Prehospital care in Hong Kong

CB Lo, KK Lai, KP Mak

A quick and efficient prehospital emergency response depends on immediate ambulance dispatch, patient assessment, triage, and transport to hospital. During 1999, the Ambulance Command of the Hong Kong Fire Services Department responded to 484 923 calls, which corresponds to 1329 calls each day. Cooperation between the Fire Services Department and the Hospital Authority exists at the levels of professional training of emergency medical personnel, quality assurance, and a coordinated disaster response. In response to the incident at the Hong Kong International Airport in the summer of 1999, when an aircraft overturned during landing, the pre-set quota system was implemented to send patients to designated accident and emergency departments. Furthermore, the 'first crew at the scene' model has been adopted, whereby the command is established and triage process started by the first ambulance crew members to reach the scene. The development of emergency protocols should be accompanied by good field-to-hospital and interhospital communication, the upgrading of decision-making skills, a good monitoring and auditing structure, and commitment to training and skills maintenance.

HKMJ 2000;6:283-7

Key words: Decision making; Disaster planning; Emergency medical service communication systems; Quality assurance, health care; Transportation of patients

Introduction

Hong Kong has a population of approximately 6.8 million and a total land area of 1046 square kilometres. The main provider of the emergency ambulance service in Hong Kong is the Ambulance Command of the Fire Services Department (FSD). The Auxillary Medical Service and the St John Ambulance Brigade supplement this service by providing one and three ambulances for disaster response, respectively. At the receiving end of the emergency transport are the 14 hospitals of the Hospital Authority (HA) that have Accident and Emergency (A&E) departments.

The provision of the ambulance service is governed by law in the Fire Services Ordinance, which states that the FSD should "…assist any person who appears to need prompt or immediate medical attention by (i) securing his safety, (ii) resuscitating or sustaining his life, (iii) reducing his suffering or distress."[1] During 1999, the FSD Ambulance Command responded to 484 923 calls, which corresponds to 1329 calls each day.[2] The Ambulance Command consists of approximately 2200 uniformed staff, about 105 of whom are officers. The 240 ambulances and 23 ambulance motorcycles are located in 29 depots and 27 outstations. The target response time per call is 12 minutes. In 1999, 93.3% of responses to calls were within the target response time (unpublished data, 2000).

The public can access the emergency ambulance service by dialing 999; calls are taken by the police at the 999 centre. If only the ambulance service is requested, the call will be transferred to the Fire Services Communication Centre, where call-takers will process the call. When a call is made about situations such as traffic accidents, ambulances will be requested by the call-takers at the 999 centre when casualties are anticipated.

History and development of the ambulance service

Before 1953, an emergency ambulance service was provided by the Hong Kong Fire Brigade and a non-emergency ambulance service was provided by the Hong Kong Medical Department. In 1953, the two ambulance services merged into a single service under the administration of the Fire Brigade. From 1960 to 1965, the Trench Report[3] called for the development of an individual ambulance unit, which led to the

Fire Services Ambulance Command Training School, 1 On Shan Lane, Ma On Shan, New Territories, Hong Kong
CB Lo, FHKAM (Emergency Medicine)
KK Lai, FHKAM (Emergency Medicine)
KP Mak

Correspondence to: Dr CB Lo

establishment of the FSD Ambulance Command in 1968. The Command, headed by the Chief Ambulance Officer, is one of the seven Commands that are headed by the Director of Fire Services. The other six Commands in the Fire Services are the Headquarters Command, the two Fire Protection Commands, and the three fire-fighting Operational Commands in Hong Kong, Kowloon, and the New Territories.

Prior to 1973, the Ambulance Command provided an ambulance service to the standard specified in St John Ambulance First Aid Manual. After 1973, the Ambulance Aid Proficiency Qualification scheme was adopted. The skill level attained by staff approximated to that of an emergency medical assistant (EMA) I or a basic emergency medical technician. The Ambulance Command now has its own 'Ambulance aid notes' for basic training, which are updated regularly by a team of officers. From 1987 to 1991, the Advisory Group on Extended Training for Ambulancemen called for the advancement of skills in the Ambulance Command. In response, the automated external defibrillation technique was introduced in 1989 and since 1998, all FSD ambulances have been equipped with automated external defibrillation devices.

