Road Safety Guidelines

for the Asian and Pacific Region

4.12

EMERGENCY ASSISTANCE TO ROAD ACCIDENT VICTIMS

Asian Development Bank

EMERGENCY ASSISTANCE TO ROAD ACCIDENT VICTIMS

Although there is great diversity in application, there is general agreement on the principles of an effective emergency medical service. The essential functions of such a service are as follows:

- the provision of first aid and medical care to the casualties at the roadside;
- the transport of the casualty to a hospital; and
- the subsequent provision of more definitive treatment.

The typical components of an ambulance service in a developed country are as follows:

- a notification and communication system;
- central control and coordination of operations;
- effective rescue and medical aid at the scene; and
- transport to a hospital and the provision of definitive care in an emergency department.

In many countries, the absence of organized ambulance systems may mean that accident victims must rely on being transported to a hospital by the first available vehicle passing the site (often called scoop and run). In such locations, efforts should be made to educate the public in the basic four or five actions that can be taken to preserve life, and the need to transport the victim to the nearest medical facility as quickly as possible.

To ensure accident victims get the best emergency medical treatment practically possible, there should be a review of the local situation to provide information on the available resources and current usage patterns; i.e., how casualties arrive at the hospital and how long a time at the scene and in transit. With data from a study of crashes and injuries, and transport to hospitals, short- and longer-term plans can then be made for the development of a system suited to local situations.

PRIORITY ACTIONS NEEDED

1. Provide basic first aid information on treatment of accident victims (how to stop bleeding, choking, etc.) to all drivers (e.g., at the back of the highway code and through targeted publicity campaigns).

2. Train police, fire, and any other emergency service personnel in basic first aid.

3. Develop local and regional trauma plans based on study of postaccident assistance and consequences for road traffic accident casualties.

The key principle is to provide initial stabilization of the injured party during the “golden hour” (i.e., the first hour after injury). The general driving public should be made aware of simple actions that can be taken to preserve life.

1 INTRODUCTION

These sector guidelines on "Emergency Medical Services" are from a set of *Road Safety Guidelines for the Asian and Pacific Region* policymakers, developed as part of a regional technical assistance project (RETA 5620: Regional Initiatives in Road Safety) funded by the Asian Development Bank (ADB).

The role of emergency medical services in minimizing the consequences of road traffic crashes lies immediately after the crash. The functions of an emergency medical service can be defined as:

1) the provision of first aid and medical care to accident victims at the roadside;
2) the transport of the victim to a hospital; and
3) subsequent provision of a more definitive treatment.

While the quality of care provided by the emergency wards in hospitals is clearly of critical importance, it is beyond the scope of these brief sector guidelines and the focus here is on the care and transport of road traffic accident victims from the accident scene until reaching the hospital emergency ward or the nearest medical facilities.

2 WHY IS EMERGENCY MEDICAL ASSISTANCE NEEDED?

The benefits of providing treatment to the injured as soon as possible were first recognized about 200 years ago during wars in Europe when "flying ambulances" or light horse-drawn carriages were introduced to carry the wounded from the battlefield. Since that time, there has been a slow but steady increase in the sophistication of emergency medical services, often accelerated by the requirements of wartime situations. Mortality rates dropped from 4.5 deaths per 100 casualties in World War II to less than one in recent times. This reduction was due, at least in part, to a reduction from hours to minutes in the time required to reach medical care and to the provision of effective care "at the scene" by trained paramedical personnel. Increasing efforts are being made to provide similar standards of care in the civilian realm, particularly for injuries resulting from road accidents.

About 50 percent of road traffic deaths happen within 15 minutes of the accident as a result of injuries to the brain, heart, and large blood vessels. A further 35 percent die in the next 1-2 hours of head and chest injuries, and 15 percent over the next 30 days from sepsis and organ failure. The time between injury and initial stabilization is the single most important factor in patient survival, with the first 30-60 minutes being the most important.

