Care Model factors of Pre-Hospital Emergency Services in Iran

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Abstract

Introduction: The care model of pre-hospital emergency services is one of the most important factors of reducing mortalities and Morbidities of emergency events. The aim of this study was to determine the care model factors of pre-hospital emergency services in Iran.

Methods: This is a descriptive cross-sectional study that was done in the first half of 2010 using a group decision-making technique. Required data were collected via questionnaires filled by 30 Iranian experts in pre-hospital emergency, who were selected by convenient sampling. Influential (influenced, affected or effective) factors were determined using SPSS 17.0 software (One-Sample T-Test) and then prioritized by MATLAB and Visio software.

Results: According to Franco-German and Anglo-American models along with the most appropriate hospital in terms of incident type and duration, the classification of emergency medical services (Basic Life Support [BLS], Intermediate Life Support [ILS] and Advanced Life Support [ALS]) and medical direction were counted as care model factors. In addition, the classification of emergency medical services and the most appropriate hospital based on incident type and duration were determined as the most affecting and affected care model factors, respectively, with the coordinates (1.21 and 1.21) and (1.01 and -1.01) on the pre-hospital emergency care model factors graph.

Conclusion: Care model as one of the factors of pre-hospital emergency services in Iran is very important and should be considered as a subsystem that interacts with other subsystems. The classification of emergency medical services (BLS, ILS and ALS), based on Anglo-American and Franco-German models, medical direction, as well as the most appropriate hospital based on incident type are essential for making fundamental reforms in providing emergency medical services in Iran.

Keywords: Care model, Pre-hospital, Iran, Emergency service

Introduction

The care model of pre-hospital emergency services is one of the most important factors in reducing mortalities and Morbidities of emergency events. World Health Organization (WHO) sees emergency medical services (EMS) as an integral part of a productive health system due to changes of diseases’ patterns, increase in car accidents and cardio-vascular diseases. The cardiovascular diseases are responsible for 30% of the deaths, according to data from WHO [1-2]. Cardiovascular diseases and unintentional accidents are among the most causes of mortality in Iran. Furthermore, Iran’s road accidents are more than the global rate. Although in recent years, Medical Emergency and Accident Management have made efforts to improve standards, it still has a long way to reach the international standards. They do not adequately meet the needs of patients with life- or limb threatening medical emergencies and injuries that require prompt recognition and management [3].

A study showed that more of mortalities occur in the scene and during transportation of the injured to a hospital that indicates the importance of care model and transportation [4]. The provision of EMS includes Franco-German and Anglo-American models according to the philosophy of pre-hospital care delivery. In the Franco-German system, equipment and facilities are taken to the scene of the accident, and a physician attends to the patient in the ambulance. In the Anglo-American system, trained technicians provide care for the patient at the scene of the accident and then transfer the patient to a well-equipped medical center [5]. Another classification is related to the level of care, provided in to Basic Life Support (BLS), Intermediate Life Support (ILS) and Advanced Life Support (ALS) [5]. Results of study conducted by Dick (2003) showed that the outcomes for patients with multi system traumatic injuries are poorer in Franco-German than in Anglo-American system [6]. Arnold’s study (2005) indicated that cost–benefit analysis of developing an EMS in Kuala Lumpur that meets United States standards is noticeable [7]. According to the study of Shuster, “life threatening” patients had “improved”
when pre-hospital ALS was present [8]. A review from Germany contented that Franco-German or on scene-treatment had led to a significant reduction of early post-traumatic death [9]. Some studies have shown that Franco-German model reduced patient's mortality [10]. Some countries have been successful in improving EMS, so that they allocate their available resources suitably and properly through proper planning in crisis situations. In these countries, EMS is considered as a complete system with its independent components. These components interact with each other and result in a productive system [11-13].

