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Introduction: Low and middle-income countries (LMICs) bear a disproportionately high burden of sepsis, contributing to an estimated 90% of global sepsis-related deaths. Critical care capabilities needed for septic patients, such as continuous vital sign monitoring, are often unavailable in LMICs.
Aim: This study aimed to assess the feasibility and accuracy of using a small wireless, wearable biosensor device linked to a smartphone, and a cloud analytics platform for continuous vital sign monitoring in emergency department (ED) patients with suspected sepsis in Rwanda.
Methods: This was a prospective observational study of adult and pediatric patients (≥ 2 months) with suspected sepsis presenting to Kigali University Teaching Hospital ED. Biosensor devices were applied to patients' chest walls and continuously recorded vital signs (including heart rate and respiratory rate) for the duration of their ED course. These vital signs were compared to intermittent, manually-collected vital signs performed by a research nurse every 6-8 hours. Pearson's correlation coefficients were calculated over the study population to determine the correlation between the vital signs obtained from the biosensor device and those collected manually.
Results: 42 patients (20 adults, 22 children) were enrolled. Mean duration of monitoring with the biosensor device was 34.4 hours. Biosensor and manual vital signs were strongly correlated for heart rate (r=0.87, p<0.001) and respiratory rate (r=0.74 p<0.001). Feasibility issues occurred in 9/42 (21%) patients, although were minor and included biosensor falling off (4.8%), technical/connectivity problems (7.1%), removal by a physician (2.4%), removal for a procedure (2.4%), and patient/parent desire to remove the device (4.8%).
Discussion: Wearable biosensor devices can be feasibly implemented and provide accurate continuous vital sign measurements in critically ill pediatric and adult patients with suspected sepsis in a resource-limited setting. Further prospective studies evaluating the impact of biosensor devices on improving clinical outcomes for septic patients are needed.

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Hospital Information Technology Considerations for No Notice Disasters

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Introduction: Modern hospital systems are highly dependent on computerized information technology (IT) systems. The integration of laboratory and radiology ordering and resulting cannot be easily replicated with a "paper" processes. This poses challenges for no-notice events, where the rapid registration of patients is a must for effective clinical care. This weakness in hospital response has been demonstrated in events such as the Boston Marathon bombing, the Aurora Theater (to be discussed), and Las Vegas shootings.
Aim: To discuss lessons learned in configuring IT systems for disasters.
Results: A integrated system of IT system preparation was implemented at the University of Colorado Hospital. This system has been demonstrated to be effective in multiple real-world events.
Discussion: Four areas of IT preparedness are needed for hospital IT response to disasters. First is rapid disaster registration with prepared disaster medical record numbers and packets. The medical records must be active in the hospital IT environment, and a visit or case number must be preassigned or rapidly generated. The medical record number alone in the IT environment will allow the initiation of test ordering. The packet should include preprinted labels, a demographic data sheet, and downtime charting and ordering forms. The second item for response is templated order sets to allow rapid ordering of multiple studies such as laboratory, and especially radiology, without having to reenter clinical information. The third is a method of patient care charting scalable, from paper to electronic, depending on the patient volume, acuity, and workstation access. The fourth is a method for patient care in the IT downtime in a disaster setting. Simple inexpensive measures will allow rapid placement of patients in the IT environment and therefore allow rapid and accurate test ordering and resulting.

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Prehospital Advanced Resuscitation with Video Direct Medical Control Using Mobile Smart Device

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Introduction: The prognosis for out-of-hospital cardiac arrest (OHCA) remains controversial if a smart device or video is used. In this study, a system was used that provides advanced cardiac life support (ACLS) with direct medical control through remote video calls for OHCA patients. The study investigated how this system will improve survival.
Aim: The effect of video remote direct medical control using a mobile smart device for cardiac arrest was the main objective of this research.
Methods: Medical origin OHCA patients over 18 years old for one year were included in the video remote direct medical attempt. Trauma, intoxication, environmental origin, and family disagreement were excluded. The advanced field resuscitation was performed by paramedics with video communication-based medical direction, who were dispatched simultaneously by two ambulances. Video communication was performed by a mobile