The most serious injuries resulting from traffic accidents are head, spinal, and internal soft tissue damage to vital organs. Early treatment and stabilization of these typical accident injuries can enhance a patient's timely and full recovery. Delay or well-intentioned but inappropriate first aid, can result in death or permanent disability. Medical experience around the world has demonstrated that stabilization of the injured person and hospitalization to a specialist center, within what they describe as the "golden hour," increases the patient's potential for survival and full recovery.

Ambulance services are intended to meet the following needs:

1) rapid response to life threatening or serious incidents;

2) preservation of life at the scene;
3) prehospital life support and patient stabilization; and
4) reduction in death and serious injury for accident victims

Ambulance services may not be as appropriate or effective in developing countries and a more flexible approach to emergency medical services needs to be considered because of:

1) lack of an effective communication network prevents ambulance services from being notified of road traffic accidents;
2) public unwillingness to give priority to ambulances as ambulances are more usually used for nonemergency trips such as transferring patients and hospital staff between hospital and home; and
3) lack of data that prevents the need for ambulance services from being identified.

Given the often crowded streets of cities in the region, it is difficult to see how an ambulance could reach the scene of a crash and transport the victim to hospital faster than the ad hoc arrangements now operating in some cities. In New Delhi, India, for instance, the times taken for patients to reach hospital approximate those reported in cities in Europe and the United States (US). However, the standard of medical care provided in a formal first aid and transport system would be higher; e.g., the care of airway obstruction and bleeding would be improved.

3 KEY COMPONENTS

3.1 Alternative Approaches

There are two general philosophies in the "**formal**" provision of emergency medical care. One of these formal approaches is to provide immediate first aid and emergency care at the scene of the incident, then to transport the injured person to the emergency department as fast as possible. It is there to supply skilled and definitive care, the so-called scoop and run philosophy. This approach is taken in countries such as Australia, New Zealand, United Kingdom (UK), and parts of the US.

The alternative is to carry the skilled care to the site of the incident and, there provide appropriate treatment. This approach is taken in France, Germany, and Russia, where well-equipped vehicles carry skilled doctors to the scene. Unfortunately, there is no evidence to show that one approach produces better results than the other, although both have their ardent supporters. An intermediate step is to use personnel with advanced training in diagnosis and resuscitation (paramedic), but again there is no evidence to show differences in outcome, although there may be differences in cost.

A third approach, an **"informal system,"** is found in many situations in countries in the Asian and Pacific region. Since there is often no organized ambulance service, the injured are picked up by bystanders or passing motorists and carried to the nearest emergency department by whatever transport is available, usually without any treatment or first aid at the scene. This results in rapid transport to the emergency department but without any resuscitation measures. The outcome of this system depends to some extent on the capacity of the emergency department to deal with these severe cases and to provide effective treatment on arrival.

The essential components of an organized emergency medical care system, are given below:

3.2 Formal Emergency Ambulance Systems

a) *An effective notification and communication network*

There should be a single, convenient method of notifying the ambulance service of the location and nature of the emergency. In many countries this is a telephone number such as 999, 000, or 111, which operates throughout the country and provides telephone access to all emergency services, police, fire, and ambulance. Ideally, these calls should also be without charge. An additional requirement for this to work is that there must be a way of identifying the exact location of the incident. In urban areas this is done usually with street names and intersections, but there can be difficulty where street names are not used or where there are a few landmarks, as in rural areas.

b) *Central control and coordination*

There should be a central control center for receiving calls from the public and from

other emergency services, and for coordinating the despatch of vehicles and crew, even though the vehicles may be based at out-stations strategically placed in relation to the anticipated demands.

Plate 1: Command and control screen.

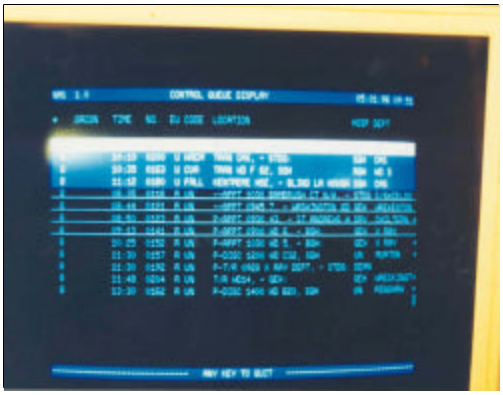

Plate 2: Typical ambulance used in developed countries.

