DOI: 10.7860/JCDR/2020/44344.14031

Original Article

Nursing Section

Nurses' Experiences of Managing Cardiopulmonary Resuscitation: A Qualitative Study

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ABSTRACT

Introduction: Cardiac arrest is one of the leading causes of death. Nurses are often the first members of the healthcare teams to deal with these patients. The management of how nurses performing resuscitation has drawn a lot of attention.

Aim: The present study was conducted with an aim of determining nurses' experiences of managing Cardiopulmonary Resuscitation (CPR).

Materials and Methods: This qualitative study was conducted using the content analysis approach. Fourteen nurses with different positions and active roles in the CPR were selected purposefully. Data were collected through semi-structured interviews from July to December 2019. Data were analysed based on the Graneheim and Lundman's approach. Guba and Lincoln's trustworthiness criteria were used to obtain the trustworthiness of data.

Results: Fourteen Nurses, with mean age of 32.14±4.34 years and mean work experience of 9.78±4.50 years were included in the study. Four main categories and fourteen subcategories were recognised in the questionnaire, including the role of human resources (fluctuation of coordination and cooperation, capability and motivation), management of procedures (cardiac massage, shock, airway, drug therapy, and vascular access), role of context and structure (equipment and physical space, contextual factors, and losing time) and the role of law and ethics (guideline, reporting and evaluation, and power of conscience).

Conclusion: This study showed that nurses face various challenges and limitations at the beginning, during and after resuscitation in the management of CPR. Therefore, nurses' ability to manage and execute this process should be enhanced.

Keywords: Cardiac arrest, Healthcare staff, Qualitative research

INTRODUCTION

Cardiac arrest is an unexpected sudden event that happen at any location, at any time [1], So that there are more than 500,000 deaths each year outside and inside the hospital (in the world) [2]. The main strategy in bringing the patient back to life is CPR [3]. However, survival rates after CPR are low and vary across countries and hospitals [4]. One of the important factors that influence the patients' survival after CPR is the quality of resuscitation teams' performance [4,5]. Nurses are considered as the key member of the resuscitation team and their competence has a significant impact on CPR outcomes [6].

Nurses are often the first members of the healthcare teams to deal with patients with cardiopulmonary arrest [7]. Incompetency of nurses in CPR undoubtedly results in the risk of losing the opportunity to save the patients [8]. In addition to the professional and educational characteristics of staff that are critical to ensuring the quality of CPR, factors including the specialists' ability to manage stress during resuscitation, and the coordination and co-operation of all resuscitation team members are important [5]. In other words, the resuscitation process needs to be managed in a comprehensive way so that the resuscitation team can play a key role in dealing with existing problems and barriers [9]. Therefore, the experiences of these staff will play an important role in the management and success of resuscitation.

In recent years, the management of performing resuscitation in hospitals has drawn a lot of attention. However, a coherent management does not exist at the time of resuscitation. It seems to be that the most important reason for the decline in the success of performing CPR is the lack of a proper management system at these critical and crucial moments [9]. For this reason, several issues need to be considered in the strategic management of CPR in hospitals [10]. The fact is that the hidden and apparent angles of managing CPR are unknown or little-known by nurses. The management of CPR is considered as a unique event that requires careful exploring from various angles. Some literature has documented nurses and healthcare staff experiences about CPR [5,11], but none of them have been scientifically reviewed and analysed the management of CPR by nurses. Information about nurses' experiences in this area can be helpful. Nurse Managers and policymakers can use nurses' experiences in managing potential future revivals to identify and address challenges in this area; they can also improve CPR with careful planning. The present study was conducted with the aim of determining nurses' experiences of managing CPR based on content analysis approach.

MATERIALS AND METHODS

This qualitative study was conducted using the content analysis approach based on Graneheim and Lundman's approach [12]. The study was conducted at two hospitals: educational and non-educational in two of the urban areas of Iran, the study lasted from July to December 2019. 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 was obtained (Ethical code: 43357). The informed consent forms were signed by participants who were willing to participate in the study. Participants were informed that all interviews would be kept confidential without the participants' names and addresses by the researcher.

Fourteen nurses with different positions and active roles in the CPR teams were recruited through a purposeful sampling method, and participated in this study. In order to gain various experiences and views, sampling with maximum variation was used, therefore nurses with different work experiences and wards were interviewed.

