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ORIGINAL ARTICLE

Saudi Out of Hospital Cardiac Arrest Registry: study protocol

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ABSTRACT

Background: Cardiac arrest is a major global health concern. It accounts for almost 30% of the global mortality rate, with a poor survival rate for In-Hospital Cardiac Arrest, with worse survival rate for Out-Hospital Cardiac Arrest (OHCA). We aimed to establish an OHCA in Saudi Arabia, to provide a benchmark to determine the best practice protocols for out of hospital cardiac arrest in the country.

Methods and Analysis: Saudi Out of Hospital Cardiac Arrest Registry (SOHAR) collects data in two phases, namely prehospital and receiving hospital, and the data will be linked internally. SOHAR was established a year ago, and the registry already contains more than 1,100 cases and is growing rapidly. The patient data will be entered by the regional coordinators in an on-line data management system, designed exclusively for this project.

Ethics and Dissemination: The study was approved and funded by King Abdullah International Medical Research Center (IRBC/0748/20). On completion of the study analysis, we are planning to discuss the findings with the study team and collaborators, and finalize the dissemination strategy of the main findings.

Conclusion and Contribution to the field: The first OHCA in Saudi Arabia; Registering the survival rate of OHCA patients; Providing feedback to key stockholder organizations to develop a future plan to adopt an evidence-based policy for OHCA in Saudi Arabia.

Keywords: Cardiac arrest, out of hospital, registry.

Introduction

Cardiac arrest is a major global health concern. It accounts for almost 30% of the global mortality rate [1], with a poor survival rate of In-Hospital Cardiac Arrest [2]. The survival rate for Out of Hospital Cardiac Arrest (OHCA) is worse [3]. Global Emergency Medical Services (EMS) and public agencies are attending OHCA on a regular basis. Monitoring resuscitation outcomes and performance is an important step to improve the survival rate for OHCA.

It is a necessity to assess the current protocols and outcome of OCHA in Saudi Arabia, to obtain evidence-based information about OHCA in the country. The analysis will allow us to compare our data to other established OHCA registries [e.g., Pan-Asian Resuscitation Outcomes Study (PAROS) and the Cardiac Arrest Registry to Enhance Survival] [4,5]. Similar to other registries, the Saudi Out of Hospital Cardiac Arrest Registry (SOHAR) has many key questions related to OHCA, with the aim to report the OHCA outcomes [5]. The registry is designed to recognize OHCA as a medical condition, and the data from the registry will evaluate the current system, protocols, and practices used in OHCA, with the primary outcome increasing the survival rate of OHCA. The large sample size of SOHAR

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will provide valuable information to identify and analyze the preventable risk factors and systemic predictors of survival of OHCA. This paper presents the SOHAR protocol, the implementation process, the concepts, aims, obstacles, limitations, and the potential benefits to the Saudi healthcare system and OHCA.

Aims and objectives

The aim of the registry is the development of a national on-line system to report OHCA.

Primary objectives

- To build a national unified on-line system to report OHCA
- To assess the neurological outcomes in Saudi OHCA
- To quantify the Saudi OHCA survival:
  - Rate of Return of Spontaneous Circulation
  - Rate of survival to hospital admission
  - Rate of survival to hospital discharge

Secondary objectives

- To identify the preventable risk factors and systemic predictors of survival in OHCA
- To understand the epidemiology of OHCA

Methods and Analysis

Design and setting

The registry is a prospective data collection system. Data will be collected on a monthly basis from defined regions. Saudi Arabia is subdivided in 13 regions (provinces), including 40 cities, of which 20 are considered major cities. Each city will have a designated registry coordinator who is responsible for data collection and data entry. Data will be entered in an online database, designed to fulfill the registry requirements. The registry will include all OHCA starting from 01/01/2019.

Data collection

The patient's data will be collected from two main sources:

- The Saudi EMS provider, Saudi Red Crescent Authority (SRCA)
- The Saudi receiving hospitals

The reported cases of OHCA from SRCA will be followed-up by the research support team, each patient will have a unique identification number, using an online system (REDCap). We will follow-up all the patients to record their hospital outcomes. The registry will have a unified form of reporting OHCA, using the "Utstein style", an internationally recognized method of reporting OHCA. It was developed in 1990 by an international multidisciplinary team, at a meeting held at the Utstein Abbey near Stavanger, Norway. The method is endorsed and periodically updated. The latest update was in 2015. The following core variables are included:

- System core
- Dispatch core
- Patient core
- Process core

We will also collect some supplemental information in our case report form.

