Emergency medical services in Singapore

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Introduction

Singapour est une ville/état cosmopolite située sur une île au carrefour de l'Asie du Sud. Il s'agit de l'un des plus petits pays du monde, ayant une superficie de 644 kilomètres carrés et une population de 3,5 millions d'habitants. Les dépenses pour les soins de santé représentent environ 3 % du produit national brut.[1] Six hôpitaux publics ont des services d'urgence et de traumatologie. L'un de ces hôpitaux se spécialise dans les soins aux femmes et aux enfants. Il y a plusieurs hôpitaux privés dotés de départements d'urgence, mais ceux-ci n'acceptent généralement pas les patients en ambulance.

Introduction

Singapore is a cosmopolitan city–state situated on an island at the crossroads of Southeast Asia. It is one of the smallest countries in the world, with a land area of 644 square kilometres and a population of 3.5 million. National health care expenditure is about 3.0% of the gross domestic product.[1] Six public hospitals provide 24-hour accident and emergency services, one of which is a specialized women and children's hospital. There are several private hospitals with emergency departments, but they don't usually accept ambulance patients.

History and development of EMS in Singapore

Prehospital emergency medical services (EMS) began as a hospital-based service. From 1960 to 1976, there were 2 emergency ambulance services in operation. The first was Central Ambulance Services, coordinated by the ED at Singapore General Hospital, the largest tertiary care hospital. Anyone with an emergent problem could call the Singapore General Hospital ED and an ambulance with a staff nurse, health attendant and driver would be dispatched from one of the EDs. Central Ambulance Services provided 24-hour first aid and transport for over 10,000 calls per year, with an average response time of 25 minutes.[2] The Singapore Fire Brigade operated the second service, which responded only to accidents and fire casualties and provided 15-minute response times in the majority of cases.[3]

However, this dual system confused the public. In 1977, the 2 services were integrated into the Emergency Ambulance Services, under the coordination of the Singapore Fire Brigade. The Emergency Ambulance Services was designed as a single-tier system, with nurses and midwives seconded from the hospitals to staff the ambulances. There was no formal medical control, but doctors from the EDs provided ad hoc advisory services on a case-by-case basis.

Singapore Civil Defence Force and the Emergency Ambulance Services

In 1989, the Emergency Ambulance Services was absorbed into the Singapore Civil Defence Force (SCDF). This remained a single-tier system, coordinating a fleet of 16 ambulances, each staffed by an ambulance officer (a staff nurse trained in first-aid, cardiopulmonary resuscitation [CPR] and midwifery), an attendant (former fireman trained in first-aid and CPR) and a driver. Later the same year, the Singapore General Hospital's departments of emergency medicine and cardiology initiated a pilot program to train 24 ambulance officers in the use of semi-automated external defibrillators (AEDs). In 1993, marking the launch of the National Heart Save

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Project, this AED service was extended to all ambulances. Pre-hospital defibrillation protocols were developed, and regular audits are performed. Now, excluding cases where death is pronounced at the scene, the system transports approximately 250 cardiac arrests to EDs annually.

Successful treatment of out-of-hospital cardiac arrest is now used as one of the quality indicators for the local EMS system,[4,5] and a group of emergency physicians and SCDF officers perform monthly quality assurance evaluations. Forty-six percent of the cardiac arrest cases have ventricular fibrillation as the initial rhythm. The remainder have asystole and electromechnical dissociation in approximately equal proportions.

Three crew members of the Emergency Ambulance Service

Fast Response Medic scheme

In 1992, because of long ambulance response times due to traffic congestion in urban Singapore,[6] EAS introduced a motorcycle-based Fast Response Medic scheme (FRM) to provide care to road-traffic trauma victims. The scheme reduced response times from 15 to 8 minutes. Now there are 1 or 2 FRMs at each of the city's 13 fire stations. FRMs provide first-aid, CPR and AED defibrillation. They respond only to trauma cases from road accidents. Patients attended to are subsequently transported to the EDs by ambulance.

Medical Advisory Council

Prior to 1997, the EAS functioned without a formal program of medical oversight and review. In 1997, the Medical Advisory Council was established, consisting of 3 emergency physicians, 2 surgeons, a cardiologist, an anesthetist and a pediatrician. The Medical Advisory Council, chaired by an emergency physician, governs, endorses protocols and procedures, and assures quality and standards within the EAS. This council also oversees the training and operation of the emergency medical dispatchers.

National Paramedic Training scheme

Paramedic training began in 1995 as collaboration between the SCDF, the School of Military Medicine and the Paramedic Academy of The Justice Institute of British Columbia. The program consists of 3 modules, completed over 18 months. Trainees receive first aid, basic cardiac life support (BCLS) and basic trauma life support (BTLS) courses, as well as supervised on-the-job clinical training. Successful program completion leads to paramedic certification, and Singapore paramedics are comparable to Canadian or US EMT-Ds. To date, 4 paramedic classes have graduated.

