

## Disaster and Emergency Preparedness and the Impact of the COVID-19 Pandemic on Child Care Programs in Michigan: A Mixed-Methods Analysis

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**Introduction:** Historically, the child care industry has been unprepared for emergencies. A previous study identified gaps in Michigan's child care programs' emergency plans. Study objectives were to reassess programs' preparedness plans after the introduction of state-mandated emergency plans and to examine the effect of the COVID-19 pandemic on programs' operations.

**Method:** A 29-question survey was sent to ~500 child care programs across Michigan in 2020 to assess emergency plans and response to COVID-19. Data were analyzed using descriptive statistics and qualitative methods.

**Results:** Overall, 346 programs (70%) responded. Most (92%) reported having a written plan, but one-third reported having no infectious outbreak plan pre-pandemic. One-third of programs lacked plans for special needs children (vs. 40% in 2014); 62% lacked plans for child reunification (vs. 60% in 2014); 46% reported staff received no preparedness training. COVID-19 impacted programs substantially: 59% closed, 20% decreased capacity, and 27% changed disinfecting protocols. Several themes related to the pandemic's effect on programs were identified: 1) changes in learning 2) changes in socialization 3) increased family burden 4) financial challenges 5) lack of guidance.

**Conclusion:** Significant preparedness gaps remain among Michigan's child care programs, suggesting the need for increased support and the addition of emergency preparedness to programs' quality ratings.

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## Overview of Medical Countermeasures (MCM) for the Treatment of Monkeypox in United States (US) Children During the 2022 Multinational Monkeypox Response

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**Introduction:** During the 2022 Multinational Monkeypox Response, cases of Monkeypox illness reported in children and adolescents in the US were rare. Early in the response, little was known about MCM safety and efficacy for treating monkeypox in children and adolescents. As cases in children and adolescents increased, knowledge about safety and efficacy evolved.

**Method:** Cases of monkeypox in children <18 years of age across the US were reported to CDC. MCM consultations from clinical and regulatory affairs subject matter experts supported clinician administration and management of antiviral and immunoglobulin treatment. Data from the first pediatric

cases were collected to help answer some of these questions on the use of MCM in pediatric populations.

**Results:** Across the US, 116 cases of monkeypox in children <18 years of age have been verified through October 2022. Of these cases, 41 occurred in patients twelve years of age or less, with 75 cases in adolescents 13-17 years of age. Ten percent of patients were hospitalized, none required ICU care and no deaths occurred. Children were most commonly hospitalized due to young age, rash near or including the eye, secondary bacterial infections, or pain management. At least eleven patients with confirmed orthopoxvirus were treated with tecovirimat and two with Vaccinia Immune Globulin. Those who received MCM recovered and tolerated treatments well with one patient stopping treatment secondary to development of a drug rash.

**Conclusion:** Data on the safety and efficacy of MCM for monkeypox are limited in pediatric populations. As of November 3, 2022, most cases of monkeypox in the pediatric population in the 2022 monkeypox outbreak were mild and self-limited. Patients who received MCM recovered and tolerated treatments without serious adverse events. These findings can inform clinicians and public health providers about the clinical features of monkeypox in children and provide information about MCM treatment options.

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## Development and Validation of a Novel "Luminescent Guidewire" for more Efficient and Safer Guidance During Endovascular Rescue Procedures

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**Introduction:** Endovascular procedures in emergencies like the implantation of tubes for a life support system are increasing. Guidewires are the essential basis for the regularly used Seldinger Technique. We present a novel concept that may further optimize the safety and efficacy of guidewire handling and navigation during endovascular procedures.

**Method:** Using specifically designed luminescent particles, a novel, clinical-grade coating protocol was created to develop a new luminescent guidewire. Different prototypes were designed and tested for their luminescent capacity following a short exposure to any light-source. Chemical-analysis, hemocompatibility, hemolysis and cytotoxicity testing of the new guidewire was performed. The usability of the new prototype was compared to regular guidewires by application into needles, catheters and tubes which are used during percutaneous procedures.

**Results:** The engineered guidewires demonstrated a luminescent capacity of at least 20 minutes after less than ten seconds of exposure to a light source. Chemical analysis, cytotoxicity, hemolysis, and hemocompatibility indicated a biocompatibility profile of the guidewire. Good usability, safe and rapid handling was demonstrated when simulating endovascular procedures. Under dimmed-light conditions, the luminescent guidewire

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.

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### 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<sup>®</sup> 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<sup>®</sup> (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.

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### 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.

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### 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.