Proposal for establishment of a National Sudden Cardiac Arrest registry

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ABSTRACT

There is a need to establish a National Sudden Cardiac Arrest registry that would track the performance and outcomes of out-of-hospital (OHCA) and in-hospital cardiac arrests (IHCA) in the country. An effective strategy to improve survival from sudden cardiac arrest in Singapore requires a multi-pronged effort targeting the community, Emergency Medical Services (EMS) and the hospitals. The establishment of such a registry is important, as it would enable the tracking of trends and effectiveness of subsequent interventions related to our national strategy for management of both OHCA and IHCA. The quality improvement process of measurement–benchmarking–feedback/change is well established. A key part of this process is data collection. A cardiac arrest registry can be a key tool for quality improvement and serves as an important foundation on which to implement and track planned improvements to cardiac arrest management both in and out of hospital. It would also aid in planning for deployment of resources, interventions and ongoing efforts to improve Singapore's EMS.

Keywords: cardiac arrest, cardiopulmonary resuscitation, community, hospital, quality

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INTRODUCTION

Of the approximately 16,000 deaths that occur in Singapore every year, about 23% are from a cardiac cause,[1] of which about 30%–40% will occur suddenly and outside a hospital. The mechanism of death is usually fatal arrhythmia, most often ventricular tachycardia (VT) or ventricular fibrillation (VF).[2]

The Cardiac Arrest and Resuscitation Epidemiology (CARE) study reported a 2.0% survival from out-of-hospital cardiac arrest (OHCA) in Singapore.[3] Advanced Emergency Medical Service (EMS) systems have reported survival rates of up to 20%. The mean age ± standard deviation (SD) for OHCA was 62.2 ± 17.9 years, with a male predominance (65.6%). 59.8% of collapses occurred at home, 35.3% of arrests were not witnessed and 20.6% had bystander cardiopulmonary resuscitation (CPR) performed. The mean ± SD for time from collapse to call received by the EMS was 10.6 ± 13.1 minutes, and that for EMS response time was 10.2 ± 4.3 minutes, from call to defibrillation was 16.7 ± 7.2 minute and for on-scene time was 9.9 ± 4.5 minutes. The first presenting rhythm at the scene was asystole in 54.5% of cases, pulseless electrical activity (PEA) in 22.9%, VF in 19.6% and VT in 0.4%. Of all the cardiac arrests, resuscitation was attempted in 351 patients whose arrest was of a cardiac origin; 17.9% had return of spontaneous circulation, 8.5% survived to hospital admission and 2.0% survived to discharge. Currently, there is limited data on in-hospital cardiac arrest (IHCA) in Singapore. The only published study, conducted in 1998 involving 137 patients in a single centre, found a survival rate of 10% with the use of a dedicated 'code' team.[4]

Early initiation of treatment has an important effect on outcomes and survival.[5] This is illustrated by the 'chain of survival' concept[6] for cardiac arrest patients, which states that early initiation of the four 'links' in the chain of survival will improve survival in OHCA. The links are: early access (activating the EMS system by calling medical dispatch or '995'); early CPR; early defibrillation (delivering electrical therapy to restore a pulse); and early advanced care (airway management and drugs, etc). Research has shown that for every minute that a cardiac arrest is left unattended, the chances of survival decrease by 10%.[7]

We believe that the most effective strategy to improve survival from sudden cardiac arrest (SCA) in Singapore would require a multi-pronged effort targeting the community, the EMS and the hospitals. The establishment of a National Sudden Cardiac Arrest registry is important, as it would enable the tracking of trends and effectiveness of subsequent interventions related to our national strategy, which is vital for both OHCA and IHCA.

CARDIAC ARREST AS A REPORTABLE DISEASE

In 2008, the American Heart Association Emergency Cardiovascular Care Committee, Council on Cardiopulmonary, Perioperative and Critical Care, Council on Cardiovascular Nursing, Council on Clinical Cardiology, and the Quality of Care and Outcomes Research Interdisciplinary Working Group issued a statement

