental disasters occurring between January 1, 1901–July 30, 2022. A disaster is defined by CRED in its glossary as “technological accidents of an industrial nature, or involving industrial buildings”. All categories and definitions are predetermined by the EM-DATS as per their glossary.

Results: The May 24, 1964 Estadio Nacional disaster in Lima, Peru was the worst (in terms of deaths) to date with 350 deaths. This is followed by the 1982 Luzhniki Stadium disaster in Moscow, Russia (340 deaths), the 2001 Accra Sport Stadium disaster in Ghana (123 deaths), and the 1985 Hillsborough Stadium disaster in Sheffield, England (96 deaths) as well as 14 of the 40 stadium disasters occurred in Africa, 11 in Europe, 10 in the Americas, and five in Asia.

Conclusion: A total of 40 stadium disasters were included, leading to 2,025 deaths and 6,640 injuries. This equated to an average of 50.6 deaths and 166.0 injuries per disaster. Given the potential risk of mass casualty events, stadiums should incorporate disaster medicine education, training, and expertise in their emergency medical plans.

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Emergency Care to the Sound of Music

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Introduction: There are known higher rates of drug and alcohol consumption in music festival attendees. Patterns of MDMA use had been changing over a number of years however the festival season (Sept 2018 - May 2019) in NSW saw a dramatic rise in drug related mortality and morbidity which had not been seen in other states in Australia although similar instances had been noted overseas.

With over 70 music festivals in NSW in this period, five deaths in four months and 29 severely unwell patrons transported to NSW hospitals, the impact was significant. To support both the festival site and NSW hospitals a Health Response Team (HRT) deployment model was implemented. **Method:** The planning and intervention strategies included provision of onsite specialist critical care teams to complement existing event management and paid healthcare providers. Disaster management principles, although documented, had not previously been used in the music festival setting. To deploy such a team, guidance on equipment, pharmaceutical and