

Original articles

Trauma care system in Iran

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【Abstract】Objective: The high burden of injuries in Iran necessitates the establishment of a comprehensive trauma care system. The purpose of this paper is to describe the current status of trauma system regarding the components and function.

Methods: The current status of trauma system in all components of a trauma system was described through expert panels and semi-structured interviews with trauma specialists and policy makers.

Results: Currently, various organizations are involved in prevention, management and rehabilitation of injuries, but an integrative system approach to trauma is rather deficient. There has been ongoing progress in areas of public education through media, traffic regulation reinforcement, hospital care and prehospital services. Meanwhile, there are gaps regarding financing, legislations and education of high risk groups. The issues on education and training stan-

dards of the front line medical team and continuing education and evaluation are yet to be addressed. Trauma registry has been piloted in some provinces, but as it needs the well-developed infrastructure (regarding staff, maintenance, financial resources), it is not yet established in our system of trauma care.

Conclusions: It seems that one of the problems with trauma care in Iran is lack of coordination among trauma system organizations. Although the clinical management of trauma patients has improved in our country in the recent decade, decreasing the burden of injuries necessitates an organized approach to prevention and management of trauma in the context of a trauma system.

Key words: *Emergency medical services; Trauma centers; Wounds and injuries*

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Our country, Islamic Republic of Iran, faces one of the highest burdens of injuries throughout the world. According to the burden of diseases

and injuries study, 28% of years of life lost (YLL) in Iran are attributed to injuries.¹ In fact, injuries are the first cause of YLL among all causes of death in our nation.² In addition, road traffic injuries are considered to be the first cause of disability adjusted life years (DALY) among males, followed by natural disasters.¹

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Iran is located in southwest of Asia and has a population of over 70 million. During the past few years and with the growing pattern of urbanization and motorization, there have been an increasing number of deaths from injures. The rate of road traffic injuries (RTI) increased from 109.7 to 400.6 per 100 000 population between 1997 and 2005. In 2006, due to national recognition of this problem and the concerted interventions, the RTI rate decreased to 392.7 per 100 000 population and in 2007 it further decreased to 343.1.³ In Iran, for each 100 road traffic crashes, 4 people die and the rate of death for every 10 000 vehicles is about 17.⁴ This high burden

necessitates the establishment of a comprehensive trauma care system. This concept concerns all aspects of providing and distributing trauma services to injured patients. Currently, various organizations are involved in prevention, management and rehabilitation of injuries, but an integrative system approach to trauma is rather deficient. The purpose of this paper is to describe current status of trauma system regarding the components and function.

METHODS

Components of trauma care system are extracted from the Model Trauma Care System⁵, and are listed as follows. The components in this model are based on the components described in several trauma care resources.⁶⁻¹²

- I. Administrative components
 1. Leadership
 2. System development
 3. Legislation
 4. Finance
- II. Operational and clinical components
 5. Public information/ education and prevention
 6. Human resources
 7. Prehospital care
 - A. Communication
 - B. EMS medical direction
 - C. Triage
 - D. Transport
 8. Definitive care facilities
 - A. Trauma care facilities
 - B. Interfacility transfer
 - C. Medical rehabilitation
 9. Evaluation
 - A. Data collection
 - B. Trauma system evaluation
 - C. Trauma center evaluation
 - D. Research

The current status of trauma system in each component of trauma system was described through expert panels and semi-structured interviews with trauma specialists and policy makers in Sina Trauma Research Center. There were 13 sessions of focus group discussion, each comprising 20 specialists from different divisions of trauma management stakeholders (trauma surgery, neurosurgery, general surgery,

epidemiology, emergency medicine, present and past executive managers in emergency and trauma, researchers and physicians of Red Crescent Organization). Selection of participants was based on recognition in trauma field, availability and cooperation for taking part in the sessions. Semi-structured interviews for evaluation of the current status of trauma system were performed by a general practitioner who had an experience of executive management in Emergency Medical Services (EMS) organization. This questionnaire consisted of questions regarding the current status of trauma and emergency medical services in Iran regarding manpower, logistics, coverage and prehospital time. The general practitioner mentioned above completed the questionnaire by interviewing emergency field experts and executives.

RESULTS

The current status of trauma care system in Iran according to different component of Model Trauma System is as follows.

