

# Challenges of Organisational Structure and Human Resources in Pre Hospital Emergency Medical Systems for Cardiopulmonary Resuscitation: A Qualitative Study

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## ABSTRACT

**Introduction:** Studies about Cardiopulmonary Resuscitation (CPR) in pre hospital setting in Iran is limited. Despite the importance of this issue, numerous challenges in this area are left unattended.

**Aim:** To explore the challenges of the organisational structure and the human resources in pre hospital Emergency Medical Systems (EMSs) for CPR.

**Materials and Methods:** This qualitative study was conducted using content analysis approach. Data was collected through semi-structured interviews in 2020, until saturation was achieved. The participants were 16 Iranian emergency medical staff who were selected through a purposive sampling method. Data were analysed based on the Graneheim UH and Lundman B approach.

**Results:** Thirteen participants were males and the rest were females. The mean age of the participants was 33.06±7.85 years

and their mean work experience was 10.62±6.63 years. By analysing the data, the information was placed in two main categories- “the challenges of human resources” which includes four sub categories (lack of experience and skills, intrapersonal challenges, non targeted performance and weakness in education as the existing challenges), and “the challenges of organisational structure” which includes three sub categories (improper structure and access, lack of organisational support and shortages of the facilities and the equipment as the existing challenges).

**Conclusion:** Results from the present study revealed that pre hospital EMSs staff had to face various problems, challenges and limitations in CPR. Therefore, the ability of these staff to manage these challenges should be increased through the opportunity to acquire clinical knowledge and skills in order to improve patient-centered services.

**Keywords:** Cardiac arrest, Cardiac life support, Content analysis, Healthcare staff

## INTRODUCTION

Cardiac arrest is addressed as one of the leading causes of death throughout the world [1]. More than 500,000 adults die each year due to cardiac arrest outside or inside the hospitals [2]. The United States (US) statistics shows that 335,000 cardiac arrests occur outside of the hospitals each year [3]. In addition, according to a report from the American Heart Association, the number of Out-of-Hospital Cardiac Arrests (OHCAs) assessed by the EMSs is 110.8 per 100,000 and the number of patients treated by these systems is 57 per 100,000 [4]. Hence, OHCA is considered as one of the leading causes of death and disability worldwide by affecting 1% of the population [5,6]. The rate of survival to hospital discharge, the rate of survival to hospital admission and the one year survival rate are 8.8%, 22% and 7.7%, respectively [7]. It also accounts for 10% of the total death in developing countries, and approximately 60% of which is assessed by the EMSs [5,6].

CPR is the first line therapy for sudden cardiac arrest [8]. Although the CPR is performed to restore the blood flow, the survival rates are low and vary from country to country [9]. Survival of patients with OHCA requires a coordinated set of actions including immediate recognition of cardiac arrest, activation of the emergency response system, early CPR, and other vital actions [10]. This chain of survival encompasses the community, the ambulances, and the pre hospital EMS navigation centre [10].

Pre hospital emergency care plays a vital role in saving human lives [11]. The success of pre hospital EMSs depend on the people present at the scene, the skill level of the relief workers, the interventions, the rapid transfer using appropriate facilities, the response time, the ability of the people in charge, the trained staff, the facilities,

the coordination, and the communications [12,13]. Although international guidelines are used in all systems for resuscitation, the data show significant differences between pre hospital EMSs regarding the success of the treatment of cardiopulmonary arrest as well as the CPR [14]. Hence, the assessment as well as the treatment of OHCAs has become a challenge, along with other challenges for the pre hospital EMSs [11,15].

In recent years, CPR in pre hospital EMSs has received a lot of attention. However, each treatment unit has its own unique challenges, and hence the specific challenges of pre hospital EMSs are not the same as those found in treatment units. This is because in these systems, there are different challenges from different people and the system itself [16]. CPR is no exception to these challenges. The structural challenges of CPR in pre hospital EMSs are very little known or not known at all, because it has not been thoroughly assessed. The CPR is considered as a unique skill and procedure that needs to be carefully and expertly researched into. The best approach to provide a better understanding of these aspects of CPR treatment is qualitative research, because this kind of research is used to describe behaviours, emotions, life experiences, perspectives, values, cultures and human relationships [17]. In this approach, components are studied in the natural environment, and attempts are made to interpret and argue the phenomena based on what individuals express [18].