Germany and France represent the two most well-known examples of countries where doctors are an integral part of pre-hospital emergency care. These integrated EMS systems combine BLS-level ambulances with physician-staffed ALS ambulances and helicopters in a noncompetitive but complementary fashion. Physician-based EMS systems are always part of a multi-tiered system and often use what is referred to as a “rendezvous system” to dispatch two units simultaneously to the scene, one unit staffed with EMTs (BLS or ALS level) and one ambulance carrying the doctor. Often, the physician-staffed vehicle will be a non-transport vehicle aimed to provide quick response to emergencies without having to move a large and slow truck through traffic. EMS physicians are licensed physicians from various medical specialties who undergo a specialized training in pre-hospital emergency care. The level of mandatory education varies from country to country. In many countries with direct physician involvement in pre-hospital care, anesthesiologists compose the largest fraction of physicians and often assume the role of chief emergency physician/medical director [14-16]. In North America, EMTs provide organized pre-hospital care. Physicians will rarely be directly involved in out-of-hospital patient care on the scene. By U.S. law, physicians are required in most states to oversee the medical operations of EMS systems, either online through direct communication or offline as EMS medical directors responsible for developing and implementing standardized treatment protocols. In addition to developing standard operating procedures and approving new medical devices, EMS medical directors are responsible for quality control and improvement and are an integral part of EMT education [17]. In the United States, EMS medical directors are often emergency physicians working in the emergency department of the local hospital [13,15]. Considering the high rate of traffic accidents in Iran, Medical Emergency and Accident Management should pay specific attention to development of pre-hospital emergency services. The aim of present study was to identify care model factors of pre-hospital emergency services in Iran.

Material and Methods
This is a descriptive cross-sectional study done in the first half of 2010 using a group decision-making technique. The care model factors of pre-hospital in different systems were collected and a questionnaire was designed. A sample population of 30 Iranian experts in pre-hospital emergency, who were selected by available sampling method, was asked to evaluate the recommendations and modify the factors using their scientific and practical experience. The experts were chosen in terms of being academic and having experience in administrative responsibilities regarding emergency medical services. The questionnaire had five closed questions and one open question. The closed questions were rated using a Likert scale. A 5-point scale was used to assess the determinants and in order to determine the priority of each determinant over all others (9= extremely important, 7= very important, 5= important, 3= slightly important, and 1= equal importance) [18]. The questionnaire validity was done through content validity which itself was carried out by the emergency medicine experts from the country. In order to do so, the experts were asked to comment on the content of the designed questionnaire and its items to the written format. After collecting these comments from the experts, the necessary changes were introduced and the final questionnaire was shared with the experts and their approval was obtained. The reliability of the questionnaire was calculated by Cronbach’s Alpha Coefficient (α=0.85). The factors were identified using Delphi method. Then, the influential factors were determined using SPSS 17.0 software (One-Sample T-Test). The experts were asked to indicate the relationship between those factors and, finally, the related graph was depicted via MATLAB and Visio software.

Results
Findings of this study showed that factors of pre-hospital emergency services based on Franco-German, Anglo-American and combinative models (as needed: Franco or Anglo model), according to the most appropriate hospital based on incident type and duration, the Classification of emergency medical services (BLS, ILS and ALS) and medical direction, are important in care model. However, Iranian pre-hospital emergency experts approved of these pre-hospital emergency care model factors except pre-hospital emergency services based on combinative model (as necessary: Franco-German or Anglo-American model) (P=0.001) (Table 1). Furthermore, the factors of the "emergency medical services classification" (BLS, ILS and ALS) (P1), "pre-hospital emergency services based on Anglo-American model" (P2) and "Pre-hospital emergency services based on Franco-German model" (P3) were penetrating the system, which were placed in the cause group as first through third priorities. However, the factors of "medical direction" (P4) and "according to the most appropriate hospital based on incident type and duration" (P5) were partially influenced, which were in the effect group as fourth and fifth priorities (Table 2 and Figure 1). The factors of the "classification of emergency medical services (BLS, ILS and ALS)" and "according to the most appropriate or the nearest hospital based on incident type and duration" were determined as the most affecting and affected care model factors, respectively, with the coordinates (1.21 and 1.21) and (1.01 and -1.01) on the pre-hospital emergency care model factors graph.

Discussion
In this study, we identified and prioritized factors of care model in pre-hospital emergency services using group decision-making methods. Several studies show that the main components of EMS are the care in the accident sites, patient transportation and hospital which are
Table 1. The results of the expert opinions about pre-hospital emergency care model in Iran

<table>
<thead>
<tr>
<th>Components</th>
<th>Completely agreed</th>
<th>Completely Opponent</th>
<th>Mean</th>
<th>SD</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-hospital emergency services based on Franco-German model</td>
<td>20</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Pre-hospital emergency services based on Anglo-American model</td>
<td>20</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Pre-hospital emergency services based on combinative model (Based on the needs: Franco or Anglo model)</td>
<td>1</td>
<td>0</td>
<td>12</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>According to the most appropriate hospital based on incident type and duration</td>
<td>17</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Classification of emergency medical services (BLS, ILS and ALS)</td>
<td>15</td>
<td>15</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Medical direction</td>
<td>12</td>
<td>18</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 2. The hierarchy of affecting and affected care model factors of pre-hospital emergency in Iran