Leadership and system development

EMS organization which works under the supervision of the Ministry of Health and Medical Education (MOHME) is the main organizational body responsible for leadership of prehospital care. Hospitals (public and private) provide inpatient trauma care to trauma patients and rehabilitation centers are available for post-discharge care, if necessary. In order to organize a joint system of trauma prevention, care and rehabilitation, a trauma committee was developed by MOHME. This committee had members from different stakeholders: deputy of MOHME, research centers, academicians, injury prevention experts, road engineers, police, legal and forensic medicine experts, emergency medicine specialists, municipality and fire department. There were three subcommittees of injury prevention, treatment and evaluation. Unfortunately, the monthly sessions continued less than a year. Afterwards, activities of the national trauma committee and subcommittees were discontinued. At the time being, trauma experts are planning to restart the initiative to sustain the system development activities.

Legislation

It has been asserted in the third development plan of our country in the year 2000 that the government is re-

sponsible for developing trauma system for optimum care to trauma patients. The government has to develop trauma centers inside health facilities or develop de novo trauma centers so that all trauma patients receive optimal care free of charge. Thus, some legislations are in practice and some others need reinforcement. For example, police officers now stop motorcyclists who do not wear helmets, but the essential legislation regarding wearing seat belt seems to need reinforcement especially for rear passengers.

Financing

All public hospitals provide free care to those injured in road traffic injuries. In addition, part of the money retrieved from drivers that disobey traffic rules and are fined is allocated for safe construction of roads. Establishment of trauma centers, equipping ambulances and education of rescue teams are costly and have been part of the ongoing process in Iran during the last few years.

Public education

Educational programs targeting different population groups such as drivers, mothers of young children and school children have been developed. Media especially television which absorbs a large number of audience have been very active in recent years in preparing animation and producing interviews to inform people about the necessity of seat belt for car passengers and helmet for motorcyclists.

Human resources

In public hospitals, nurses, general practitioners and residents of surgery and emergency medicine are available round the clock for management of injured patients. Hospital emergency services are provided by general practitioners and if necessary, the emergency medicine or surgery residents who are present in the emergency room round-the-clock see the patients. General practitioners are educated about emergency skills throughout their seven years of medical education, but the efficacy of this education on how well they can manage trauma patients has to be assessed. Recently, fellowship of traumatology has been suggested as a 2-year post-doctoral course for surgeons. Nevertheless, initiation of such subspecialties necessitates that the field of work and collaboration with related specialties, such as orthopedics, be defined firstly, so conflicts of interest and overlapping do not hamper the initiative.

Prehospital emergency services are provided by emergency medical technicians (EMTs). These technicians have passed a 2-year course on emergency skills. They are trained on clinical emergency skills such as intubation, triage and intravenous rehydration therapy. They also participate in periodic continuing medical education courses but the details and requirements of this refreshment are not well defined.

Prehospital care

As indicated previously, EMS organization is responsible for providing prehospital care to patients. Anybody in need of emergency services can get in touch with the phone number 115. The line is answered by EMTs and most of the time, an ambulance is sent to the scene. Yearly evaluation has shown that EMS transfers almost one third of patients entering the emergency rooms of hospitals. Thus, most people go to the emergency room themselves (by family members or friends). In some areas of the country, there are limited resources for communication and medical directing between the dispatch center and ambulances and also between ambulances and the destination hospitals. Recently, in some provinces, medical directing has become achievable and EMTs can get in touch with general practitioners in the dispatch center.

Triage protocols are not well developed and the patients are usually transferred to the hospitals according to the main injuries. There are specialized trauma hospitals equipped with required facilities and manpower, but formal designation of trauma centers is not performed. In other words, there are not different levels of trauma centers for admission of trauma patients according to the severity of their injuries.

Hospital care

As trauma centers are not formally designated, EMTs decide on which hospital a patient should be transferred to. This decision is made according to severity of injuries, the distance between the injury scene and the potential destinations. Protocols for transfer of patients between health care facilities are not well defined and the physician in charge of the trauma patients decides on each case. After admission to the emergency room, the patient is cared for in the clinical ward selected according to the type of the main injuries of the patient. Specialists other than the one responsible for the care of the main injuries of the admit-

ted patient also provide consultation for the optimal care and management of his/her other injuries, in the case of multiple traumas. This is to say that in many hospitals, there are no wards as the "trauma ward". Instead, the patient might be admitted in orthopedics, vascular surgery or general surgery ward and other specialists provide care, simultaneously.