Studies have been conducted regarding the comparison of various training methods of CPR [19], the relationship between staff skills and the efficiency of CPR [20], and the statistics related to out-of-hospital CPR [21]. Nonetheless, not only have these studies been conducted in a different context, but also in none of these studies the

challenges of organisational structure and human resources of CPR in pre hospital EMSs have been scientifically analysed. Considering the differences in the pre hospital EMSs in different parts of the world and despite the great efforts in the field of CPR, the challenges of this operation in the pre hospital EMSs have not been properly studied yet. Hence, the present study was conducted with the aim of exploring the challenges of the organisational structure and the human resources in pre hospital EMS for CPR using a content analysis approach.

## MATERIALS AND METHODS

The present descriptive qualitative study was performed using the content analysis approach based on Graneheim UH and Lundman B approach [22]. After obtaining approval by the ethics committee this study was conducted from February to March 2020, in the central provinces of Iran. There are five pre hospital emergency bases in the centre of the province and each base has between 5-6 staff. Participants were purposefully selected from all these bases.

The permission of the Joint Ethics Committee of the School of Nursing and Midwifery and the School of Rehabilitation of Tehran University of Medical Sciences (IR.TUMS.FNM.REC.1398.125) was received. The permission to conduct the study was obtained from the managers. The written and informed consent form was signed by those who were willing to participate in the study. The participants were assured that all the interviews would be kept confidential and unnamed by the researcher.

**Study participants:** The total number of staff in these five bases was 30 and 16 of them were included in the study, based on the inclusion criteria. Before starting the interview to select the participants, CPR statistics of these staff were extracted from computer data. The choice of these bases was due to having more missions than other bases (at least six missions in one working day). Staff with different degrees (Bachelor of Anaesthesiology, Emergency Medicine and Nursing) and professional positions (bases manager, training and quality control staff) participated in the study. Staff with the experience in CPR were selected through a purposeful sampling method. Some of the participants also worked at the base and at the same time they had responsibilities in the field of training and quality control. Participants worked 175 to 350 hours per month. Work shift of each participant was 24 hours during the study. The number of missions performed during 24-hour period was a minimum of six and a maximum of 15. In other words, each participant dealt with at least six patients daily. Respiratory, cardiac, gynaecological, peripheral, and cardiopulmonary arrests were among the participants' missions during the workday. In order to have maximum diversity in the participants, sampling was done at different urban and road bases. The time and place of the interviews were selected to be at the participants' workplaces, according to their wishes, and in a quiet environment.

**Inclusion criteria:** Participants were included in the study if they had at least one year of work experience, experience of caring for four cases with the CPR during the last two months and had an active role in CPR.

**Exclusion criteria:** Lack of willingness to continue the interview and inability to express their experiences fully and accurately were the exclusion criteria.

## Data Collection

A total of 16 face-to-face and semi-structured interviews were conducted with all the participants. Data saturation was obtained in interview 13, however, to increase the richness of information, three other staff were interviewed. All interviews were conducted by one researcher. The main questions included: What has been your experience with CPR? What were the challenges you experienced in CPR? Please explain more about the challenges of organisational

structure and human resources? The interviews lasted between 45-60 minutes. If necessary, additional interviews were conducted with the participants. All the interviews were recorded using a digital device. In the shortest possible time after the interview, the data were also typed in a computer.

## STATISTICAL ANALYSIS

Collected data were analysed based on Graneheim UH and Lundman B approach [22]. This approach consists of several steps including reading the interviews and achieving a general understanding, considering the whole interview as a unit of analysis, selecting the meaning units, coding the meaning units, comparing the codes and reaching abstract categories, comparing the categories with each other, and introducing the main themes. To achieve this, after conducting the interviews, each interview was reviewed several times, and after achieving a general understanding of the data, the data analysis was performed. In the next step, after specifying the meaning units, a specific code was given to each one. Coding was done using MS Word software. In the next step, by constantly comparing the similarities, the differences, and the proportions, the codes that emphasise a single subject were placed in one category, and the subcategories were categorised. In the last stage, through deep reflection regarding the subcategories, as well as examining and comparing them with each other, the content hidden in the data were introduced as the main categories. For rigor, five proposed criteria of Guba and Lincoln including credibility, transferability, confirmability, dependability, and authenticity were considered [23,24].