In the late 1980s, two officers with a nursing background were sent to United Kingdom (UK) to train as paramedics. Shortly afterwards, the UK ambulance services introduced the National Health Service Training Authority Paramedic Training Courses, which led to a National Vocational Qualification. The introduction of the new qualification meant that officers from Hong Kong could no longer be sent to the UK to receive paramedic training, because the basic training in Hong Kong was no longer recognised. The FSD sought other opportunities to upgrade its paramedics' skills and, after visiting the ambulance service in British Columbia, Canada, officers considered that the British Columbia ambulance system had many similarities to that of Hong Kong. Since 1993, an intermediate level of paramedic service, at EMA II level, was initiated with the assistance of the Justice Institute of British Columbia. An honorary Medical Director of the HA was appointed, and he has since assisted in the establishment of protocols for local practice.

In 1997, a contract was signed between the HA and the FSD whereby the HA would provide professional support to the FSD in training EMAs. In the same year, an emergency physician from the HA took up the part-time post of Medical Director to assist the FSD in training paramedics, improving their skills, and planning training programmes. Soon afterwards, the Prehospital Care Subcommittee was formed under the A&E Coordination Committee of the HA. The Subcommittee meets regularly to formulate new protocols, to make improvements on existing protocols, and to discuss future developments of the emergency medical service in Hong Kong. The FSD and the HA also meet regularly to discuss ways of improving the coordination of prehospital care.

The current emergency medical service includes protocols to assist patients with asthma, chronic obstructive pulmonary disease, chest pain, hypoglycaemia, haemorrhagic shock, narcotic overdose, and multiple trauma. At the end of 1999, there were 66 and 33 ambulances with EMA II–level staffing during the day and night shifts, respectively. Drugs that EMA II–level care providers are permitted to administer include salbutamol by nebulization, intramuscular (IM) naloxone, IM glucagon for hypoglycaemia, and IM thiamine. These personnel are also allowed to help patients take their own nitroglycerin tablets, to initiate intravenous normal saline fluid therapy for patients who are in haemorrhagic shock, and to give 10% dextrose solution intravenously to hypoglycaemic patients. Furthermore, EMA II–level staff may apply a Sager splint to treat lower-limb fractures.

In 2000, the laryngeal mask airway and Combitube training programme was started. More experienced members of staff are recruited to receive training through this 3-day course. Once qualified, the successful candidates are allowed to perform the intubation technique on cardiac-arrested patients as an advancement from the basic bag-valve-mask technique.

Training

The Ambulance Command has its own training school, which was established in 1992. It is staffed by a commandant (superintendent grade), three chief instructors (senior officer grade), 6 instructors (officer grade), and 15 assistant instructors (non-officer grade). Ambulance staff receive 24 weeks of training (26 weeks for officers). Training in automated external defibrillation has become part of the basic training since 1989. Ambulance motorcycle crews receive an additional 2-week training course in managing patients single-handedly.

The EMA II training course lasts for 6 weeks. It is conducted under the supervision of the Medical Director by EMA II instructors who have been certified by the Justice Institute of British Columbia. Emergency physicians from the HA participate in the EMA II

training course by delivering lectures during the course and by training EMA II candidates during their attachment to A&E departments. The practical training provided includes intravenous and IM techniques of drug administration.

Candidates at the EMA II level have to pass a written examination and three scenario tests before they are qualified. After graduating, each practising EMA II is required to attend a 2-week recertification course every 3 years. Between the recertifications, EMA II staff will receive 2 days of continuous medical education (CME) each year, under an arrangement that was introduced in 1998. New or amended protocols, new equipment, and new concepts are introduced during the CME. Emergency physicians from the HA are invited to deliver lectures during the CME programmes.