Rehabilitation

Rehabilitation medicine is a recognized and well-developed speciality in Iran and there are numerous centers providing rehabilitative care to patients. Nevertheless, rehabilitation is not an integrated part of the care provided to trauma patients and the trauma hospitals are not necessarily equipped with rehabilitation devices and manpower. Instead, trauma patients can be introduced/referred to such centers after discharge in the case of residual disabilities.

Evaluation

Trauma registry was piloted in some provinces for a short period of time of almost one year without continuation due to financial and logistics limitations. Thus, it is not yet established in our system of trauma care.

DISCUSSION

Injuries as the first cause of YLL in our country have attracted the attention of decision makers in our health care system in recent years. Numerous activities are being performed by different organizations involved in prevention, care and rehabilitation of trauma, but gaps still remain. It seems that one of the problems with trauma care in Iran is lack of coordination between these organizations, while in other countries other problems might be dominant. For example, Nijs and Broos¹³ believe that the total lack of coordinated "intra-hospital" care is the major problem of trauma care in Belgium.

Results of a study on trauma patients referred to the emergency department of a teaching hospital in Iran showed that the EMS services provided to trauma patients need to be improved. Although wound bandaging and haemostasis were done correctly in 80% of the cases, splint was applied correctly in 50% of patients in need for such a device. Collar and spinal bed were not performed in 80% of the indicated cases.¹⁴

The situation of EMS is different in other low-middle

income countries. In a large country such as China, there are five different levels of prehospital emergency system based on differences in population and economic situation.¹⁵ In Hong Kong, criteria for activating trauma calls and ICU utilization need to be improved.¹⁶ In India, the same as in China and Iran, the quality of trauma care system in rural areas is not as efficient as in urban area. There is no leader in trauma system and no mechanisms exist for accreditation of trauma centers. There, the needed advocacy for establishment and maintenance of trauma system is lacking.¹⁷ In Iran, Nafissi and colleagues¹⁸ have been successful in improving the physiological status of trauma patients in a rural area by short-course training of physicians, nurses, emergency technicians and even lay people in a three-year study period.

In countries with scarce resources, involvement of private sector in development of trauma system might be beneficial. In Thailand, for prehospital care, there are several weak points including facilities, personnel and funding. Thus, both government and private sectors have helped together to prevent traffic accidents during the past few years.¹⁹

Trauma care system is more primitive in Hanoi, the capital of Vietnam. In Iran generic coverage by incident management is about 33%,²⁰ while in Hanoi there are just 4% of injured people transferred by ambulance to the hospitals and most people do not receive primary aid in scene. There, system lacks communication between ambulances and hospitals and many vital components of management are not available yet.²¹ In Iran, The communication centres are available in cities that have a population of more than 250 000 people and have medical universities and colleges. In other cities, a dispatch centre exists that serves as information and coordinating centre.²⁰

Regarding prevention of trauma, some successful programs exist in Iran. For instance, in the year 2010, about 10 million volunteer students throughout the country took part in Police Assistant Campaign (Hamyare Police). They are active players in alarming their parents to drive under speed limits, not to speak and eat while driving.²² This initiative started in 2007 and is supported by Iran's traffic police and Ministry of Education. It focuses on traffic education in schools and trains students to play the role of traffic police officers within their

families. This program has been assessed to be successful in reducing the number of road accidents. In addition, ten countries have shown interest to adapt this model for their countries.²³ Meanwhile, this and other educational programs need reinforcement for sustainability, evaluation and feedback.

Multiple studies have demonstrated the beneficial effects of a regionalized and well-organized trauma care system.²⁴⁻³³ The cornerstone of trauma regionalization is the categorization of hospitals according to their emergency capability and the designation of trauma centers that are able to treat the most severely injured.³⁴ Development of a comprehensive trauma system and the trauma registry or a nation-wide injury surveillance system¹⁷ and organized approach to prevention and management of trauma necessitates that enough money is invested for decreasing the burden of this first priority of our nation's health and needs the well-developed infrastructure including staff, maintenance and resources.

In conclusion, in this study, the strengths and gaps in different components of trauma care system in Iran were dealt with. There has been ongoing progress in areas of public information, traffic regulations reinforcement, hospital care and prehospital services. Now, a coordinated approach to trauma care including monitoring, intervention and evaluation is necessary to improve the quality of care provided to trauma patients.

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