## RESULTS

Sixteen people with a mean age of  $33.06 \pm 7.85$  years with the work experience at geographical bases, urban bases (bases within the city to cover the urban accidents), road bases (bases on the road to cover the road accidents), the telephone triage unit (the first place of communication between the client and the EMS), and the navigation unit (the unit that is responsible for sending the most appropriate operational code in terms of type, distance and number to the emergency location and navigating the ambulance until the end of the emergency) participated in this study [Table/Fig-1]. The mean work experience of participants was  $10.62 \pm 6.63$  years. By analysing the data, the information was put in two main categories ("the challenges of human resources" and "the challenges of organisational structure") [Table/Fig-2].

No.	Age (years)/Sex	Work experience (years)	Units
1	27/M	2	road, urban base
2	32/M	8	road, urban base
3	30/M	10	road, urban base
4	34/M	9	road, urban base
5	30/M	9	road, urban base
6	28/M	10	road, urban base
7	38/M	14	road, urban base
8	24/F	2	triage, the navigation unit
9	35/M	13	road, urban base
10	50/M	15	road, urban base
11	50/M	29	road, urban base
12	32/M	12	road, urban base
13	24/M	4	road, urban base
14	34/M	13	road, urban base
15	36/F	16	triage, the navigation unit
16	25/F	4	triage, the navigation unit

[Table/Fig-1]: The participants' demographic characteristics.  
M: Male; F: Female

Category	Subcategories
The challenges of the human resources	Lack of experience and skills.
	Intrapersonal challenges.
	Non targeted performance.
	Weakness in education.
The challenges of the organisational structure	Improper structure and access.
	Lack of organisational support.
	Shortages of the facilities and the equipment.

[Table/Fig-2]: The categories, and the subcategories.

### The First Category: The Challenges of Human Resources

**The lack of experience and skill:** In this subcategory, the participants mentioned lack of experience and skills regarding the performance of the tasks as well as the principles of resuscitation among the staff as the existing challenge. The experiences of a participant with an associate degree and nine years of work experience at road and urban bases reflects the above challenges.

“Eventually, you go on the mission with someone, especially new company staff who are just coming in. Employees that have just entered the system it’s really hard to go on a mission with these people. Even when they come, you have to drive the ambulance, do the work and manage all. Also, along the way, you should always be focused on how the new staff will work? You always have to tell them what not to do and what to do. At the end, you have to sit down and teach them how to write a report, because if they make an error, I will be held accountable as a senior.”

In this subcategory, some participants mentioned inability to manage the scene and lack of communication skills as the existing challenges. The experiences of a participant with a bachelor’s degree and 14 years of experience at urban and road bases reflects the above statement.

“At once, I told Mr. ... to do a CPR. Put his hands somewhere and begin massaging. He was completely frozen. He was looking to see what the others were saying. One of the people present at the scene tells to take the patient and transfer her/him, while another says not to. He was a novice; and I think it was his first shift in the EMS. Eventually, I myself started the venipuncture and left an airway for the patient. I got the vein with difficulties. The condition was getting worse. I saw that my colleague’s procedure was not very effective.”

**The intrapersonal challenges:** In this subcategory, the participants mentioned physical disability, weakness in inner strength and loss of motivation as the existing challenges. The following statement, expressed by a participant with a degree in paramedic and 15 years of work experience, reflects that physical problems are among the challenges that the staff experience.

“I even have a letter from the Iranian Legal Medical Organisation that I cannot work inside the city have medical problem in my neck, three of which are critical and need surgery. I also have two lumbar discs. After I do CPR, when I go home two hours later, my symptoms appear to be getting worse.”