Inclusion criteria: Nurses should be registered with at least 1-year experience in ICU or coronary ICU, and have some experiences with CPR and if consented for participating in the study by signing the consent form. The time and place of interviews in the hospital were

set according to the nurses' own opinions and in a quiet and calm environment. A total of 76 nurses were working in the two hospitals at the time of study; of which 30 were working in ICU or Coronary ICU and 16 were experienced in pulmonary resuscitation. After exclusion and taking consent, 14 nurses were finally interviewed.

Data Collection

Data were collected through face-to-face and semi-structured interviews. In each interview, while trying to cover the main question of the study, the interview was conducted individually. The researcher tried to ask probing questions during the interviews in order to improve the richness of the study. The main questions in this study were: What experiences have you had during the management of CPR? What do you usually do during CPR? What were the facilitating factors and barriers during CPR? Interviews continued until data saturation [13]. The interviews lasted between 45-60 minutes. All interviews were recorded using a digital recorder. Collected data were typed in Microsoft Word as soon as possible after the interviews and checked with the recorded voices again.

Data Analysis

Data were analysed based on the Graneheim and Lundman's approach [12]. Each interview was read through several times and after an overall understanding of the data, the data were analysed. For data analysis, meaning units were first specified in the text, and a code was assigned to each one. The coding was done based on their similarities, differences and proportions; the codes that emphasise a single subject were grouped as subcategories. Finally, by examining and comparing the subcategories with each other and profound reflection, the main categories appeared.

Guba and Lincoln's trustworthiness criteria were used to obtain the trustworthiness of data [14]. To meet these criteria, using long-term being in the field with the participants and gaining their trust, using the interview guidelines, dedicating sufficient and enough time to each interview, checking the codes and the summary of participants' findings with them, maximum variation sampling based on nursing positions, reviewing continuously the data and categories by team. To examine the transferability, data was presented in a detailed and comprehensive manner to readers.

RESULTS

Fourteen nurses with a mean age of 32.14±4.34 years with the experience of working in different wards participated in this study [Table/Fig-1]. The mean work experience of individuals was 9.78±4.50 years. Data analysis provided four main categories [Table/Fig-2].

Serial no.	Sex	Age (years)	Work experience (Years)
1.	Male	31	9
2.	Male	32	9
3.	Female	28	4
4.	Female	40	17
5.	Male	36	14
6.	Female	33	11
7.	Male	34	10
8.	Male	32	12
9.	Female	24	2
10.	Male	26	3
11.	Female	30	8
12.	Female	32	10
13.	Male	34	12
14.	Female	38	16

[Table/Fig-1]: The demographic characteristics of the participants.

Category	Sub-category
The role of human resources	Fluctuation of coordination and cooperation
	Capability
	Motivation
The management of procedures	Cardiac massage
	Shock
	Airway
	Drug therapy
	Vascular access
The role of context and structure	Equipment and physical space
	Contextual factors
	Losing time
The role of law and ethics	Guideline
	Reporting and evaluation
	Power of conscience

[Table/Fig-2]: The main category and subcategory.

First Category: The Role of Human Resources

There were three sub-categories.

1.1 Fluctuation of coordination and cooperation: Most of the participants mentioned the arrangements of resuscitation processes, clear responsibilities and good cooperation among staff. Some participants have noted a lack of coordination during the performance of CPR. Many participants experienced the lack of human resources in the resuscitation team and the management of this condition.

"Fortunately, there is a very good coordination among the personnel, which is one of the strengths of our hospital. During resuscitation, we all play a part in making a successful one. Then, I will step down as the resuscitation team arrives and play role as the partner." (Participant 1).

"The percentage of our resuscitation success is very low and the lack of coordination between staff can be one of the reasons of failure during the performance of CPR" (Participant 3).

1.2 Capability: Most participants mentioned the selection of high-powered, experienced and skillful individuals as the indicators of selecting the members of resuscitation teams. Participants noted not being up-to-date and insufficient experiences of physicians and nurses, the ineffectiveness of training courses in practice and the lack of attention to evidence.

"We had a lot of unsuccessful resuscitations. The most important barrier to a successful resuscitation is the education level of our physicians and nurses, since the majority of physicians in the hospital are novice "(Participant 6).

"Nurses working in the wards will certainly have valuable experiences based on evidences, as the theoretical courses will not be like experiences, especially in CPR" (Participant 1).