Communication by radio between control center and vehicle is essential, as are radio and telephone links between control center and out stations and with hospital emergency departments.

Easy communication between the emergency department of the receiving hospitals and the ambulance service allows ambulances to radio ahead giving details of injuries and any special medical treatment needed.

This helps to ensure that casualties are speedily dealt with on arrival. There should also be cooperation between the ambulance service and hospital in training of staff, and planning, development, and evaluation of operations.

c) *Effective rescue and medical aid at the scene*

The most important factor relating to the successful recovery of the accident victim is the initial first aid treatment provided to the injured person within the golden hour after the injury. Stabilization of the patient and/or, prevention of choking or bleeding to death can prevent permanent injury or premature death.

d) *Effective and appropriately equipped transport vehicles*

Ambulance vehicles used for patient transport should be clean, comfortable, possess enough room for treatment to be provided to the patient, and be capable of traversing the local terrain. This should carry a range of basic first aid equipment, as appropriate, depending upon the training of the crew.

e) *Training and evaluation of staff performance*

Training for emergency medical services personnel is commonly provided at basic and advanced levels. Basic level training provides for control of bleeding, preservation of a clear airways, cardiorespiratory resuscitation, and the stabilization of fractures. Advanced training includes intravenous therapy and cardiac defibrillation.

f) *Documentation*

It is essential that records be kept of all operations and treatment given, for medico-legal reasons, and to provide a basis for the evaluation of the efficiency and effectiveness of the service. Records should include the time of initial response, time spent at scene, and the time of transport to hospital to determine the overall efficiency as well as the time associated with each stage in order to identify potential time savings. It is also important to record that the victim was injured or killed in a road accident and to use the E codes (in the ICD-9 coding system) to provide statistics for planning purposes and to permit comparisons with police data to assess underreporting.

3.3 Informal Systems

While the term scoop and run originally applied to the practices in developed countries where ambulances were used for rapid transport and not providing medical treatment on site, it now also refers to the common practice in developing countries where the first available vehicle (almost always a passing private vehicle) is used to transport the injured to hospital.

With the absence of ambulances and limited mobility of the police in many developing countries, passing vehicles are often the only chance a road accident victim has of reaching proper medical care quickly. There are three basic requirements for such systems to operate effectively. These are that:

1) drivers of private vehicles have to be willing to transport road accident casualties;
2) road users need basic first aid knowledge; and
3) publicity campaigns and programs need to be undertaken to help achieve the first two requirements.

While a regulation requiring passersby to assist road accident victims is commonly found in the traffic legislation of many developing countries, it is rarely enforced. In many cases, payment must be collected first from donations at the road accident scene. There is also a disincentive to help as people fear being blamed for the accident by police and crowds who may become hostile. There is also reluctance to carry someone who is bleeding badly in case it damages car upholstery and clothes.

Timely transport may be important, but according to recent research conducted in India and elsewhere, in many cases, only basic first aid is required to sustain life. Accordingly, basic first aid teaching should be incorporated into as many driver oriented resources as possible, including highway codes, driver training programs, and driving tests.

Publicity measures should be used to remind the driving public of their legal responsibilities as well as the importance of helping as it could mean the difference between life and death for the victim. The general public will also need to be convinced that there are norisks or disadvantages (apart from the inconvenience) from assisting the injured.

In some Asian countries, well-meaning but misguided local perceptions can sometimes aggravate a patient's condition (e.g., making an injured person drink water in the belief this will help). Publicity campaigns should consider current local practice as well as recommended practices, especially if local practices need to be discouraged or modified.

Hospital locations will also need to be publicized and countries should consider requiring private hospitals and clinics to treat road accident victims.

In many developing countries, road accident victims will often be taken to the main public hospital where treatment is free, even when other hospitals are closer. The delay in treatment may result in more serious injury.