<table>
<thead>
<tr>
<th>Components</th>
<th>D</th>
<th>R</th>
<th>D+R</th>
<th>D-R</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classification of emergency medical services (BLS, ILS and ALS) (P1)</td>
<td>1.21</td>
<td>0</td>
<td>1.21</td>
<td>1.21</td>
</tr>
<tr>
<td>Pre-hospital emergency services based on Anglo-American model (P2)</td>
<td>0.39</td>
<td>0.18</td>
<td>0.57</td>
<td>0.21</td>
</tr>
<tr>
<td>Pre-hospital emergency services based on Franco-German model (P3)</td>
<td>0.39</td>
<td>0.27</td>
<td>0.66</td>
<td>0.12</td>
</tr>
<tr>
<td>Medical direction (P4)</td>
<td>0.18</td>
<td>0.71</td>
<td>0.89</td>
<td>-0.53</td>
</tr>
<tr>
<td>According to the most appropriate hospital based on incident type and duration (P5)</td>
<td>0</td>
<td>1.01</td>
<td>1.01</td>
<td>-1.01</td>
</tr>
</tbody>
</table>

Related to each other and lack of each one results in inefficient emergency medical services [19]. Results of Rudsari et al study (2007) showed that the evaluation of EMS systems in developed countries could be useful for developing countries through providing the experience of these countries. Additionally, care model plays an important role in efficiency of pre-hospital services. Therefore, care model features should be completely clear and obvious in order to provide the best pre-hospital care [20]. These results, therefore, confirm our study findings.

According to Smith’s study, one of the priorities for developing global emergency is care model [21]. Based on the findings of current study, the factors of the "classification of emergency medical services (BLS, ILS and ALS)", "pre-hospital emergency services based on Anglo-American model", "pre-hospital emergency services based on Franco-German model", "medical direction" and "according to the most appropriate hospital based on incident type" were indicated as influential components on pre-hospital emergency care model. The factor of the "classification of emergency medical services (BLS, ILS and ALS)" is influential on the other factors however is not impressive from others which show its effectiveness on EMS reform and development in Iran.
Some studies have shown that classification of prehospital emergency services (BLS, ILS and ALS) especially ALS intervention in pre-hospital emergency improves patient outcome [22-24] and other studies show that advantages of ALS over BLS interventions for traumatic victims is not certain [25-26]. In the present study, classification of emergency medical services is the most affecting factor of care model.

Franco-German Emergency Medical Services System has considerable drawbacks compared to the Anglo-American Emergency Medical Services System; even so, considering the needs of each region, using them seems acceptable [6]. Countries, namely Australia, United States, New Zealand and Canada use Anglo-American model and majority of European countries use Franco-German model. In these countries, EMS is well developed and is one of the reasons for the success of countries in pre-hospital emergency services [20,27-31].

Based on Pozner’s study (2004), medical direction in care model is very important and may be online or offline. Pre-hospital personnel under physician supervision or protocol standards act for ALS or BLS that in the present study medical direction is one of the care model factors and the effect [13].

According to the Haghparast et al study, an ineffective medical direction along with referral system is the major barriers when providing care on the scene or when transporting the victims to the hospital. These results are consistent with our study findings [32]. The results of another study conducted in Iran showed the lack of resources for communication and medical directing between the dispatch center and ambulances also between ambulances and the destination hospitals as another obstacle [33].

The results of Adnet’s study (2004) on the international EMS system: French, demonstrated that the nearest hospital is not always the best hospital for the traumatic patients. Emergency medical center allows patients to go directly to the appropriate service center [34]. Results of the present study like Adnet’s study showed that “according to the most appropriate or the nearest” hospital is very important in care model of EMS.

Conclusion
Care model as one of the factors of inside EMS in Iran is very important and should be considered as a subsystem that interacts with other subsystems. The “classification of emergency medical services (BLS, ILS and ALS)”, “pre-hospital emergency services based on Anglo-American model”, “Pre-hospital emergency services based on Franco-German model”, “medical direction”, as well as, “according to the most appropriate hospital based on incident type” are essential to make fundamental reforms in providing emergency medical services in Iran.

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References