The participants mentioned the technician’s lack of commitment to medical emergencies, the technician’s inadequacies and the technician’s inconvenience of being in the EMS as the existing intrapersonal challenges. The following statement, expressed by a participant with a bachelor’s degree and work experience in urban, road and navigation bases, reflects the above statement.

“Emergency staff who should be motivated and up-to-date so they can understand as fast as changes and perform accordingly. Yet, we are not progressing. Many of us feel this way. I do not know what is happening in this EMS. The structure of the EMS has changed a lot and all this affects our performance, in particular, our performance regarding the resuscitation. These mental conflicts of the staff have become too much, and the staff motivation is decreasing.”

**The non targeted performance:** In this subcategory, the participants mentioned theatrical resuscitation, futile resuscitation and not performing

the resuscitation in patients as the existing challenges. The following statement, expressed by a participant with 10 years of experience as a relief worker and technician at urban and road bases, reflects the experience of the above challenge.

“Most of the times, when we arrive at the scene, we see that an hour has passed after the person’s death. He/she has rigor mortis. He/she has cyanosis. So, it is useless to do CPR for such a person. However, there is so much pressure in the scene and accompanied by agitation that if you do not do something, they will assault you. In this case, resuscitation was done.”

The following experience, expressed by a participant with a bachelor’s degree and work experience in urban and road bases as a technician, also reflects the challenge of the futility of resuscitation.

“In my opinion, CPR is a futile intervention in the pre hospital EMS, and two-person CPR does not make any sense.”

In addition, most participants mentioned the duality of non-transfer of a patient with complete arrest and the compulsion to transfer such patients as the existing challenges. The following statements expressed by participants with work experience in urban, road and navigation bases reflect the experience of this dual challenge.

“I also had an experience of resuscitation in a building without an elevator. I had many of these cases. Usually, we do not take them anywhere. We try to do the CPR for them inside the house, and announce the end of the resuscitation there.”

“Well, you sometimes go to some places where you are forced to take a patient with cardiopulmonary arrest to the hospital.”

**The weakness in education:** In this subcategory the participants mentioned turbulence in education, shortcomings of education, and preferences in education as the existing challenges. The following statements, expressed by participants who have previously been relief workers and are now technicians in urban and road bases, reflect the above challenges.

“Well, this is also one of the shortcomings of the EMS that has always existed. Firstly, the classes are not efficient enough; and secondly, people, who attend the classes, come and go, and just announce their presence, and no one evaluates the result of these classes.”

“Most of the things we’ve learnt are theoretical but only theory is not enough, we have to put it into practice. We have to experience what we studied in university together in practice. These classes keep us up to date. This can be very helpful in CPR. The least is when you have a monitor in front of your eyes, when you are alone, the things you saw in class are all associated with you. Is this asystole? Is this arrest? You have it all in your mind.”

In this subcategory, some participants mentioned the lack of educability of the people and how to teach dispatch as the educational challenges. The following statements, expressed by the expert who is working in the triage and navigation units, reflect the above challenges.

“There was a case of an elderly man. His caregiver was his wife, an elderly woman. She said that her husband was sitting, and suddenly fell. I realised that this was a cardiac arrest. I asked if he was breathing or if he had a pulse and had a history of any illnesses. I said to the ma’am “I’ll teach you how to do the CPR, and you do it.” But she said: “I can’t, I’m afraid.” I think she was very old. I tried very hard to convince this lady that CPR is not a difficult task. I told her to do it until my colleagues arrives. Whatever I did, I could not convince her.”

### The Second Category: The Challenges of Organisational Structure

**The improper structure and access:** In this subcategory, the participants mentioned improper location of the bases, improper exit of the bases, improper structures and gates of the bases as the existing challenges regarding the CPR. The following statements,

expressed by two participants with the work experience at urban and road bases, reflect the above challenges.

“Our area has a strategic problem. Our base is outside the city and in front of a square. If we want to cross, we always lose three minutes. That means our total time is plus three minutes. In other words, you have to add 3 to 4 minutes to all our missions, and it is the time required for us to reach the city. And our mission time is longer than the average time of emergency base in the whole province.”

“Our emergency base is in the center of the city ... We do not have a sign in front of the door that show emergency base.”

