

Barriers of Pre-Hospital Services in Road Traffic Injuries in Tehran: The Viewpoint of Service Providers

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ABSTRACT

Background: Iran is one of the countries with considerable road traffic injuries. Pre-hospital interventions have an important role in preventing mortalities and disabilities caused by traffic accidents. The present study aimed to explore the barriers of pre-hospital care in traffic injuries in Tehran, Iran.

Methods: A qualitative content analysis approach was conducted based on 21 semi-structured interviews with 18 participants. A purposeful sampling method was applied until reaching data saturation. Interviews were transcribed verbatim, and then data condensing, labeling, coding and defining categories were performed by qualitative content analysis.

Results: Four main barriers including 4 main categories and 13 subcategories emerged; they included Barriers related to people, Barriers related to metropolitan infrastructure, Barriers related to the profession and Barriers related to managerial issues.

Conclusion: Based on the findings of this study, pre-hospital service barriers in traffic accidents have many dimensions including cultural, structural and managerial domains. Policy makers in health system can use these findings to promote the quality of pre-hospital services, especially in the field of traffic injuries.

KEYWORDS: Emergency medical services; Traffic accidents; Iran

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INTRODUCTION

Based on the report of World Health Organization (WHO), road traffic injuries (RTIs) stand for 25% of injury-related mortalities.¹ Traffic injuries constitute the largest proportion of unintentional injury deaths (33%) in the world.² Road traffic injuries are the ninth leading cause of all deaths and leading contributor to the worldwide burden of disease.³ Yearly traffic collisions cause 1.2 million deaths and 20 to 50 million disabilities in the world.^{2,4} WHO estimates that without proper measures, the incidence of traffic mortalities rise by 67% and in 2020 it will be the third cause of death among 5 to 45 year old people.^{1,5-7}

Low and middle-income countries have 85 percent of traffic mortalities in the world. only 14% of traffic mortalities occur in highly motorized countries (HMC) such as North America, Australia, Newzeland, Japan and West Europe although these countries have comprised about 60% of the world vehicles.^{8,9}

Previous studies showed that death caused by traffic injuries has been increased in Africa, Eastern Mediterranean and Asia in recent years. The mean of mortality caused by RTIs among world population is 22.6 per 100000. This ratio is about 13.9 in Eastern Mediterranean and 30 per 100000 in Iran.^{10,11} In addition, the rate of traffic mortality to whole mortality is 2.5 in the world and 1.9 in the region (Eastern Mediterranean) while this ratio in Iran is about 7.5.¹²

While having one percent of the world population, one fortieth of road traffic accidents occur in Iran.¹³ Studies have indicated that Iran has too many road traffic injuries; for example, Iran with RTI fatality rate of 31. 8 per 100 000 in the year 2007 had the highest rate in the region of Eastern Mediterranean.¹⁴ In Iran, there are about one vehicle for every four individuals; in comparison, this ratio is higher than that of Eastern Mediterranean countries but lower than those of industrialized and developed countries.¹⁵ Researches show that 35 people die by every 10000 car in Iran.¹⁶ Moreover,

RTIs stand for the most prevalent cause of injury and the second leading cause of death in Iran.^{13,17}

A report by WHO showed that despite technological development, it is not clear why mortality rate in traffic injuries has a progressive trend in many countries. Although new traffic laws had effects on reduction of fatal and non-fatal rates of road traffic injuries in Iran,⁵ injuries from road traffic incidents have been increased in recent years.¹³

Comparative studies show that an important portion of traffic mortalities occur in post-crash phase (after crash, until transferring the injured victim to hospital) in Low and Middle income countries.¹⁷ One noticeable part of these mortalities are preventable by proper pre-hospital interventions.^{18,19} One of the most important roles of pre-hospital services is life support and prevention of future disabilities in the post-crash phase.²⁰ Triage of an injured patient to an appropriate trauma center can have an impact on morbidity and mortality.²¹

Studying the process and structure of pre-hospital service system provides knowledge and insight for assessment of these types of services.^{11,22} Despite the importance of pre-hospital service in preventing mortalities and disabilities caused by road traffic injuries, there is lack of knowledge in these fields, especially cultural and contextual aspects. Since the function of pre-hospital service is culture and context bound, qualitative approach was an appropriate method to design the study.²²⁻²⁵ Also, since process of pre-hospital services is a phenomenon that consists human relationships, action-interactions, and emotions that are usually hidden and could not be assessed by quantitative approaches, qualitative method was selected as an approach. By qualitative approaches, we can observe phenomenon from the eyes of the participants, and the hidden aspects of phenomenon can be explored. Determining the barriers of pre-hospital service in viewpoints of participants was another reason for selecting the qualitative approach. Lack of qualitative studies in this field is another

reason for selecting this method. The aim of this study was to explore the barriers of pre-hospital service in traffic injuries in Tehran, Iran.