4 STAGES OF DEVELOPMENT

4.1 Emergency Medical Services Committee

Under the national road safety council, an intersectoral committee should be set up to review the provision of emergency medical services and the fate of victims of road traffic crashes. The membership of this committee could include representatives of the health, transport, public works, and police departments, hospitals with emergency departments, existing ambulance services, and possibly the insurance industry.

The tasks of this committee would include a review of the present situation and the resources available

This could include a survey of hospital attendances from road traffic crashes to establish the range of times from the crash to reaching hospital, and the method of transport to hospital.

This information, plus the nature and severity of injuries and their outcomes, would be valuable in establishing a baseline against which to measure the result of any future changes.

This review would also include an examination of the situation with regard to:

1) notification and communication systems, e.g., the capacity and coverage of the telephone system, the availability of radios, and a system of identifying the location of events;
2) personnel available, their level of expertise, and need for training;
3) systems for control and coordination of operations, including the coordination of emergency department and prehospital activities. Is there capacity within the existing emergency services or the hospitals to run a control center?
4) transport, the provision of appropriate vehicles, their operation and maintenance. What vehicles are available? Are they suitable? What type of vehicle would be appropriate?
5) emergency wards and medical staff at the hospitals; and
6) systems for documentation, review, and evaluation of operations. Are there any records available?

The first aid, transport, and hospital emergency department should be considered as parts of a whole emergency medical care system, but with different priorities

The results of this review will provide the information necessary to develop short- and long-term development strategies and action plans.

4.2 Short-term Action Plan (1-2 Years)

In the short term, in countries where there is no emergency ambulance, it may be more effective, given limited resources, and as a first step, to encourage informal scoop and run by:

1) providing basic first aid training to police, fire service, and other rescue personnel;
2) providing information (via highway code, publicity, etc.) to all drivers and riders (and especially professional drivers) on the four or five basic steps to stop a road accident victim bleeding or choking to death;
3) provide information and guidance on how to carry and transport injured persons to the nearest hospital; and
4) provide a mechanism (from insurance companies) to cover any minor expenses incurred in bringing the injured victim to hospital (e.g., cost of taxi fares [insurance companies could save money if victim reaches qualified medical care earlier]).

Hospital emergency departments should be upgraded with regard to equipment and the training of medical, nursing, and paramedical staff. There is little point in developing means of rapid notification and transport if the emergency department remains underequipped, understaffed, and undertrained. It is unlikely that there would be any improvement in outcomes; the place of death would merely be transferred from the road to hospital.

Until a more formal national emergency ambulance system can be established under the ministry of health, it is often possible to develop reasonable coverage by placing ambulances under the control of police highway patrols or fire stations. These emergency services often already have effective communications and disciplined staff who can be trained in basic first aid procedures. They can provide some emergency cover until a more comprehensive system can be established.

4.3 Medium-term Action Plan (3-5 Years) (or in the short term where some components of an emergency medical system already exist)

The main focus during this stage should be on the following aspects:

1) improving communications;
2) training personnel;
3) obtaining or upgrading vehicles and equipment;
4) developing a notification, despatch, and control system; and
5) developing a record system that can be used to monitor and evaluate performance of the system.

The action plan should include the appointment of a person, under the emergency services committee, to organize implementation of the improvements and to coordinate the activities of the agencies in providing the necessary resources.

If it is felt that the ambulance system should be improved, this is best done by appointing a professional manager to build up a new ambulance service. The manager's duties could include:

1) defining the ambulance needs for the country;
2) responsibility for finances;
3) ensuring staff resources are adequate in numbers; and
4) coordinating all interested bodies.

The financing of the manager's post and the ambulance service will depend upon government policy, but possible sources include:

1) legislation to provide levy from vehicle insurance, fuel, or highway tolls;
2) improved central funding of existing agencies; and
3) development banks and aid agencies for certain aspects, including studies and pilot projects.

The manager should prepare plans for the next one or two years together with a longer term strategy over perhaps five years.

