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Emergency Medical Service Concepts in Tehran, Iran

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1. Intruduction

Emergency medical service (EMS) is one of the most substantial health care services, which has a fundamental role in saving people's lives and decreasing the rate of mortality and morbidity (1). For an efficient, coordinated, and prompt transfer of health and secure services to victims of sudden sickness or hurt, numerous arrangements of staff, facilities, and equipment have been provided by EMS (2).

The world health organization considers EMS systems as a necessary part of any efficient and functional health care system (3). The EMS is the first point of contact for the majority of people to health care services during emergencies and life-threatening injuries and acts as a gate-keeping step for accessing secondary and tertiary services.

2. EMS in Tehran, Iran

Tehran EMS was established in 1974 and is managed by the Ministry of Health. Access to EMS services anywhere in the country is possible through calling 115, which provides free services to people since it is financed by the government.

2.1. Emergency Medical Dispatch Center

The center includes four units; contact recipient, dispatch, admission, and medical telephone consult units.

All of the 115 call receiving staff are registered nurses, and the medical telephone consultants are physicians, and the dispatch operators are basic emergency medicine technicians.

2.2. Emergency Medical Operation Deputy

Tehran EMS has 180 emergency response stations and over 609 vehicles, which include 383 ambulances, 217 motorcycles, eight support unit buses, and one helicopter.

Everyday approximately between 6800 to 7500 calls take place to the emergency communication center. Around 2000 to 2400 calls are responded by dispatching an ambulance, motorcycle, bus and/or helicopter daily.

The level of an EMS operational staff is paramedic (EMT-P), EMT-I, EMT-B, and First responder.

2.3. Emergency Medical Operation Procedure

An emergency telephone call is answered by an emergency communication nurse. The nature of the emergency is determined by asking questions based on integrated algorithm (i.e. chief complaint, level of consciousness, airway and breathing, etc.) The nurse may find it necessary to give urgent advice in life threatening situations (i.e. CPR instructions, delivery management, choking). If needed, a physician may give some medical consultations. Finally, if the case is recognized as emergent, the address is completely received and forwarded to the dispatch unit.

The operator of the dispatch unit pages the nearest ambulance station to the address of the incident and immediately then, the ambulance crew begins their mission.

3. Improving EMS in Tehran

During the last few years, many activities have been implemented that have resulted in improvement of EMS in Tehran. Some of them are approval of some laws and protocols, use of tele-cardiology for cardiovascular patients, ambulance clinical triage for stroke, emergency motorcycle ambulances and etc.

3.1. Tele-Cardiology

Prehospital electrocardiogram (ECG) diminishes time to reperfusion in STEMI (ST segment elevation MI) patients, especially when combined with association of STEMI diagnosis and preferably transport to a PPCI-capable (primary percutaneous coronary intervention) hospital (4). A new set of guidelines, the 2015 international consensus on cardiopulmonary resuscitation and emergency cardiovascular care science with treatment recommendations, suggested not only the use of prehospital ECG (5), but also

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wireless transition and physician interpretation of prehospital ECG, which can theoretically contribute to lower rates of false-positive and false-negative STEMI diagnosis and indicate choice of the goal hospital and treatment in path (6). There is an intense integration between immediate performance of PPCI and recline of mortality (7, 8).

Tele-cardiography technology enables a cardiologist to analyze the patient's ECG far away from a medical center.

Tele-cardiology has been used in Tehran EMS since 2016. The procedure consists of five steps:

1. Recording of 12-lead ECG signals by an EMS technician in case the patient has any sign or symptom of chest discomfort or heart diseases.

2. Data transmission using mobile data-network infrastructure to the cardiologist for interpretation

3. Cardiologist's recognition of ST-elevation in the patient's ECG

4. Activation of "code 247" by dispatch nurse in EMS and informing cath-lab's supervisor

5. Direct transfer of the patient to cath-lab for primary angioplasty

3.2. 724 (SAMA)

The EMS staff could boost early and precise recognition of stroke-like symptoms, which provides timely, efficient stroke care, culminating in fast transportation to a stroke center, which can enable the greatest quality definitive care possible (9).

According to a comprehensive algorithm and several standard questions asked by emergency medical dispatcher, if there is any possibility of stroke, the nearest unit of emergency, helicopter, is on the priority if it is possible to be dispatched. After the probable diagnosis of stroke is confirmed by an EMS physician and EMS technician based on the assessed signs and symptoms, the patient will be directly transferred to a pre-determined hospital with neurologic definitive care.

3.3. Emergency Motorcycle Ambulances

Emergency motorcycle ambulances have an important role to play in providing services to patients and injured people, since like an ambulance, they are supplied with valuable necessary medical equipment, such as telemedicine, oxygen, ventilator, AED, etc., as well as an expert technician. They are sent as pre-orders for missions and if more medical treatment or transfer to a hospital is needed, an ambulance will be dispatched, otherwise after appropriate interventions, the mission will be finished. The need for this new service is more felt when the growing demands of crowded population of Tehran and high and heavy traffic would increase the arrival time of the emergency units and moreover not all people's demands through the use of ambulances can be met. However, through utilization of emergency motorcycle ambulances, the response time, cost, and unnecessary transfer has been dramatically reduced.

4. Problems and Challenges

Ambulance services are already struggling to cope with emergency demands. The predicted growth in demand and the tension on their available resources is likely to extremely affect their ability to answer demands in the future. In addition, Iran's growing ageing population (10) and disasters is likely to have significant consequences for ambulance services and demand for their services.

5. Conclusion

The use of modern technologies like telemedicine and imaging modalities in pre-hospital settings are helpful in the evaluation and management of patients, particularly in time-affected conditions such as trauma, which is known as a time-sensitive factor (11). Providing prompt services has a crucial impact on the trauma patient and causes a reduction in mortality and hospital cost (12) and reduces expensive transfer of trauma patients (13). Considering that a significant number of Tehran EMS calls are related to trauma (approximately 27%), the use of modern technologies, like ultrasound and tele-radiology for early recognition and improving prehospital management of traumatic patients is recommended.

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