"Resuscitation members should be selected from pediatric personnel who are skillful to get IV-line and from intensive care units who can work well with ventilator and from operation room and anesthesia personnel who have better ability to open and manage the airway" (Participant 7).

1.3 Motivation: Participants noted the effectiveness of financial or psychological incentives for staff to be present in the team and the resuscitation processes, lack of attention to motivations of members of the resuscitation teams, and the force to place the individual in the resuscitation team.

"The spiritual reward was that at the end of the process, I was encouraged because of my responsibility by more experienced individuals. They encouraged me on things like speed and accuracy" (Participant 10).

On the whole, in the category of the role of human resources, participants emphasised the importance of coordination and

cooperation between different personnel, the need to be attentive and pay attention to the individuals' abilities and the psychological and material motivations for joining the resuscitation teams.

Second Category: The Management of Procedures

Participants' experiences showed that the management of procedures including cardiac massage; shock; airway; drug therapy and vascular access are the important and influential factors in the management of CPR.

2.1 Cardiac massage: Participants emphasised the importance of fast onset, continuity, not stopping the massage for even one second, and the need to pay attention to the patient's rhythm for massage.

"I also went quickly and saw everyone standing next to the bed and the physician was examining the patient, and I thought they were waiting for me to go and give the massage. I immediately went to give the massage without regarding the rhythm, people stopped me as it was the sinus rhythm. Then, all the staff started laughing" (Participant 2).

2.2 Shock: Participants emphasised the importance of recognising the necessity of rhythmic shock and managing the standards required for shock.

"For example, one of the most popular errors during resuscitation is giving inappropriate shocks, although studies have shown that only the first shock is highly effective and the rest are virtually unaffected, this is not taken into account and sometimes multiple shocks are given" (Participant 6).

2.3 Airway: Participants emphasised the importance of not losing the golden time, use of ventilators properly, and managing errors in airway maneuvers.

"One of our errors during the resuscitation is hyperventilating the patient ... because it causes pulmonary barotrauma or sometimes, the bag valve mask is connected and is not attached to the oxygen storage bag or to the oxygen capsule" (Participant 6).

2.4 Drug therapy: Many participants pointed to errors such as the routine use of medication without considering the rhythm and heart rate and lack of attention to the scientific timing of injecting cardiac and resuscitation medications.

"One of our errors that occurs during resuscitation is not paying attention to the scientific timing of injecting cardiac and resuscitation medications including medication injection and infusions" (Participant 5),

2.5 Vascular access: In this subcategory, participants referred to issues such as getting IV-line appropriately, the need to open the vein, and the vein's ability to tolerate. The following is an illustration of this.

"If we fail to access to the vein or the jugular vein, the medication is given to the patient through the endotracheal tube due to the lack of intraosseous catheters." (Participant 8).

On the whole, the experience of the participants in this subcategory indicated the importance of paying attention to the management and accuracy of the procedures in order to succeed in CPR and the need to adhere to the standards of these procedures.

Third Category: The Role of Context and Structure

Participants' experiences showed that the context and structure with the subcategories of equipment and physical space; contextual factors and losing time play an important role in the management of CPR.

3.1 Equipment and physical space: Participants pointed to issues like preparing and checking equipment and facilities until the arrival of the resuscitation team, and outdated equipment. Participants pointed to strengths and weakness of the hospital physical space.

"The biggest problem is related to the inadequate physical space and lack of equipment due to sanction and other issues ... and the non-standard arrangement of the equipment in the room" (Participant 4).

3.2 Contextual factors: Participants emphasised the importance of the role of the emergency medical services and the poor practice of pre-hospital team, the presence and attendance of family members, and the importance of paying attention to beliefs, emotional needs, and a variety of religious and norms.

"... in my experience, the pre-hospital medical services play a very important role in the resuscitation because during the time I worked in the emergency department both as a nurse and head nurse, they worked very poorly, the technicians who are responsible for resuscitating the patients during the transfer to the hospital should be very skillful ..." (Participant 2).

3.3 Losing time: In this subcategory, participants discussed issues such as the loss of golden time, the late arrival of the patient to the hospital, the delay in resuscitation and the location of the deceased's accident with the hospital as inhibitors of CPR.

