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ORIGINAL RESEARCH

Development of a trauma and emergency database in Kigali, Rwanda

Développement d'une base de données sur les traumatismes et les urgences à Kigali, Rwanda

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ABSTRACT

Introduction: Injuries account for 10% of the global burden of disease, resulting in approximately 5.8 million deaths annually. Trauma registries are an important tool in the development of a trauma system; however, limited resources in low- and middle-income countries (LMIC) make the development of high-quality trauma registries challenging. We describe the development of a LMIC trauma registry based on a robust retrospective chart review, which included data derived from prehospital, emergency centre and inpatient records.
Methods: This paper outlines our methods for identifying and locating patients and their medical records using pragmatic and locally appropriate record linkage techniques. A prehospital database was queried to identify patients transported to University Teaching Hospital – Kigali, Rwanda from December 2012 through February 2015. Demographic information was recorded and used to create a five-factor identification index, which was then used to search OpenClinic GA, an online open source hospital information system. The medical record number and archive number obtained from OpenClinic GA were then used to locate the physical medical record for data extraction.
Results: A total of 1668 trauma patients were transported during the study period. 66.7% were successfully linked to their medical record numbers and archive codes. 94% of these patients were successfully linked to their medical record numbers and archive codes were linked by four or five of the five pre-set identifiers. 945 charts were successfully located and extracted for inclusion in the trauma registry. Record linkage and chart extraction took approximately 1256 h.
Conclusion: The process of record linkage and chart extraction was a resource-intensive process; however, our unique methodology resulted in a high linkage rate. This study suggests that it is feasible to create a retrospective trauma registry in LMICs using pragmatic and locally appropriate record linkage techniques.

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ABSTRACT

Introduction: Les blessures sont responsables de 10% de la charge mondiale de morbidité, résultant sur environ 5,8 millions de décès par an. Les registres des traumatismes constituent un outil important pour le développement d'un système sur les traumatismes; cependant, les ressources limitées qui caractérisent les pays à revenu faible et intermédiaire font que le développement de registres des traumatismes de qualité est difficile. Nous décrivons le développement d'un registre des traumatismes dans les pays à

revenu faible et intermédiaire à partir d'un examen rétrospectif approfondi des dossiers incluant des données tirées des registres pré-hospitaliers, des services d'urgence et des patients hospitalisés.

Méthodes: Cet article décrit les méthodes dont nous disposons pour identifier et localiser les patients et leurs dossiers médicaux en utilisant des techniques de couplage de dossiers pragmatiques et localement appropriées. Une base de données pré-hospitalières a été interrogée afin d'identifier les patients transportés à l'Hôpital universitaire de Kigali, au Rwanda, de décembre 2012 à février 2015. Les informations démographiques ont été enregistrées et utilisées afin de créer un indice d'identification à cinq facteurs, utilisé ensuite pour mener une recherche dans OpenClinic GA, un système d'information hospitalière en open source accessible en ligne. Les numéros de dossiers médicaux et les codes d'archives obtenu par OpenClinic GA ont été ensuite utilisés pour localiser le dossier médical physique afin d'en extraire les données.

Résultats: Au total, 1668 patients ayant souffert de traumatisme ont été transportés au cours de la période à l'étude. 66,7% ont pu être couplés à leur numéro de dossier médical et code d'archive. 94% de ces patients ont pu être couplés à 4 ou 5 des cinq identifiants préétablis. 945 fichiers ont pu être localisés et extraits pour être intégrés au registre des traumatismes. Le couplage des dossiers et l'extraction des fiches ont nécessité environ 1 256 heures.

Conclusion: Le processus de couplage de dossiers et d'extraction des fiches a nécessité des ressources considérables; cependant, notre méthodologie unique a résulté sur un taux de couplage élevé. Cette étude suggère qu'il est possible de créer un registre des traumatismes rétrospectif dans les pays à revenu faible et intermédiaire en utilisant des techniques de couplage de dossiers localement appropriées.

African relevance

- Trauma registries are an important tool in the development of a trauma system.
- Few trauma registry publications come from the low- and middle income regions, particularly Africa.
- Record linkage is one tool that can be used to help merge information from multiple sources.

Introduction

Injuries account for 10% of the global burden of disease, resulting in approximately 5.8 million deaths annually [1,2]. While global morbidity and mortality from trauma has declined significantly since 1990, most of these improvements have been seen in high income countries [3].

Since 2004, the World Health Organization has advocated for improved trauma care particularly in low- and middle-income countries (LMIC) where trauma results in disproportionately high morbidity and mortality rates [4,5]. In fact, researchers have found that patients with life-threatening but potentially treatable injuries are up to six times more likely to die in countries that lack an organised trauma system [6]. A 2012 review of recent trauma registry publications found few publications emanating from the developing world, particularly in sub-Saharan Africa. The authors also stressed the limited availability of information on the methodology used to develop the trauma registries [7].

Trauma registries are an important tool in the development of a trauma system. Registry data can be used to track health outcomes, assess the impact of system improvements, and compare providers or health facilities across geographic regions [8]. However, limited resources in LMICs make the development of high-quality trauma registries challenging. Barriers to implementation include: poor availability of high-quality or complete medical charts, lack of computerised medical records systems, and personnel limitations [5]. Furthermore, multiple documentation systems (i.e. prehospital run sheets, registry books, billing databases, and paper-based medical charts) which utilise non-integrated identification variables and contain disparate information compound the existing barriers. As a result, data linkage across systems and care settings is limited in the majority of LMICs.

Record linkage is one tool that can be used to help mitigate any discrepancies when merging information from multiple sources, including prehospital and hospital databases [9–11]. Record linkage techniques aim to identify pairs of records that describe the same patient, when unique identification numbers are lacking across systems. To do so, commonly available identification information, including name, date of birth, and sex, are used to categorise records as links, possible links, or non-links so that they can be appropriately merged to create more comprehensive data repositories.

Here we describe the development of a LMIC trauma registry based on a robust retrospective chart review, which included data derived from prehospital, emergency centre (EC) and inpatient records. This paper outlines our methods for identifying and locating patients and their medical records using pragmatic and locally appropriate record linkage techniques.

Methods

This retrospective chart review was conducted at University Teaching Hospital of Kigali (UTH-K) in Kigali, Rwanda. UTH-K is a 576-bed urban, tertiary-care teaching hospital. It is the primary trauma centre for a population of 1.1 million people in Kigali and serves as the primary academic referral centre for the entire country, a population of 10.5 million [12]. UTH-K has a 24-h EC that sees all adult patients with acute complaints, as well as paediatric and obstetric trauma patients. Available resources at UTH-K include 24-h surgical coverage, access to radiology services including X-ray, ultrasound and CT, and on-call orthopaedic neurosurgical services.

Patients were eligible for inclusion if they were transported by Service d'Aide Médicale Urgente (SAMU), the Rwandan prehospital service, to UTH-K for trauma during the 26-month period from December 2012 through February 2015. SAMU uses trained nurses and anaesthetists to provide prehospital care through a network of ambulances [13]. Patients who died en route to UTH-K and were subsequently registered were included. Exclusion criteria included patients transported for non-traumatic illness, including medical or obstetric complaints, as well as patients transported by SAMU to hospitals other than UTH-K.

SAMU has maintained an electronic database of each patient encounter since 2012. The original SAMU run-sheet is saved and contains additional data not stored in the electronic database. On arrival to the EC, patient names are recorded in a logbook. Shortly after arrival, patients are registered in OpenClinic GA, an online