The FSD started the EMA II service with 10 instructors in 1993 to 1994. In 1999, another six instructors were trained and certified by the Justice Institute of British Columbia. The FSD Ambulance Command extended its training courses to Macau from 1994 to 1995, during which 27 basic ambulance personnel from Macau were trained officially. Since 1996, assistance in the training of Macau's ambulance staff has been provided voluntarily by the Hong Kong branch of the Ambulance Service Institute—an academic body that was formed in 1971.

Quality assurance

In the summer of 1999, a 2-week audit of the performance of EMA II staff was undertaken with the assistance of A&E departments of the HA. Each department appointed a coordinator, who assessed staff performance and gave feedback to the Medical Director. In late 1999, the FSD established its own audit structure and under this scheme, an EMA II instructor is assigned a number of EMA II–level staff to supervise. Instructors visit depots to review report forms; they also ride in ambulances with EMAs to assess their performance.

As part of the laryngeal mask airway and Combitube programme, all qualified personnel have to keep a logbook, which is examined every 3 months. The logbook contains assessments and comments from emergency physicians on the effectiveness and complications, if any, of using these respiratory adjuncts. The insertion technique is re-evaluated by examining the logbook entries. With such efforts in quality assurance, it is hoped that the standard of service will improve; yet, more commitment is needed from the FSD in resource allocation, because auditing procedures are time-consuming.

As the number of EMA II care providers increases, the workload for each instructor will also rise. A set ratio of instructors to providers would be a sensible arrangement for the healthy development of the service. The ratio of instructors to providers is currently 1:15 to 1:16, which is acceptable, given the amount of time instructors can spend on training and supervision among their other duties, such as administration. While skills become upgraded from basic to intermediate level, however, the risk associated with the emergency care provided will also rise, and the distinction between benefit and harm begins to blur. Hence, strict monitoring and good training are important in ensuring a good quality of service.

Cooperation with emergency departments

During depot visits by the Medical Director, some crew members have revealed that some emergency physicians may not be fully aware of the protocols practised by EMA II staff (CB Lo, unpublished observations, 2000). As the protocols are formulated to cater for the prehospital phase, they may not fully match the mindset of those who work mainly in hospitals. There is thus a need for better liaison between EMA II instructors/staff and emergency physicians; this will help achieve seamless patient care between prehospital and hospital phases of treatment.

Despite anecdotal appraisals that reports from the EMA II crew help hospital management, especially with regard to the mechanism of injury in trauma cases, filing such reports is currently not considered compulsory by most A&E departments. The reason may be that the standard of the reports in general has not reached a respectable level, but it is more likely to be that physicians currently rely mainly on their own skills in history-taking and physical examination. Improvements in the standard of prehospital information may further assist physicians in treating patients.

Disaster response

Before 1998, the prehospital diversion of patients relied mainly on a Medical Control Officer (MCO)—usually a Senior Medical Officer from an A&E department—and the HA Duty Officer. Since 1998, the FSD and the HA have agreed to divert pre-set quotas of disaster patients before the arrival of the MCO at the scene, to help achieve a coordinated

disaster response. However, the diversion process in past incidents was occasionally inefficient owing to the initial lack of direction.

The FSD has subsequently adopted the concept of 'first crew at the scene' whereby the command structure is to be established by the first-arrived ambulance crew members, irrespective of their ranking. The crew will then hand over command to the appropriate officers at their arrival. To prevent overloading at a single or a few receiving hospitals, crews are required to triage and transport patients to hospitals according to preset quotas agreed with the HA. In the first phase, most hospitals will receive 20 patients, four of whom would be in the top priority category (most severe, coloured red in the triage category).[4]

When the MCO arrives, he or she will take up the job of commanding subsequent diversion. This is especially important in prolonged disasters. Hospital capacity can be updated from time to time by consultation with A&E departments, hospital disaster coordinators, and the HA Duty Officer. If needed, quotas can be overridden after hospital capacity has been checked. Communication routes are provided to the MCO for these functions, including radio, cellular telephone, and cellular fax.