"... we had one case that a car driver was brought to the hospital after a week, who had fallen into a forest valley in the middle of a river. He had fallen into the valley at night and was found dead after a week and we immediately transferred him to Forensic Medicine without CPR, because of tissue decompensation ..." (Participant 4).

On the whole, participants' experiences in this category indicated the weaknesses and shortcomings in the equipment and facilities and emergency medical services, and these experiences indicated the loss of opportunity and time in patients with cardiac arrest.

Fourth Category: The Role of Law and Ethics

Participants' experiences showed that law and ethics- guidelines; reporting and evaluation and power of conscience- play an important role in the management of CPR.

4.1 Guideline: Participants noted failure to perform resuscitation based on the guidelines, generalisation of guidelines and protocols.

"My experiences, both as a student and during my short work experience as a nurse, about the CPR are summarised in which all the resuscitation I have encountered have been disordered and there has been a failure to implement resuscitation protocols, and the treatment staff were only aiming to resuscitate the patient but without any coordination and proper planning and implementing the protocols and guidelines" (Participant 3).

4.2 Reporting and evaluation: Based on the experiences, participants highlighted the importance of field supervising and the existence of an evaluation checklist and the writing of a resuscitation report to explore weaknesses, strengths and difficulties. Some participants in this subcategory complained that there were no up-to-date, evidence-based and localised checklists.

"... our guidelines and checklists are not updated and most of them are not even localised. Of course, I should say that our checklists are not evidence-based, since these cases are announced by the university and implemented without any changes ..." (Participant 7).

4.3 Power of conscience: Based on the experiences of the participants, physicians have not previously been sensitive to ethics and law for some reason. Some participants pointed to the importance of conscientiousness as a whole and especially in the resuscitation, as we continue the CPR as enough as necessary.

"... during CPR, we have to look at the issue of resuscitation from a non-therapeutic point of view. We understand the high importance of it … Resuscitation is also important in terms of altruism and helping others ..." (Participant 9).

On the whole, the experiences showed the fluctuations of implementing the protocols in CPR and the improvement of ethical sensitivity in personnel.

DISCUSSION

The findings of this study indicate that several factors such as human resources, procedure management, facilitator and barriers related to context and structure, law, and ethics play a role in the management of CPR by nurses.

The experience of the participants showed that among CPR team members, sometimes there is lack of coordination and cooperation. In this regard, personnel move between these fluctuations to properly manage the process and reduce human resource shortages. In this way, sometimes the coordination between the members of the resuscitation team is minimised. In line with the present findings, more than half of the participants in a previous study reported that there was no coordination between resuscitation team members, which had a negative effect on patient outcome [5]. It is visible from this study that these discrepancies lead to a reduction in the success rate of resuscitation. Previous studies have shown that the lack of nursing staff is one of the organisational challenges affecting the outcome of CPR and the lack of nurses affects the health outcomes of patients and is one of the causes of errors [15-17]. Participants in the present study also reported a lack of nurse personnel that managed with more work by others during resuscitation.

Participants' experience showed that some personnel do not have up-to-date and sufficient experience and knowledge. Studies have not directly discussed the lack of up-to-date information and a lack of experience in nurses and physicians. However, a past study has shown that nurses' level of knowledge was desirable [18], and another study indicated a lack of nurses' knowledge and skill about CPR. These studies also showed that a lack of skilled and experienced personnel is one of the barriers to successful resuscitation and the formation of a trained, fixed, and experienced team in the emergency rooms improved the outcomes of CPR [7,17,19-22]. But what is different in the present study and not in other studies is that most of the nurses involved in CPR are novices who do not have enough experience and knowledge about CPR.

In this category, the participants' experience showed that financial and psychological motivation has an important role in their function. Studies have also shown that external incentives are effective in the decision-making process and appreciation as a psychological incentive for staff is more effective than financial rewards and is the most important motivation for nurses [23,24]. However, the present study showed that in some experiences, there is a lack of attention to the motivation of personnel to participate in the resuscitation team.

In the second category (procedure management), the participants' experience showed that one of the errors during massage and shock was the lack of attention to the patient's heart rhythm and rate. The results of a study showed that in addition to not checking the patient's rhythm for shock, carelessness in placing the pedals and not warning colleagues to pull back are among the most common mistakes [25]. But what is shown in the present study in this section is misplaced shocks that have not been reported in other studies.