An online registry with limited access will be available to the city coordinators. Access to the registry will be granted by the project director. Coordinators will only be able to enter data. Each case entry will receive a unique serial number based on the city. Incomplete data will not be issued a number, which will require a review and re-submission from the coordinator. The data will be collected using a standard method.

Participant selection

Inclusion criteria

- All OHCA transported to a hospital by the Saudi Red Crescent ambulances.

Exclusion criteria

- Patients announced dead on the scene.
- Patients known to be Do Not Resuscitate without the attempt of resuscitation made at the time of arrival to the hospital.

Outcomes

The proposed registry will measure variables adopted from the Utstein recommendations [2]. First, the variables will include demographic information such as the name, date of birth, gender, and nationality. Second, detailed information will be collected regarding the prehospital phase. Starting from the method of transport, whether it was by EMS or a private method of transportation, the time EMS received the call, ambulance dispatched, ambulance arrival, ambulance left the scene, and the time of Emergency Room (ER) arrival. The prehospital data will include the patient's past medical history, location of incident, estimated time of arrest, first arrest rhythm, the time cardiopulmonary resuscitation was started, the time automated external defibrillator was applied, airway intervention, medication administration, and the details of the resuscitation process. The third phase will contain detailed information of the patient status in the ER. The last phase will be the patient's survival outcome.

Data management and statistical analysis

The patient data will be entered by the regional coordinators in an on-line data management system, designed exclusively for this project. After the data entry, the research support team will review the data to validate the inputs. The patient data will be encrypted before a serial number can be issued and the data can be saved to the registry.

Planned data analysis

The SOHAR registry and SOHAR database will allow the generation of periodic descriptive statistical reports for all the appropriate variables related to OHCA. These reports will include variables related to the transport methods,

service timing, and patients' demographical and clinical data. These reports will allow researchers to generation hypotheses, plan interventions, and estimate the magnitude and burden of OHCA. Additional inferential statistical analyses are to be planned and performed.

Data linkage and storage

On receiving the data from the SRCA, the registry will follow-up the outcome of the patients using their Saudi ID for data linkage between the prehospital and hospital settings. The patient data will be encrypted and anonymously stored in a secured online platform (REDcap).

Patient and public involvement

Patient and public involvement groups are yet to be establish in Saudi Arabia. However, we have been in contact with patients who survived an out-of-hospital cardiac arrest. They have been involved form the beginning of the registry design, they all emphasize the importance of the registry and agree on the process of the registry.

Dissemination and future plan

On completion of the study analysis, we are planning to discuss the findings with the study team and collaborators, and finalize the dissemination strategy of the main findings. We aim to publish our result in a high impact factors journal. In addition, we will our present our findings at relevant national and international conferences. Based on the finding and in cooperation with key stockholder organizations (Saudi Red Crescent and Ministry of Health), we will develop a future plan to adopt an evidence-based policy for OHCA in Saudi Arabia.

Discussion

The large geographic area of Saudi Arabia and the different stakeholders of the Saudi healthcare system resulted in a variation in reporting OHCA outcomes. The aim of this project is to innovate the SOHAR. The registry will unify the reporting method of OHCA in Saudi Arabia, promote research related to OHCA, and assist in designing future guidelines and protocols. There are similar current registries, such as the PAROS and the Resuscitation Outcomes Consortium of North America [6]. However, since this project is the first in our region, the registry will provide the basis of the national OHCA prevalence, management, and outcomes. The registry will provide valuable information that may assist in developing future national resuscitation guidelines to optimize OHCA outcomes.

To date (April 2021), less than a year from establishing the registry, more than 1,100 patients have been entered in the preliminary database. The pre-implementation phase is not yet complete and was only tested in Riyadh. We are now beginning to enroll patients from most of the major cities, to achieve our maximum recruitment capacity before September 2021. With the increased enrollment, we plan the first statical analysis in 2022.

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List of Abbreviations

EMS	Emergency medical services
ER	Emergency room
OHCA	Out-hospital cardiac arrest
PAROS	Pan-Asian Resuscitation Outcomes Study
SOHAR	Saudi Out of Hospital Cardiac Arrest Registry
SRCA	Saudi Red Crescent Authority

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Ethical approval

The study was approved by the Institutional Review Board of King Abdullah International Medical Research Center (IRBC/0748/20), dated 20 April, 2020.

Author contribution

Abdulrhman Alghamdi, Omar Aldibasi, Nawfal Aljerian and Abdullah Alabdali drafted the manuscript. Nawfal Aljerian, Alanowd Alghaith, Noura Al Quraishi, Mohammed Alwarhi, and Abdullah Alabdali designed this study. All authors contributed, read and approved the final manuscript and agree to be accountable for all aspects of the work.

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