**The lack of organisational support:** In this subcategory, the participants mentioned lack of a productivity law, lack of getting off after the CPR, legal issues, and shortcomings in salaries and benefits as the existing challenges. The following statement, expressed by a participant who has previously been a relief worker and is now a technician in urban and road bases, reflect the above challenges.

“The productivity, the reduction of working hours, and the increase in salaries, which are not provided for us, should be applied. What have been approved in the parliament eight years ago should be applied to us; yet, it is not. This itself results in frustration of our colleagues. Naturally, it affects the work. It is true that we are humans and altruistic. We have to do our job and we do it, but it affects us, it definitely has an effect. I will be certainly disappointed.”

In this subcategory, some participants mentioned lack of psychological support as an organisational challenge for CPR. The following statement, expressed by a technician in urban bases, reflect the above challenge.

“We are not provided with psychological support. I made you an example about that child. I still see the scene in front of my eyes ... It was very bad .... It was very difficult ... Those times are hard for me and has an impact on me ... sometimes, I needed a psychologist, but our organisation does not have one.”

The following statement, expressed by a technician with 10 years of work experience in road base, reflects a set of shortcomings regarding the organisational support.

“We are not supported as we should be. Attention support, financial support, and welfare support. We have no welfare support. For example, they can simply come and say that we have provided a swimming pool for our EMS staff. Two nights a week. They can consider a gym for us. They can consider psychiatric and psychological sessions. They can have a full-time team to support us, or they can provide a team that come at least three days a week. We do not have such things here.”

**The shortages of the facilities and the equipment:** In this subcategory, the participants mentioned that the living conditions are not at par. The following statement, expressed by participants with 29 years of work experience, reflect the experience of this challenges.

“Come and see, we cook the food inside the base, and what should we do if a mission is announced while cooking? It is a problem itself. If we say that the organisation itself will prepare food for us, they will choose and prepare low quality food. On the other hand, if we cook ourselves, and a mission is announced, we have to drop the food and go on a mission. This is a challenge.”

In this subcategory, most of the participant's experience challenges and shortcomings regarding the equipment in the ambulance. The following statements, expressed by two participants with 4 and 2 years of work experience, reflect the experience of challenges such as lack of a proper cooling system, lack of manual and portable suction system in the ambulance and inadequate parking lot.

“At the base, since the ambulance was exposed to the sun, the back of the ambulance was the same as the bath. In my opinion, this also affects the quality of the resuscitation we provide. The heat itself makes us impatient. We do not have a proper parking lot,

and the ambulance's cooling system is broken. We had no cooling system for almost two years.”

“Well, we do not have a portable suction system in our ambulance. And it has been two and a half years since we don't have a manual suction system.”

## DISCUSSION

The results of this study indicated that the forces confront with many challenges regarding the human resources such as the lack of experience and skills, intrapersonal challenges, non targeted performance and weakness in education. In addition, the participants confront with several challenges regarding the organisational structure such as improper structure and access, organisational support, and the shortages of the facilities and the equipment. It should be noted that, at this point, no study has examined the challenges of the organisational structure and the human resources of CPR in pre hospital EMS.

One of the results of this study was the lack of experience and skills among the staff. The results of one study revealed that the medical staff and pre hospital emergency managers lack the necessary skills in disasters [25]. The results of another study showed the inadequate skills and ability to manage the scene among pre hospital EMS staff [26]. Some studies have suggested that one of the barriers to successful resuscitation is the lack of skilled and experienced individuals [27,28]. Although these studies have not directly addressed the lack of skills and experience as a challenge in CPR among the pre hospital EMS staff, they have shown the importance of experience and skills, which in some ways, reflects the concerns and somewhat consistent with the results of the present study.

In the present study, intrapersonal challenges were one of the issues that staff were involved with. The results of different studies have shown that pre hospital EMS staff suffers from low back pain and musculoskeletal problems [29,30]. The results of these studies were expressed quantitatively which indicate the challenge of physical problems among these staff. In one study, the experience of the participants showed a decrease in EMS staff's motivation [26]. The exploration of the participants' experiences is consistent with the results of the present study. In some studies, the medical staff's level of organisational commitment was moderate [24,31]. The results of these studies are in line with the results of the present study, and showed that decreasing motivation is one of the challenges that staff face. In the present study, participants face a challenge called non targeted performance. There is no study that directly addresses the futility of resuscitation as well as the resuscitation.