MATERIALS AND METHODS

The study was based on a conventional qualitative content analysis. Applying this method is suitable when the existing theories are inadequate to describe the phenomenon.²⁶ In content analysis, concepts are gained directly and inductively from the raw data.²⁷ It is a method with the purpose of providing knowledge, new understanding, and representation of realities. The aim of content analysis is to attain a summarized and comprehensive description of the phenomenon. In this method, concepts (categories) are the product of the analysis.^{28,29} Another advantage of this method is the possibility of observation of the phenomenon, as viewed by the participants.²⁸

Data Collection

Data was gathered through semi-structured interviews. First, interviewer proposed some general questions to start the interviews such as “*Please explain one of your assignments*”. Then, based on the participants’ responses and trend of the interview, next questions were arranged. Each interview lasted about 45-60 minutes. The time and location of the interviews were arranged by agreement with the participants. Interviews were recorded in the form of audio files (MP3) and transcribed verbatim. In addition, researchers used other methods of data gathering such as field notes, focus groups and observation. For data gathering by observation, the researcher observed the scenes of crushing and recorded the observed events (field note). The se notes consisted of the type of crushing, the way first aids were provided to the injured victim, the person who provides aids to the injured person, the way the crowded people in scene of crush interfere with care giving process, and the way the action of other organizations interferes with interventions of pre-hospital

service providers. In addition, one session of focus group for enrichment of data was performed with pre-hospital managers and paramedics. This study was conducted from July 2014 to May 2015. In general, researchers performed 21 interviews with 18 participants.

Participants

Eighteen participants were selected by purposive sampling and that those with at least 2 years’ experience in the field of pre-hospital services were considered to be enrolled in the study. Then for selecting other participants, snowball sampling was also used. The participants consisted of 14 paramedics, 1 dispatch operator, 2 pre-hospital service managers and 1 police officer.

Data Analysis

Each interview was recorded and typed verbatim by the first researcher. For analyzing the data, we used a content analysis approach. According to this approach, at first, the researcher read the texts several times (intensive reading) for getting a complete understanding of the respondents’ accounts; then, the meaning units of phrases was identified and summarized. Finally, after coding, based on common properties or dimensions, similar codes were classified in higher-level categories with a new and high abstract label (Table 1). Researchers performed data collection and data-analysis phases concurrently. Data collection continued until data saturation, meaning that adding further data does not offer any new information and new properties for each category.

Trustworthiness

For examining the rigor of data and results, Guba and Lincoln strategies were used.³⁰ To insure the credibility of data, several strategies were used including: a) Prolonged engagement (data gathering lasted about one year and during this period, researchers were oriented to culture, language and environment of the participants and atmosphere of the field), b) Peer review (data and interpretation

Table 1: Example of meaning units, condensed meaning units, codes, subcategories and categories

Meaning Unit	Condensed Meaning Unit	Code	Subcategory	Category
Mistake calls are one of the problems that we have every day in this center. For example one calls 110 (police), instead of 115 (EMS).	Calling police instead of emergency medical service.	Mistake calls	Mistake calls	Barriers related to people
Even you may be on time and are responsible personnel, but one important barrier for us is traffic.	One important barrier is traffic,	Traffic	Traffic	Barriers related to Metropolitan infrastructure
We have not autonomy for performing our responsibility. The system does not use our experience and knowledge. Infact, I feel I am a taxi driver only.	We have not autonomy for perform our responsibility	Inadequate autonomy for performing professional responsibilities	Professional Autonomy	Barriers related to profession
Our tele- communication system is not up-to-date. We need systems as other organizations. We also do not have portable wireless devices.	We need the up-to-date telecommunication system.	Ancient telecommunication technology	Inadequate telecommunication technology	Barriers related to management problems

of data were checked by other researchers), and c) Member checking (data rechecked by participants and our interpretations from data were reviewed and confirmed by them). In addition, to insure the dependability of data, triangulation strategy for data collection such as interview, observation, focus group and field notes were applied. By this strategy, data can be collected from many aspects and dependability of data will be increased.

