

demonstrated substantially enhanced visibility when compared to the standard-of-care.

Conclusion: We present a new, luminescent guidewire that may enhance the safety and efficacy of endovascular procedures, especially where light conditions are suboptimal or for emergency situations when procedures have to be as fast and efficient as possible.

Prehosp. Disaster Med. 2023;38(Suppl. S1):s212–s213
doi:10.1017/S1049023X23005435

A «Push&Plug» Lifesaving Device to Prevent Exsanguination

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Introduction: Severe bleeding from external wounds is a major reason for death. Immediate control of hemorrhage is of highest priority. We present the novel Acute Wound Occluder (AWO) which was developed for rapid and targeted wound occlusion. Here, we present the design, in-vitro testing, and in-vivo performance compared to QuikClot[®] using a clinically-relevant pig model.

Method: AWO is made of an applicator with pushing function into which a self-expanding, Silicone coated Nitinol meshgraft is mounted to enable plugging into the wound-channel. In-vitro tests included biocompatibility, cytotoxicity, skin sensitization, and aging validation. Next, 12 pigs underwent standardized sized femoral-artery puncture to mimic life-threatening bleeding and were either treated with the AWO (n=6) or QuikClot[®] (control). Animals were followed-up for 4hrs, before device-removal macroscopic assessment.

Results: The AWO successfully passed all in-vitro tests. The AWO could be delivered within 40±15 seconds to the wound to achieve instant bleeding control, and no additional manual compression needed. Quick Clot application was less convenient, with approximately four minutes (application 56±8ss, plus three minutes of manual compression) to achieve bleeding control. In all AWO treated pigs, exsanguination could be prevented immediately, no major blood-pressure drops occurred, with four pigs where bleeding could be completely stopped, and two pigs with irrelevant oozing which stopped within 75-150 seconds leading to minimal blood-loss of 12ml and 2ml. Tissue-analysis showed only small hematomas in five out of six animals. In contrast, QuickClot treated pigs showed significant bleeding and a blood-loss of 19ml. All six pigs showed substantial hematomas, two out of six showed very large hematomas. AWO application appeared to be safe with no periprocedural adverse-events (AEs) or collateral damage to surrounding tissues.

Conclusion: The AWO enables rapid and targeted control of life-threatening bleeding without any AEs. The AWO may represent a promising hemostatic device for bullet or knife-stab wounds.

Prehosp. Disaster Med. 2023;38(Suppl. S1):s213
doi:10.1017/S1049023X23005447

Benefits of RFID Technology in the Provision of Medical Services at Mass Gathering Events

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Introduction: Radiofrequency Identification (RFID) is becoming a ubiquitous technology that provides methods of tracking and organizing complex processes, and has had previously described benefits when used in medical and clinical situations such as disaster and mass casualty incidents. However, the potential benefits of this technology have not yet been examined or applied to mass gathering events such as music festivals using the medical lens.

Method: RFID at music festivals was observed and characterized at a Canadian multi-day festival through a combination of (1) observation of real world application of the use of RFID-enabled attendee wristbands and (2) the development of a proposed implementation framework using expert input in event medical care, public health, festival safety and event organization. Potential roles for RFID technology in enhancing attendee safety, facilitating event medical care and collaborating with other on-site services, and promoting research agendas for these unique events were explored.

Results: Observed and theoretical roles for RFID fell into four main domains: (1) the presence of important encoded personal health data and contacts specific to individuals that would be accessible in case of an emergency, (2) the unique, anonymous identification of attendees who access (and re-access) medical as well as other services, including during handovers between these services, (3) support for any larger public health research projects aimed at understanding the behaviors and flow of attendees, including recreational substance use and related harm reduction efforts, and (4) the storage of festival-tailored data throughout the event on RFID-enabled wristbands (eg previous medical visit details, self-entered substance use history, etc).

Conclusion: The use of RFID at music festivals has clear benefits. It allows for the dynamic access and retrieval of important data that can aid safety and support the provision of timely and tailored medical care. Security and privacy issues need consideration where attendee data is concerned.

Prehosp. Disaster Med. 2023;38(Suppl. S1):s213
doi:10.1017/S1049023X23005459

Sudden Cardiac Arrests During the 2021 Taipei Marathon after COVID-19 Confinement in Taiwan

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Introduction: Large-scale mass-sporting events pose unique challenges for emergency health teams. Data is limited in athletes with sudden cardiac arrests (SCAs) and the emergency medical services (EMS) in major sporting events that took place after the coronavirus pandemic.

Method: This retrospective observational study describes data from the Taipei Marathon event that took place on December 19, 2021, in Taiwan. The temperature was about 15.2–19.3°C.



Four SCAs among 18,144 half-marathoners and the EMS were enrolled.