In this category, most of the errors from the perspective of nurses in the present study were in the field of airway management, improper use of ventilators, bag-mask ventilation, and loss of time in intubation. The results of other studies are different from the findings of the present study. Pressing the laryngoscope blade on the teeth was the most common mistake in this section and another study showed that the most common mistake in opening the airway is that the participant checked the respiration only before head tilt, not afterwards [25,26]. The results of another study showed that delays and repeated attempts in patients' intubation were among the common errors in CPR [27]. What is shown in this study is that the reservoir bag-mask does not bind to oxygen source during CPR.

The experience of nurses in this category showed that in the time of medication administration, nurses has not attended to patients' heart rate and rhythm. The results of some studies have shown that choosing the wrong medication and the wrong dose are the most common drug errors in cardiac resuscitation [27,28]. But what we have found in the present study is a lack of attention to the patients' rhythm to give the drug in these emergencies.

The experience of nurses showed that alternative routes should be used in the absence of vascular access. In a previous study, access to ocular vessels was one of the alternative sites [29] that were not experienced by nurses in the present study. The findings of a past study also showed that weakness in getting IV-line causes fear and stress in parents [30] and this confirms the need for the management of vascular access skills. The results of another study stated that the most common errors in this section were delayed vascular access and its infiltration or cessation [27].

In the third category (facilitator and barriers related to context and structure), the experience of nurses showed that in the management of CPR, we have a shortage and wear of equipment. Findings of previous studies showed that lack of equipment and unprepared equipment in each ward and the long distance of the wards are one of the major barriers to successful resuscitation [20,27,31]. But what was different about the nurses' experience in the present study was that one of the factors influencing the lack of equipment was an international sanction. Also, unsuitable space of the resuscitation room was the biggest problem that has not been mentioned in other studies.

In the third category, in the field of background factors, most studies have discussed underlying diseases [19,20], while the experience of nurses in the present study shows that beliefs, religious and customary standards are among the background factors and belong to the context that is effective in managing CPR. Also, the results of another study showed that the presence of family during CPR is detrimental [32], which is in line with the results of the present study, which requires management. Studies show that reducing the time to initiate CPR will lead to better results [10,33]. But in this context, nurses' experience has shown that in some situations, patients with cardiac arrest arrived at the hospital with a delay that affects the initiation of CPR. This has not been stated in other studies.

In the fourth category (Law and Ethics), nurses' experience showed that resuscitation does not seem to work according to guidelines, although all guidelines from the American Heart Association are translated, updated and provided to all treatment staff. In one study, it was found that lack of awareness of CPR team members about their duties, long distances of wards, and lack of timely presence of the resuscitation team on the bed are the main obstacles to the success of resuscitation [20]. Although no study has been found to investigate the non-implementation of CPR according to the guideline, the above seems to be indirectly one of the reasons for failure to perform CPR according to the guideline.

In this category, nurses' experience has shown that written reports can be used to assess the strengths and weaknesses of the resuscitation team. However, in more studies, they have studied the principles of reporting, the quality of reports and the weakness recording [34-36]. And they did not pay enough attention to these reports to examine the strengths and weaknesses of the rehabilitation team and have not expressed the importance of these reports in examining the strengths and weaknesses of the CPR team function.

Participant's experiences in this category showed that CPR has a conscientious objector and nurses revive the conscience as easily as possible. The findings of some studies indicated moderate ethical sensitivity among nurses, less sensitive to the tendency of individuals to live among physicians, and a moderate level of professional ethics among health care workers [37-39]. The important point is that none of the studies have expressed the conscientious aspect of CPR.

Limitation(s)

This research has been done qualitatively and in a specific field, so it cannot be generalised.

CONCLUSION(S)

The findings of this study showed that nurses face various problems, challenges and limitations in the management of CPR. Therefore, nurses' ability to manage and execute this process should be enhanced through the opportunity to acquire clinical knowledge and skills to enhance patient-centered services. Policymakers are expected to contribute to better and appropriate performance of CPR by formulating laws and regulations and providing the appropriate environmental, educational and material conditions. It is suggested that in future qualitative studies, the structural and organisational conditions will be examined in greater details.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Mar 17, 2020
- Manual Googling: Jun 14, 2020
- iThenticate Software: Aug 29, 2020 (14%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Mar 16, 2020**
Date of Peer Review: **Apr 21, 2020**
Date of Acceptance: **Jul 08, 2020**
Date of Publishing: **Sep 01, 2020**