Ethical Considerations

The participants were informed about the purpose of the study. They were also informed about their authority for withdrawal from the study at any stage of study. In addition, their anonymity as well as confidentiality was insured and the participants signed the informed consent form. Ethics Committee of Tehran University and the Department of Social Welfare and Rehabilitation Sciences approved the study. In addition, one abstract of the results of the study was mailed for

participants interested in the findings. Also, recording of each interview was only done after permission of participants. Participants were informed about confidentiality of the gathered data in their interviews.

RESULTS

Based on the data, 13 categories were developed and classified into four main categories (Table 2). Main categories were classified into four branches:

A. Barriers related to people consisting of concepts (subcategory) that have at least one common property. This property included barriers that were in a way related to people such as laypeople involvement, inadequate knowledge about first aids and mistake calls.

B. Barriers related to metropolitan infrastructures. This category consisted of concepts whose common properties were problems related to characteristics and structure of the city such as traffic,

Table 2: Categories and subcategories of the barriers to pre-hospital services in road trafficinjuries

Categories	Subcategories
Barriers related to people	Inadequate knowledge about first aids Laypeople -Involvement Mistake calls
Barriers related to Metropolitan infrastructure	Traffic Accessibility to streets and alleys Naming of alleys
Barriers related to profession	Professional Autonomy Workload Work-related injuries
Barriers related to managerial issues	Inadequate telecommunication technology Inadequate human resources Inappropriate workload related privilege Lack of organizational coordination

accessibility to streets and naming of the alleys.

C. Barriers related to profession. In this main category, there were concepts that explain barriers related to pre-hospital service providing profession. In this category, there are three subcategories: professional autonomy, workload and work related injuries.

D. The fourth main category named barriers related to managerial issues consisting of four concepts that were common in property of managerial problems in the field of pre-hospital service. These concepts were named inadequate telecommunication technology, human resources, inadequate workload related privilege and lack of organizational coordination. In the next section, you can see categorization of main categories and related quotations:

A. Barriers related to people:

A. 1 Laypeople -Involvement: Crowded area in the crash scenes is a problem that was brought up by the participants. Overcrowding around the crash scenes may act as a barrier for proper and on-time pre-hospital interventions. One of the participants (p2) stated:

“In many situations, when we arrive in the crash location, people crowding around the scene area barrier for timely interventions. In addition, usually their incorrect interventions will increase the severity of the injury. ”

A. 2- Inadequate Knowledge on First Aids: usually, people directly perform interventions

that may worsen the problems of the injured person. The cause of these inappropriate actions is usually inadequate knowledge about first aids interventions. As an example, one of the participants (p5) noted:

“Always people do not have enough skills for proper interventions in the accident scene and this problem may worsen the severity of injuries”.

A. 3- Mistake calls: In many situations, people call the number of Emergency Medical System (EMS), instead of other organizations such as firefighter and the other. This causes confusion and many problems. One of the participants (p3) noted:

“We have about 10000 calls, daily, in Tehran that one half of them are mistake or irrelevant”.

B. Barriers related to Metropolitan infrastructure:

B. 1- Traffic: Traffic jam is a serious problem and barrier for prompt interventions by pre-hospital service providers. One of the participants (p11) stated:

“Many of our people have not acquired acceptable traffic culture and knowledge and this problem is a barrier for on time arrival to the scene and transporting the injured victim to hospital”.

B. 2- Accessibility to streets and alleys: Problem with accessibility is one of the barriers mentioned by the participants. One (p6) stated:

“In many situations, because the streets and alleys are too narrow or too crowded, we have to stop and leave the ambulance faraway from the crush location. This acts as one cause of delay and this is especially noticeable and problematic during transport of the injured victim to ambulance”.

B. 3- Naming of alleys: In many locations, there is not a logical and systematic approach for naming the pathways. One participant (p1) expressed that:

“Non-systematic approach for naming of alleys causes problems and makes it complicated for pre-hospital service providers to find a location. For example, many alleys are named using numbers followed by an alley named using a special noun”.