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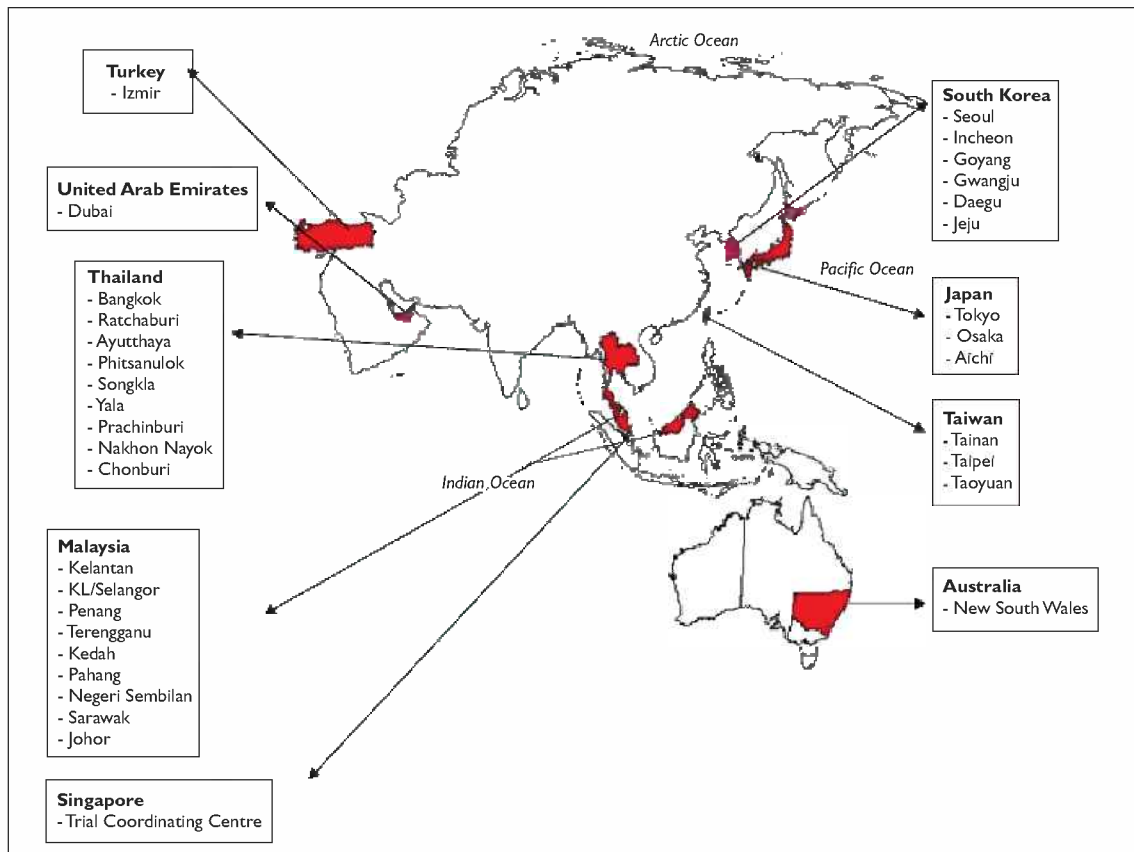Email: marcus.ong.e.h@sgh.com.sg

Fig. 1 Map of Pan Asian Resuscitation Outcomes Study (PAROS) member sites.

describing the essential features of designating OHCA as a reportable event. It was argued that SCA was an important public health issue that deserved to be made a reportable disease, as survival from OHCA is closely reflective of the quality of pre-hospital emergency care. Similarly, survival from IHCA might be regarded as a key quality indicator of hospital processes.

The Cardiac Arrest Registry to Enhance Survival (CARES), funded by the United States Centers for Disease Control and Prevention (CDC),[8] is an example of a nationwide cardiac arrest registry established in the USA. Another international example is the Pan Asian Resuscitation Outcomes Study (PAROS). So far, a total of nine countries across the Asia-Pacific region are involved in this study (Fig. 1). Together, the study sites represent a population base of 89 million people. More information about the PAROS network, constitution, methodology and data variables is available at: www.scri.edu.sg/index.php/paros-clinical-research-network.

An example of an IHCA registry is the National Registry of Cardiopulmonary Resuscitation in the USA.[9,10] This has been a vital quality improvement tool for improving IHCA treatment and survival. The state of Arizona in the USA has also shown that a state-sponsored cardiac arrest registry, together with an intensive campaign to increase bystander

CPR, was able to increase survival from cardiac arrest over a four-year period.[11]

WHY A CARDIAC ARREST REGISTRY?

It is an axiom that "*You cannot improve what you cannot measure!*" This is a powerful argument for why we need a national registry. The quality improvement process of measurement–benchmarking–feedback/change is well established. A key part of this process is data collection. A cardiac arrest registry can be a key tool for quality improvement as well as serve as a useful outcome indicator of the quality of pre-hospital care. Improving survival from OHCA would need a multi-pronged approach, with interventions at several levels. This includes increasing public awareness, improving access to '995' and dispatcher-aided CPR, increasing bystander CPR rates, reducing ambulance response times, as well as improving ambulance interventions, quality of CPR and post-resuscitation care. All these elements should be routinely measured. There is currently much room for improvement in these areas in the local setting.