A medical command center was set up 100 meters from the finish line. Ten medical tents, one first-aid station, and nine event ambulances were distributed along the course, and one medical tent was placed near the baggage storage area. Each medical tent comprised: 1 doctor, 1–3 nurses, and 1–3 paramedics. The in-event EMS also comprised a mobile first-aid team. Thirty paramedics rode motorcycles and carried automated external defibrillators and emergency medical kits throughout the racecourse.

Results: Among the 7,811 full- and 18,144 half-marathoners, the total number of SCAs was four male half-marathoners. Three runners (75%) stated that they decreased their weekly running volume during the pandemic restrictions' period. Two runners (50%) experienced cardiac arrest in the final quarter of the race. The median interval of time between SCA occurrence and EMS arrival was 2.5 minutes (interquartile range, 0.5–4 minutes). Electric shocks were delivered to all the four runners (100%) experiencing ventricular fibrillation, and all of them were successfully resuscitated in the field. The median interval of cardiopulmonary resuscitation duration before return of spontaneous circulation was 8.5 minutes (interquartile range, 6–9.5 minutes).

Conclusion: 4/18144 is a significantly high number of SCA compared to data from the annual Taipei Half-Marathon between 2016 and 2020 and past half-marathons worldwide. The high prevalence rate of SCA (22 per 100,000) may be due to inadequate acclimation and training volumes.

Prehosp. Disaster Med. 2023;38(Suppl. S1):s213–s214

doi:10.1017/S1049023X23005460

Factors Associated with International Humanitarian Aid Appeal: Analysis of Disasters from 1995 to 2015

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Introduction: International humanitarian aid is crucial in disasters but must be needs-driven and coordinated with requests from local authorities. We identify disaster and population factors associated with international aid appeal during disasters and hence guide preparation by international humanitarian aid providers.

Method: In this retrospective database analysis, we searched the Emergency Events Database for all disasters from 1995 to 2015. Disasters with and without international aid appeals were compared by location, duration, type of disaster, deaths, number of people affected, and total estimated damage. Logistic regression was used to examine the association of each factor with international aid appeal.

Results: Of 13,961 disasters recorded from 1995 to 2015, 168 (1.2%) involved international aid appeals. Aid appeals were more likely to be triggered by disasters which killed more people (OR 1.29 [95% confidence interval (CI) 1.02–1.64] \log_{10} persons), affected more people (OR 1.85 [95%CI 1.57–2.18] / \log_{10} persons), and occurred in Africa (OR 1.67 [95%CI 1.06–2.62]). Earthquakes (OR 4.07 [95%CI 2.16–7.67]), volcanic activity (OR 6.23 [95%CI 2.50–15.53]), and insect infestations (OR 12.14 [95%CI 3.05–48.35]) were more likely to trigger international aid appeals. International aid appeals were less likely to be triggered by disasters which occurred in Asia (OR 0.46 [95%CI 0.29–0.73]) and which were transport accidents (OR 0.12 [95%CI 0.02–0.89]).

Conclusion: International aid appeal during disasters was associated with greater magnitude of damage, disasters in Africa, and specific types of disasters such as earthquakes, volcanic activity, and insect infestations. Humanitarian aid providers can focus preparation on these identified factors.

Prehosp. Disaster Med. 2023;38(Suppl. S1):s214

doi:10.1017/S1049023X23005472

The Hard-to-Reach Data (HaRD) Framework: a Case Study in Humanitarian Mine Action

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Introduction: Following humanitarian crises (e.g. armed conflict), reliable population health metrics are vital to establish health needs and priorities. However, the challenges associated with accurate health information and research in conflict zones are well documented. Often working within conflict settings are authorities and non-government organizations (NGOs) who frequently collect data under the context of operations. This operational data is a potentially untapped source of hard-to-reach data that could be utilized to provide a better insight into conflict affected populations. The Hard to Reach Data (HaRD) framework highlights the process of identifying and engaging with these stakeholders collaboratively to develop research capacity.

Method: The HaRD framework was developed from literature searches of health and social sciences databases. The framework which provides a structure to gain access to data in hard-to-reach settings was applied to humanitarian mine action to identify and collect existing but underutilized data.

Results: Guided by the HaRD framework we compiled the world's first global casualty dataset for casualties of landmines and explosive remnants of war. The framework provided a structured approach to identify and engage with key stakeholders. An adaptive approach was needed for stakeholder engagement with trust building and transparency important factors in developing a collaborative partnership. Appropriate communication of research findings is important to ensure reciprocity.

Conclusion: The HaRD framework can identify potential data sources and guide access in hard-to-reach data settings. Operational data is often available but hidden; a systematic approach to identifying and engaging with stakeholders can