application or video call. The results and opinions were recorded in a mobile application and a specific website. We analyzed the general characteristics and outcomes of the prehospital ACLS using video communication.
Results: A total of 11,054 consecutive out-of-hospital cardiopulmonary resuscitation cases were recorded, and 3,352 underwent prehospital ALS using video call. Prehospital ROSC was 23.3%, survival upon hospital arrival was 13.6%, survival admission was 19.5%, survival discharge was 10.6%, and survival with good neurologic outcome was 6.0%. The reasons for no prehospital ALS included no request from a provider (29.1%), cardiac arrest during transport (20.9%), communication failure (11.6%), and family refusal (11.1%).
Discussion: As a result of providing prehospital ACLS with direct medical direction through remote video calls to cardiac arrest patients, the prehospital ROSC rate, survival admission, and discharge rate improved. Advantages of this type of medical control by video communication were ease of control of the patient`s family, more precise communication with paramedics, and continuous confirmation of the real patient's status and monitoring parameters.

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Red Cross and Red Crescent Health Information System (RCHIS): Functional Design and Usability Testing Protocol

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Introduction: The Red Cross and Red Crescent Health Information System (RCHIS) combines the functionality of an Electronic Medical Record (EMR), Health Information System (HIS), as well as Human Resource and stock management system. Its purpose is to facilitate patient quality of care, early warning for outbreak detection, accountability/reporting, and resource management. Short-term, emergency medical teams and support staff responding to acute clinical needs in a humanitarian context are the intended end users.
Aim: To explain the functional design principles and usability testing protocol implemented in initial RCHIS design and development phases to ensure technological fit within the humanitarian medical context.
Methods: RCHIS development followed the patient-user journey, with each patient/staff interaction encapsulated by a microservice. The integration of multiple microservices enabled RCHIS to mimic various patient journeys. The functional scope of each microservice was designed by medical end-users and was further used for access management. The value and variable design, including validation rules, were led by health informaticians and existing medical standards. Intuitiveness and ease of use guided User Interface design, with targeted medical end-user feedback collected on a twice-monthly basis in addition to early design workshops, field immersion, and post-development pilot testing.
Results: Support and implementation of RCHIS were not inherently guaranteed. As such, the process of co-designing with end users had the primary benefit of ensuring effective scope and technological fit given the humanitarian context, but also the secondary benefit of improving internal acceptability and advocacy.
Discussion: The added value of digital health records as a quality assurance mechanism is well documented. However, the increased workload and reduced employment satisfaction affiliated with the rise of EMRs illustrated a need to re-evaluate current design and use within clinical settings. The design and development approach taken for RCHIS is one attempt to improve human-computer interaction in the clinical setting.

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Stroke Prehospital Informed Decision-Making Using EEG Recordings (SPIDER)

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Introduction: The acute care of stroke involves the administration of a clot-dissolving drug (thrombolysis) and/or its removal using endovascular clot retrieval. Earlier intervention results in significantly improved patient outcomes. Clinical assessment scores have limitations, and studies have shown that even the most robust scores have a reported false-negative rate of >20% for large vessel occlusive strokes that may be eligible for clot retrieval, while inappropriate bypass may delay delivery of thrombolysis.[1] Quantitative Electroencephalography (QEEG) has been shown to have a very high sensitivity and specificity in the identification of acute stroke versus matched controls in an in-hospital setting.[2,3]
Aim: The SPIDER study commenced in Brisbane, Queensland on September 3, 2018, and is investigating the use of an EEG recorder to gather data on acute stroke patients presenting to a metropolitan ambulance service.
Discussion: The data collected will guide the development of a simple numerical output reference to guide decision making. The data may aid in identifying large vessel occlusive stroke and patients eligible for endovascular intervention. The QEEG will provide a more accurate and cost-effective tool for the prehospital clinician over other imaging technologies and can guide early destination decisions. This presentation discusses the implementation of a pre-hospital research platform, integration with the clinical dispatch matrix, staff engagement, patient recruitment, and the success of the project so far.

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