Continuing education is an important component of paramedic training. Refresher courses in BCLS, BTLS and AED are conducted annually. Paramedics are encouraged to attend educational courses, both locally and overseas. For those wanting to broaden their horizons, overseas attachments and visits are available. EMS personnel participate in national and regional emergency exercises to define their role in the disaster or mass casualty response team. Some have been sent overseas to assist in major disasters such as the 1990 Philippines earthquake, the 1995 collapse of a Malaysia condominium and the 1999 Taiwan earthquake.

Organizational issues

Today, 20 SCDF ambulances strategically located at 13 fire stations handle 60,000 to 70,000 emergency calls per annum. Ambulances from adjacent stations cross-cover during peak activity periods. All ambulances are equipped with basic airway, intravenous, monitoring and immobilization equipment as well as an AED. FRMs carry basic airway and first aid equipment, simple immobilization devices, and an AED on their motorcycles.

The EDs in the 6 acute care public hospitals are capable of evaluation, resuscitation and stabilization of critical patients; however, there are designated burn, neurosurgery and pediatric trauma units. Physicians provide on-line guidance to paramedics regarding the appropriate destination for specific patients.

System access is by a universal emergency number (995). All calls to Central Dispatch Controls Room are categorized into either medical or fire emergencies. A 1992 study showed that the median ambulance response time was 11 minutes, for 95% of the calls.[7] Urban Singapore, with clustered high-rise buildings, businesses and congested streets, poses many difficulties in terms of system response, patient access and transport. In addition, factors such as narrow landings and stairways, congested corridors and a lack of immediately available elevators contribute to response delays. Consequently, the "on-scene" to "patient contact" time interval, an often-hidden component of EMS response time, has been shown to be significantly longer for high-rise premises.[8]

Emergency medical dispatch training is still in its infancy. The firemen who currently perform dispatch duties have a sound basis in communications technology. Comprehensive dispatch protocols and specific dispatch training are presently under development.

Ambulance-to-hospital communications

Communications, a vital component of any EMS system, is necessary for direct medical control.[9] Conventional methods of verbal communication include high-frequency radio and cellular telephones. However, these have important limitations, including variable voice quality, the need for written records of verbal communications, and the technical difficulty of capturing and transmitting a range of clinical information. To improve data collection and communication, the Ministry of Health, the National Computer Board, the SCDF and Singapore General Hospital collaborated to develop a wireless information technology system to supplement existing voice links between ambulance crews and EDs. The result was the Hospital and Emergency Ambulance Link (HEAL), which has been piloted on three ambulances since October 1998. HEAL, a user-friendly client-server application, uses features such as touch screen and "canned text" to facilitate paramedic data entry. Mobile computers in the ambulances automatically capture patient vital signs and ECG tracings and forward these to receiving EDs via a wireless communication network. This information, together with biodata, clinical and patient management information, create a more complete electronic pre-hospital record.[10]

HEAL's main objectives are to convey medical information to the hospital (to facilitate preparation), to provide paramedics a faster, simpler way of communicating with ED physicians for online patient management, and to improve documentation. These will enhance quality control and improve patient care.

Currently, HEAL has four functional modules.

- **Advanced Patient Details Module** captures demographic data, vital signs, graphic and other medical information, and conveys it to the receiving ED.
- **Ambulance Incident Management Module** sorts and archives records received from the ambulances.
- **Drug Request and Authorization Module** helps paramedics get physician approval to administer specific drugs.
- **Text Communications Module** facilitates the exchange of messages between the ambulance crew and the ED staff nurse or doctor.

HEAL's pilot phase has demonstrated technical effectiveness (system availability, volume and timeliness of data transmission), operational effectiveness (limited time spent by

A fast-response medic with the 995 AED

paramedics in data entry and in the ED), and clinical effectiveness (faster initiation of prehospital treatment protocols and decreased ED waiting times for priority cases). An enhanced HEAL system is now ready for nationwide implementation. The enhanced system will incorporate features such as: palm-top computers to capture on-site clinical data, voice-response data capture, automated medical audit of each ambulance run, and interfacing of HEAL with the ED electronic medical records systems.

Research and future challenges

EMS development has progressed rapidly and continues to evolve. EMS personnel are expanding their role into administration, education and research.[11] Singapore EMS abstracts are being presented at local and international conferences, and our research is burgeoning in areas such as out-of-hospital cardiac arrest, low-energy biphasic defibrillation, ambulance response times and EMS response delays specific to the urban environment. In addition, the HEAL project is one of the first of its kind in the world.

Singapore emergency physicians are increasingly interested in EMS, and 3 have completed US fellowships. The Singapore General Hospital Department of Emergency Medicine has established an EMS interest group focusing on research trials and training, including annual mass public CPR training sessions. For example, in one 1999 training session, 7,000 members of the public were trained.

Singapore EMS experts are now forging relationships with developing countries in the region. A Singapore team is working with colleagues in Malang, East Java, Indonesia to set up an EMS system for a district with great variations in social demographics and physical geography.

Our future challenges, like those faced by EMS systems around the world, include addressing ambulance and personnel shortages, improving prolonged response times and limiting the number of non-emergent calls. In Singapore, we must continually assess the impact of automated technology, and we must implement policies to modify high-rise buildings — optimizing EMS elevator access and reducing time to patient contact. Singapore EMS continues to improve its capacity to find solutions to new challenges.

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