Areas that could be improved within a one- or two-year period in the whole country (if small) or in a trial area (if a large country) include:

1) funding mechanism;
2) suitably equipped fleet of vehicles;
3) trained crews;
4) training level of staff;

5) first aid equipment;
6) liaison between agencies;
7) communication systems; and
8) response times.

In the longer term, the development of plans to upgrade communication and notification systems, to train personnel, and to obtain effective and appropriate vehicles can proceed. In urban areas and where distances to medical centers are short, skills to apply effective airway management, control of bleeding, and immobilization of the spine (e.g., a basic level of training) may be sufficient.

It is important that these developments take place on a regional basis, coordinating the actions of hospital emergency departments, and the first aid and emergency transport services. It has been found that improvements in prehospital care, a systematic approach, categorization of hospitals into levels of trauma care capability, the development of systems of review of trauma management within hospitals and within regions, and regionalization of emergency care have been shown to contribute to decreases in preventable trauma deaths.

5 BENEFITS OF EMERGENCY ASSISTANCE TO ROAD ACCIDENT VICTIMS

Estimates of the potential number of lives that could be saved by improved emergency services depend heavily on assumptions made on the availability of levels of care and their effectiveness, the methods of evaluation employed, and the level of services available in the particular region under study. In less developed countries there is little data available, but estimates range from 20 percent in Papua New Guinea to 5 percent in Melbourne, Australia. The figure of less than 5 percent for Australia may well represent a lower limit for deaths potentially influenced by improvements in first aid and transport.

6 EXAMPLES OF GOOD PRACTICE

In each state of **Australia**, and in **New Zealand**, ambulance services are provided by independent, nonprofit services under the supervision of the state health departments. In addition to its role in providing emergency service, in both of these countries, the major role of the ambulance service is to provide a routine transport service transferring patients between hospital and home. Most services have crews with advanced as well as basic training, and vehicles with advanced equipment. There is a large degree of standardization of vehicle design across Australia. Some centers in both countries have developed trauma plans which categorize hospitals and increase coordination with the ambulance service. In **Japan** the ambulance service is provided by the fire service, with which its operations are closely linked. In **Singapore** the service is provided by the Civil Defence Force, which is closely allied with the fire service.

In **Kazakstan**, the ambulance system in the capital city of Almaty operates 116 ambulances and reported transporting 50 percent more road traffic accident victims than were reported by the police in 1996.

Australia, **Malaysia**, and **New Zealand**, each have a dedicated telephone number for all emergency services. **Singapore** has a single number for the police, while the ambulance and fire services share another number. Ambulance services in the **People's Republic**

Plates 4 and 5: Typical ambulances in Asia.

of China (PRC) are in the process of development. They are the responsibility of each municipality. Beijing and Shanghai have efficient services in which each ambulance is manned by a driver, a doctor, and a nurse, and there is central radio control and a number of out-stations. The Beijing service has its own emergency hospital. Other cities, e.g., Chongqing and Shenyang, have smaller, less well-equipped services.

In other countries, there is limited ambulance service. In **Papua New Guinea**, where the service is provided by the Order of St. John, service is confined to the major city. In **Indonesia** the service is provided by the Indonesian Surgeons Association, and in **Malaysia** by the Red Crescent organization. In **Viet Nam**, there is a small ambulance service in Hanoi.

The traffic police in Madras, **India,** introduced the Golden Hour Scheme in late 1994 where passersby were encouraged to help road accident victims and private hospitals were to treat road accident victims. The Police Commissioner requested all medical practitioners and private hospitals to provide all possible assistance to road accident victims and announced the police would be restricted from harassing those offering help to road accident victims. Several countries are improving their emergency ambulance systems. **Fiji**, for example, has implemented a pilot project to extend existing ambulance services and is considering basing ambulances at fire stations around the country.

In **Thailand,** the Ministry of Health is improving the emergency ambulance system by training paramedics and ambulance crews to be able to offer assistance.

7 REFERENCES

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Road Safety Guidelines for the Asian and Pacific Region

The guidelines cover 14 individual sectors affecting road safety, with four introductory chapters and four appendices. Information is presented in a series of freestanding documents that can be extracted for distribution and discussion.

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