C. Barriers related to profession:

C. 1- Professional Autonomy: participants frequently mentioned inadequate professional autonomy. One participant (p5) announced that:

“The pre-hospital system does not consider our professional capacities, knowledge and experiences. In many situations, we act only as a transporter. In many circumstances, when I consult with the physician in our center, the only order is to transport the patient to the hospital. We have no authority for any other action”.

C. 2- Workload: Based on the participants' accounts, workload may act as a barrier for service providing. Specially, this is considerable about payment system. According to participants, salaries do not suit their workload. One said (p13):

“In this part of the city, we have a high number of accidents and traffic injuries, but this is not considered by administrators of pre-hospital system. In fact, there is no difference between a high workload center and other centers”.

C. 3- Work-related injuries: Many injuries may occur during care giving by pre-hospital service providers. One participant (p14) noted:

“When we transport an injured victim to ambulance, injuries such as low back injuries and other problems may occur. Our profession is heavy and deliberate. If

one is not careful, permanent injuries and disabilities may occur. These problems may affect the paramedics' quality of life and even at the end, lead to losing the job”.

D. Barriers related to managerial issues:

D. 1- Inadequate telecommunication technology: Improper and inadequate telecommunication technology was one of the problems often announced by the participants. One (p2) stated:

“In many situations, when our ambulance cannot go so closed to collision scene, we have to communicate to our dispatch center using mobile phones or landline telephone. In these situations, old technology of telecommunication devices may limit our proper and timely interventions”.

D. 2- Inadequate human resources: One of the barriers of delivering proper pre-hospital services in viewpoints of care providers was inadequate number of care providers. In addition, the absence of physician in ambulances was another problem implied by many participants. One of the participants (p18) said:

“When I am bedside an injured woman, because of cultural and religious considerations, there are many limitations to give care to her. In these situations, having a woman technician in the ambulance may decrease such problems and promote the quality of care providing”.

D. 3- Inappropriate workload related privilege: This problem was another issue noticed, by the participants. A participant (p12) announced:

“This problem may decrease our motivation and the quality of pre-hospital care. Rewards must correspond to the load of work. In fact, the level of rewards in high and low workload centers is equal and this is one of the weaknesses of our pre-hospital care system. ”

D. 4- Lack of organizational coordination: Problems on inter- and intra-organizational coordination are are issue mentioned by the participants. One participant (p4) said:

“Involvement of other service providers

such as firefighters or police in the accident location can be disturbing as they may sometimes interfere with our activities. I think this problem is related to the lack of coordination between the involved organizations”.

DISCUSSION

This study was an attempt to identify the barriers of pre-hospital caregiving classified into four main categories: barriers related to people, to metropolitan infrastructure, to the profession and to managerial problems.

Many aspects of these findings are similar to those of Haghparast et al.³¹ They argued that administrative and organizational factors, also staff qualifications and competences, availability and distribution of resources, communication and transport, involved organizations and laypeople could act as barriers in the chain of care from crush incident to the hospital. Causes such as, administration, communication and transportation, involved organizations (named as lack of organizational coordination), and laypeople involvement, that have been brought up by Haghparast et al. are confirmed in the current study.³¹ Moreover, findings of the present study are in the same line with Khorasani et al.³² Laypeople involvement, lack of coordination, inadequate pre-hospital services, and shortcomings in infrastructure are found as barriers of pre-hospital service in road traffic injuries both by the current study and in that of Khorasani et al.³² In the study of Big deli et al. also traffic, crowding of laypeople in the scene of the crush and involvement of other organizations have been mentioned as factors that interfere with interventions of pre-hospital care providers in traffic accidents.³³

One category of barriers identified by the present study is barriers related to people classified into three subcategories: laypeople involvement, inadequate knowledge about first aids, and mistake calls. Based on this study findings, one aspect that differentiates

pre-hospital care in road traffic injuries from other fields of pre-hospital care giving is crowding of people in the scene of the crush. Based on the findings of the current study, this problem not only prevents prompt care provision to the injured victims, but also it may worsen the condition of the injured victim because of inappropriate interventions delivered by people in the scene of accident. This has been also discussed by previous studies.^{31,32,34} Another result of our study was that although laypeople involvement has been considered as a barrier, according to many participants, if care providers manage the scene, laypeople could be turned into a capacity to accelerate and facilitate pre-hospital interventions. Findings presented by a few studies such as that of Tannvik et al.³⁴ have emphasized this matter.

