

The use of GIS for the Emergency Medical Care System (EMCS)



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1. Introduction

Emergencies occur anywhere, at any location, at any time, and in various different ways - thus making any one of us susceptible.

Although the structure of the EMCS differs across nations, the aims in applying emergency medical services are world wide the same:

- To save life,
- To limit damage to individual health,
- To initiate recovery procedures ensuring the best possible quality of life.

At the present time, it is very difficult for the on-scene rescue team to obtain quick and secure information in selecting the most advantageous hospital. This also means that the admitting hospital is not properly informed about the incoming patient.

Upon admission to the hospital, the patient should be treated carefully, effectively, and spontaneously by a pre-informed and thoroughly prepared team in the shock room.

Incomplete (or lack of) incoming patient information for the admitting hospital leads uneconomical usage of resources in cases of overestimation, and to damage to the patient in cases of underestimation.

Continued efforts to increase educational guidance for emergency physicians, emergency medical services have significantly improved. Despite good overall medical care, however, there are some weak points and points of non-conformance in the single phase of the rescue course which subjects the patient to avoidable life-threatening situations. As an example, we find that an inadequate shock treatment facilitates development of post-traumatic multiple-organ-dysfunction, which threatens the patient's life even days after an accident. On the other hand, an improperly attended injury can lead to a life-long disability with secondary effects in reference to social and economical problems.

Thus, it is undoubted to establish a direct, fast, and efficient EMCS without delay. Furthermore, for timesaving and increasing the ability for patients care, it is critical sending patients to the closest and most proper hospital efficiently for further treatment and to reduce the therapy-free time intervals as much as possible, and to provide the emergency physician with the means required to foster optimal care. Hence, the development of emergency medical information system has its own value and necessity. The EMCS is known as a well-organized structure that supports the labors, equipments, and hospitals for quick and efficient emergency care and medical service during the accidental

emergency situation or the considerable disaster. When the timesaving for the emergency care can be controlled, the damage will also be able to be well minimized and, in the mean time, it will also increase the survival rate of the patients.

2. Materials and Methods

Geographic Information Systems (GIS) can integrate graphic information and data in databases to support the production of geographic information for further arrangement, analysis, and management. Maps which are produced and displayed by GIS present excellent visual interpretations of data which can hardly can be achieved by language and letters. In the past, research which used GIS for layer display tools or analysis of layer for research were most common. Recently, the GIS is getting widely acknowledged as a technology and is becoming a universally accepted tool applicable to a wide range of areas of focus. The role of the network analysis in the field of the spatial analysis is rapidly gaining momentum. In network analysis, the "optimum path" is derived by considering many criteria. Criteria could be the level of the road, one way or two way transportation, speed limit, etc. Further, following the above information then giving the different priority will help arrive at the destination in the most efficient manner.

Tracking through the Internet opens up new ways of ensuring the safety, health. Today, by using the new technology provided by GPS/GSM enabled mobile phones it is possible to protect the victims, the young and the elderly or disabled living alone. New software and GPS/GSM phones allow medical staff, no matter where, to measure the arrhythmia of heart patients, track the position of the patient and send for assistance in an emergency.

Elderly, disabled

For a small monthly outlay, this new technology is a solution for the elderly or physically disabled living alone, providing them and their relatives with peace of mind. An improvement on the panic buttons worn around the neck, these new mobile phones with their two-way message and voice connection enable the elderly or disabled to be immediately located in the case of an emergency. They also release people from the fear that they are only safe where the on-site system is operating. These new devices work when they are out and about anywhere there is mobile phone coverage. The phone not only provides the user with more control by enabling them to decide who is to be informed in case of a fall or accident but also ensure a quick response time from either the emergency services, a local GP or relative.

Heart patients

Cardiovascular diseases are the most common cause of death in industrialized countries. Patients who have had heart disease often experience a lack of confidence and mobility, which affect their quality of life. The latest adaptation of the GPS/GSM mobile phone is the mobile heart phone. This technology incorporates a central emergency call function with an integrated ECG recording and a positioning and search function. The emergency call function includes the automatic dialing of the call centre, an identification feature and advice for the patient and escorts including resuscitation procedures. Patients can, with the use of the four ECG leads provided, transmit an ECG reading via a signal converter to medical staff to provide an immediate diagnosis. A position and search function determines the position of the patient and ensures the management of an activated rescue chain.

Characteristics of the GIS can be used to develop a prototype of an EMCS and establish a mobile system that can determine the position of the accident and rapidly assist in admitting people to the nearest hospital.

Conclusions

This paper presented the EMCS system in a nutshell and how GIS can be used to play a vital role in medical care and health systems. Technologies such as GIS and the like can be used extensively to throw up new methods of applying technology to medical care and hence save lives.