Ambulance personnel may initiate or continue resuscitation even when they are aware of the futility and inadequacy of their resuscitation [32]. They may have various reasons, such as concern about the behaviours of family members [33]. In the pre hospital emergency department, when the patient's heart rhythm is without other symptoms of asystole, survival after CPR is disappointing and it is therefore recommended that CPR should be terminated or not even started in this condition and the patient should not be transferred to hospital [34]. This is in line with the experience of the participants of the present study because the participants of the present study also stated that in such circumstances, CPR should not be started, but sometimes they are forced to start or continue CPR. In 2009, a guideline was issued stating that resuscitation should be stopped under certain conditions, such as the absence of a reversible heart rhythm prior to patient transfer and the lack of a proper heart rhythm for shock. The phrase “futile and potentially inappropriate interventions” was introduced for these patients [35].

Consistent with the results of the present study, one study has identified the weakness in education and awareness, and the people's poor knowledge as the challenges of pre hospital EMS in the field of care and prevention [26]. The weakness in education has been reported in other studies [36-38], these studies are not about

the challenges experienced by pre hospital emergency staff in CPR. The results of several studies indicated the weaknesses in educability and the lack of awareness in the people [36,39]. The results of the mentioned studies are somewhat in line with the results of the present study, however, it should be noted that inadequate training can lead to the loss of a patient's life, if CPR is not done properly.

The present study showed that the improper base structure and location also are a challenge for the staff. The results of one study showed that the suitable location of the base and the unfavorable conditions of the base are among the challenges of the pre hospital EMS [11]. The results of another study showed that the lack of adequate physical space is one of the structural challenges of hospital's emergency department [40]. One study has identified non standard road infrastructure as a barrier to caring for patients with trauma [36]. However, no study was found to explore the challenges within the structure. In addition, the results of these studies emphasise the importance of the location as well as the proper structure of the pre hospital EMS base.

Consistent with the results of the present study, the results of one study showed that the lack of attention to welfare issues, salaries, insufficient financial incentives, lack of psychological and work support are among the challenges of providing services in the pre hospital EMS [26,36]. The results of one study showed that one of the reasons for staff dissatisfaction is the lack of attention to welfare issues, salaries and benefits, and the low reward [11,40]. Although the mentioned studies have directly stated this lack of support as one of the reasons for job dissatisfaction. However, the concept of lack of organisational support is consistent with the results of the present study.

The results of one study showed that the lack of essential facilities and drugs are among the barriers to effective care in patients with trauma [36]. Another study showed that the lack of ambulance equipment is one of the barriers to managing the patients [41]. Although in these studies, these shortcomings are not considered as the challenge, it is somewhat in line with the present study. In one study, it was found that worn-out ambulances, the lack of facilities such as electroshock, the inadequacy of ambulances in terms of cooling and heating, the lack of up-to-date facilities, and the low quality of consumables are barriers to providing optimal prevention and care services [26]. The results of the present study were in line with the mentioned study and some results of other studies [37,38].

In terms of the comparison between the results of the present study and the other studies, although some results are consistent, the presence of these challenges in one of the most difficult and critical pre hospital emergency missions, CPR, distinguishes these results from the results of other studies.

### Limitation(s)

In this study, pre hospital managers were not interviewed. So, the study could not evaluate the factual correctness of the findings, because it was solely based on the experience of the staff only.

### CONCLUSION(S)

The results of the present study showed that pre hospital EMS staff faces various problems, challenges and limitations in CPR. Therefore, the ability of these staff to manage these challenges should be enhanced through training to acquire clinical knowledge and skills in order to improve patient-centered services. Policy makers are expected to take steps to address existing challenges by enacting the necessary rules and regulations and to contribute to the provision of appropriate conditions for better and more appropriate implementation of CPR.

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