The system of diverting pre-set quotas was first implemented during the formulation of the disaster contingency plan at the Hong Kong International Airport in the summer of 1999, and it soon became a territory-wide practice. The airport incident involved the overturning of an aircraft during its landing, and it has shown that pre-setting the quota of hospital intakes can be helpful in the overall coordination. It is hoped that with more experience—preferably through drills rather than actual incidents—and increased familiarity with the quota concept, the 'first crew at the scene' disaster response will further improve.

Physiological assessment is the main mechanism used in the prehospital phase. The results are supplemented by those of an anatomical assessment and a determination of the mechanism of injury and co-morbid factors. Patients with no vital signs and who are not breathing with an open airway are considered dead (black triage category). Patients who cannot walk and have abnormal vital signs are classified as first priority (red). Patients who cannot walk but have normal vital signs are classified as second priority (yellow), whereas patients who can walk are classified as third priority (green). Priority will be changed according to the results of subsequent reassessment (dynamic triage).

Communication and dispatch

Call-takers at the Fire Services Communication Centre will dispatch ambulances according to the information provided when the call is taken. Ambulances containing EMA II staff will be sent in cases of major trauma, chronic airway diseases, asthma, cardiac problems, impaired consciousness, and glucose-level problems in diabetics. The option of priority dispatch is now under consideration, along with the planning for a new radio system that is expected to come into service in 3 to 4 years. The target response time is currently not differentiated according to the severity of the case.

Since autumn 1999, all A&E departments have had trunk radio sets installed to allow them to communicate with ambulances. Crews are able to inform A&E departments directly whenever they are transporting severely ill patients. During disasters, radio communication can relay information from one point to many; A&E departments and the on-scene command structure thereby form a single communication group.

In 3 to 4 years, the FSD will upgrade the capability of the radio system to improve coordination and mobilisation, so that in the time of a disaster, the new system will enable a pool of information to be generated from the scene of disaster as well as from the hospitals. The information pool can then be accessed by personnel in the A&E departments that are involved. Information logged into the system will include how many patients have been rescued, how many are en route to hospitals, and how many have already arrived at hospitals. Photographs of the disaster scene may also be transmitted to hospitals to allow the scene to be appraised on-line, thereby optimising the mobilisation of resources.

The way ahead

In the prehospital setting, emergency care providers face many variations in patient presentation, and decisions are often made with very little information provided. The upgrading of skill levels should be coupled with the upgrading of abilities in good decision-making, a good monitoring and auditing structure, and commitment to training and skills maintenance. To encourage good decision-making, creating a learning culture is very important. Although the FSD has begun to put more emphasis on this approach, autonomous learning is currently not as strongly emphasised as it is in well-established emergency medical systems in other parts of the world. In addition,

some emergency care providers in the FSD may be constrained by their mindset of following orders. They have thus self-limited their opportunities to broaden their horizons, towards the rapidly expanding knowledge-base comprising textbooks, journals, and the Internet. Although emergency care is implemented through protocols, enthusiasm and a deeper understanding of the underlying subject matter will help staff at all levels provide a better standard of care. It is often said that medicine is an art; yet, guarded by protocols, prehospital care in Hong Kong may at best be called craftsmanship.

References

1. Laws of Hong Kong Cap. 95 (Revised Edition 1986). Fire Services Ordinance. Hong Kong: Government Printers; 1986.
2. Fire Services Department, Hong Kong. Ambulance Command page. Website http://www.info.gov.hk/hkfsd/english/organ/eorga-1.htm
3. Hong Kong Fire Services Department. Fire Services Memorial Magazine on the 1997 Transition. Hong Kong: Government Printers; 1997.
4. Fire Services Ambulance Command Training School. Ambulance aid notes No. 59. Triage and disaster management. Hong Kong: Government Printers; 1998.