Inadequate information and knowledge about emergency agencies and wrong calls were also combined in one category named the barrier related to people. Inadequate information and wrong calls have also been pointed out by other researchers.^{17,32} Knowledge providing and distribution of information on first aids and pre-hospital service processes among people may act as a factor to reduce their improper interventions in the scene of the crush. Several studies have stressed the importance of adequate information and knowledge.^{33,35}

Another category of barriers identified by this study is those of metropolitan infrastructure including traffic, accessibility of alleys, and naming of alleys and streets. In fact, this category of barriers, especially *traffic*, has a remarkable confounding role in pre-hospital service delivery. It is even more considerable in traffic collisions. Traffic is a barrier that has been highlighted in both this study and several other studies.³¹⁻³³ To resolve these problems, there is a need for comprehensive assessment of the pre-hospital system and the ways other organizations (for example firefighters, police, and so on) may involve and collaborate in this system.

Our results also show that there are

some profession-related issues that may act as barriers for pre-hospital care delivery. These issues include professional autonomy, workload and work related injuries. Several previous studies have considered workload and work related injuries as barriers for care providing in the pre-hospital situations.^{31,32} However, professional autonomy is a concept that in the current study was emphasized by many of care providers (paramedics) as a factor that can decrease their motivation. In addition, use of woman paramedics in ambulance crew is an aspect of barriers that has not been mentioned by other similar studies. Based on our research findings, it can be inferred that issues such as workload and work related injuries might strongly affect the circumstances and the manner of actions done by care providers. Further, these factors can diminish the staff's motivation, as mentioned by most participants. Lack of motivation, in turn, may act as a reason for worsening the quality of services. Some issues that may decrease the motivation of care providers and quality of care and noted by participants were payments that do not correspond to workload, inadequate number of colleagues, and the rigidity of the physician orders.

Results of the present study showed that there are problems in the field of management. These factors were classified as barriers related to managerial problems, including inadequate telecommunication technology, inadequate human resources, inadequate workload based privilege, and lack of organizational coordination. Many aspects of this category have been mentioned by other studies.^{5,13,31,32} Study of Nielsen et al. also showed that one of the problems in low and middle income countries was managerial issues.¹⁰ One of the aspects that can be mentioned as a barrier and was emphasized by participants was lack of women in ambulance crew. Studies show in advanced countries, women are in arrangement of paramedics.³⁶⁻³⁸ Another issue mentioned as barrier by participants was lack of physician in ambulance assignments. Studies show that pre-hospital systems in

high-income countries use physicians in ambulance crew.^{37,39,40}

Many issues can be mentioned as limitations of this study. For example, when interviewer was in the pre-hospital context to interview with paramedics, they had to go for emergency assignment and this was a factor that interrupted the interview process. In these conditions interviewer had to continue the interview in the ambulance during the assignment or after returning the participants from their assignment. Based on conditions, many interviews performed in ambulance crew and traffic and noises were factors that interfered with recording of interviews. This caused the interviewer to plan for another session of interview with the participant or recheck the previous interview with them.

CONCLUSION

This study found that not only laypeople's involvement could not be seen merely as barrier but also it can be a potential in some situations and contexts, if care providers manage the scene of the crash. Based on these findings, a fundamental change in management system may lessen the problems and solve the barriers like metropolitan infrastructure and managerial issues. According to our knowledge, some barriers such as laypeople involvement, inadequate knowledge about first aids and wrong calls can be reduced through public education, information campaigns and changing attitudes.

Because of socioeconomic and cultural context, future studies are suggested to explore issues related to laypeople's involvement and their interventions in the scene of collision, because based on the study findings, laypeople's involvement cannot be seen merely as a barrier. In addition, future studies are suggested to assess the effect of women (as care providers) and physicians in ambulance crew on quality of pre-hospital service provided specially for injured victims. Considering the fact that the process of providing pre-hospital service in

traffic accidents is not well established other qualitative approaches such as grounded theory method is recommended for further studies.

Findings of this study contribute to improvement of the pre-hospital service system and can be used by health policy makers. For example, laypeople education, improvement of organizational coordination, use of strategies to expand the professional autonomy of paramedics, and application of practicable strategies can increase the motivation of pre-hospital care providers. In addition, use of new and appropriate telecommunication technologies and recruitment of more women and physicians as the ambulance crew may be a part of their future programs to promote and improve the quality of pre-hospital care.

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