A national cardiac arrest registry would be a useful outcome indicator of the quality of in-hospital care, as it would be able to track hospital processes for cardiac arrest team activation, cardiac arrest response times,

defibrillation by first responders, coordination of team resuscitation, adherence to protocols, post-resuscitation care and arrest outcomes. There should be a stated objective to establish a National Sudden Cardiac Arrest registry that will track both OHCA and IHCA.

HOW TO GO ABOUT ESTABLISHING THE REGISTRY

Singapore's EMS is run by the Singapore Civil Defence Force (SCDF), which operates the national '995' (universal access number) emergency telephone service. '995' is a universal, centralised, enhanced dispatching system that utilises a computer-aided dispatch system, medical dispatch protocols, and Global Positioning Satellite automatic vehicle locating and road traffic monitoring systems.

The SCDF currently operates 46 ambulances that are based in 15 fire stations and 16 satellite fire posts. It is primarily a single-tier system that is able to provide basic life support and defibrillation with automated external defibrillators (AEDs). Private ambulances currently do not routinely attend to emergencies like cardiac arrest. Emergency ambulance patients are delivered to six major public hospitals in the country, which are equipped with modern Emergency Departments (ED).

Data regarding cardiac arrest outcomes will be collected from all major public hospitals. This should be done in conjunction with hospital-appointed 'champions', including physicians and nursing personnel who are interested in the field of sudden cardiac arrest. Data will be collected from '995' dispatch records, ambulance patient case notes, the ED and in-hospital records. All completed data will then be collated and sent to the National Sudden Cardiac Arrest registry for data management using Electronic Data Capture (EDC). Long-term support and funding will be needed for such an endeavour. We should also consider making cardiac arrest a nationally reportable disease.

EXPECTED BENEFITS

A National Cardiac Arrest registry will serve as an important basic foundation on which to implement and track planned improvements to cardiac arrest management in Singapore. It will aid in planning for deployment of resources, interventions and ongoing efforts to improve Singapore's EMS such as Medical Priority Dispatch systems, Systems Status Management, improved EMS cardiac arrest protocol and treatments, and hypothermia post-resuscitation. A national registry can also help to improve in-hospital management of cardiac arrest from a quality improvement process.

CONCLUSION

A National Sudden Cardiac Arrest registry would be an important step forward in improving survival from both OHCA and IHCA in Singapore.

REFERENCES

1. Ministry of Health. Health facts Singapore [online]. Available at: www.moh.gov.sg/mohcorp/statistics.aspx?id=5526. Accessed May 24, 2011.
2. Bayés de Luna A, Coumel P, Leclercq JF. Ambulatory sudden cardiac death: Mechanisms of production of fatal arrhythmia on the basis of data from 157 cases. Am Heart J 1989; 117:151-9.
3. Ong EHM, Chan YH, Anantharaman V, et al. Cardiac Arrest and Resuscitation Epidemiology in Singapore (CARE I study). Prehosp Emerg Care 2003; 7:427-33.
4. Lee KH. Survival after cardiopulmonary resuscitation on the general wards- the results of a dedicated 'code' team. Ann Acad Med Singapore 1998; 27:323-5.
5. Cummins RO, Eisenberg MS, Hallstrom AP, Litwin PE. Survival of out-of-hospital cardiac arrest with early initiation of cardiopulmonary resuscitation. Am J Emerg Med 1985; 3:114-9.
6. Cummins RO, Ornato JP, Thies WH, Pepe PE. Improving survival from sudden cardiac arrest: the "chain of survival" concept. Circulation 1991; 83:1832-47.
7. Cummins RO. The "chain of survival" concept: how it can save lives. Heart Dis Stroke 1992; 1:43-5.
8. McNally B, Stokes A, Crouch A, Kellermann AL. CARES: Cardiac Arrest Registry to Enhance Survival. Ann Emerg Med 2009; 54:674-683.e2.
9. Peberdy MA, Kaye W, Ornato JP, et al. Cardiopulmonary resuscitation of adults in the hospital: a report of 14720 cardiac arrests from the National Registry of Cardiopulmonary Resuscitation. Resuscitation 2003; 58:297-308.
10. Peberdy MA, Ornato JP, Larkin GL, et al. Survival from in-hospital cardiac arrest during nights and weekends. JAMA 2008; 299:785-92.
11. Bobrow BJ, Spaite DW, Berg RA, et al. Chest compression-only CPR by lay rescuers and survival from out-of-hospital cardiac arrest. JAMA 2010; 304:1447-54.