



Investigating Emergency Department Nurses' Educational Needs and Exploring Strategies to Meet Challenges Against Management of These Needs: A Qualitative Study

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Abstract

Background: Nurses who are occupied in emergency departments play a critical role in health services provision and patient care. Considering the importance of providing appropriate and immediate care in emergency departments, nurses need to acquire sufficient skills and up-to-date knowledge.

Objectives: This study aimed to identify the educational needs of nurses working in the emergency department and explore strategies to meet challenges against the elimination of these needs.

Methods: This qualitative study was conducted using a content analysis approach. This study selected the emergency departments of two large educational hospitals affiliated with Shiraz University of Medical Sciences, Shiraz, southern Iran. This study was conducted on 15 emergency department nurses selected via purposive sampling with maximum variation within January 2020 and March 2021. The data were collected by performing 15 in-depth, semi-structured interviews (11 face-to-face and 4 telephone interviews due to the coronavirus disease 2019 pandemic) and making field notes. Then, the recorded interviews were transcribed verbatim and analyzed using the qualitative content analysis approach proposed by Graneheim and Lundman. The consolidated criteria for reporting qualitative studies (COREQ) was used to report the findings of this study.

Results: Three main themes, namely the need for comprehensive and continuous education, challenges of managing educational needs, and strategies to meet educational needs, were extracted following data analysis.

Conclusions: Clarifying the educational needs of nurses and exploring strategies to solve these challenges can be effective by providing continuous practical training and adopting effective teaching-learning strategies to promote nurses' education and improve their performance in clinical skills. Accordingly, the provision of appropriate infrastructure for mobile health applications and utilization of mobile-based educational applications in emergency departments have to be taken into account by hospital managers and health policymakers.

Keywords: Emergency Nursing, Education, Qualitative Research

1. Background

The emergency department is an environment for the provision of immediate and non-scheduled care services. The combination of non-scheduled care services, increased referrals to the emergency department, and limited resources for emergency practices results in challenging conditions in this environment (1). This can, in turn, increase the length of stay, reduce patient satisfaction, and endanger patient safety (2). In addition, the complexity of

the emergency department, including patients with complicated conditions, high-risk individuals, and the number of patients, increases over time (3, 4) Nurses in the emergency department are at the frontline of hospital services since they are in direct contact with patients suffering from serious disorders and with victims of injuries and violence. Therefore, they need advanced knowledge and skills to manage such patients (5).

Emergency department nurses' performance in precise decision-making and prioritization of care depends on

a combination of theoretical knowledge, previous experiences, and cognitive fields. Working in this department also requires expertise in using technologies and facilities, awareness of social challenges, the ability to work with pre-hospital healthcare providers, and advanced knowledge regarding all age groups and medical and surgical fields (6). As a result, similar to other experts, nurses have to keep their knowledge up to date to ensure that they can provide the best care for their patients and societies. In other words, professional nursing performance requires lifelong learning (7).

A needs assessment has been considered the first step for the determination of nurses' educational needs and the development of education (8). The results of a qualitative study by Jho and Kang on evaluating emergency department nurses' educational needs and clinical skills indicated that nurses prefer to learn new knowledge, evidence-based practice, clinical nursing skills, and research methods (9). Learning Needs Assessment is a systematic strategy for evaluating what individuals or groups have to learn (10). The results of a study on self-perceived educational needs by emergency nurses indicated that most nurses did not have sufficient competency, skills, and knowledge. It was concluded that nurses need educational development to improve their basic, intermediate, and advanced skills (5).

The emergency care system in developing countries is primitive, compared to developed countries, which leads to the aggravation of problems caused by overcrowding and insufficient preparation of nurses for emergency care (8). However, due to unmet educational needs, nurses face challenges in providing safe and high-quality care to patients in the emergency departments; however, these challenges have rarely been investigated (11). Considering these issues and no study performed on clarifying the educational needs of nurses working in the emergency department, it is necessary to conduct a qualitative study to gain insight and a deep understanding of emergency department nurses' educational needs and strategies to meet challenges against the elimination of these needs.

2. Objectives

This study aimed at explaining emergency department nurses' educational needs and challenges against the elimination of these needs. In addition, from the perspective of nurses, it was attempted to explore strategies to meet these educational needs.

3. Methods

3.1. Study Design

Conventional content analysis was used to investigate nurses' educational needs and challenges, along with strategies to meet these needs, from their perspective. This method is used for the collection of new and rich data and subjective content interpretation through a classified coding process to extract themes and patterns (12). Therefore, it was decided to use qualitative interviews for data collection to explore the main respondents' personal insights. The consolidated criteria for reporting qualitative studies (COREQ) was used to report the findings of this study (Appendix 1 in Supplementary File).

3.2. Participants

This study was conducted on 15 nurses working in the emergency departments of two educational referral hospitals affiliated with Shiraz University of Medical Sciences, Shiraz, southwest of Iran, using purposive sampling (13) within January 2020 to March 2021. The inclusion criteria were willingness to participate in this study, at least a bachelor's degree in nursing, and working experience for at least one year in the emergency department of the hospital. The participants were ensured they could withdraw from the study at any stage. The nurses with a variety of employment statuses, job tenures, and educational levels were enrolled. Purposive sampling continued until data saturation, where no new data were obtained. Categories were developed based on the similarities in the obtained codes. Immediately after each interview, the recording was listened to and transcribed word by word. Then, the data were analyzed, and the next interview was decided.

3.3. Data Collection

The data were collected via holding semi-structured interviews and taking field notes. Before the interviews, the participants were given information about the research team, background, objectives, and questions. Informed consent was obtained from each subject; however, they were provided with the opportunity to ask their questions. Then, they attended individual interviews. In total, 15 in-depth, semi-structured interviews were conducted by the first author (F.A.), who was a female nursing instructor (with a master's degree, master of public health) in the emergency department.

Considering the coronavirus disease 2019 (COVID-19) pandemic and its associated lockdowns, four interviews were conducted through phone contacts. For these interviewees, primary information and informed consent forms were sent via e-mail or WhatsApp application. The

interviewees were supposed to be interviewed whenever they felt comfortable. Each interview was conducted in a quiet room in the School of Nursing or the conference hall of the hospital and lasted up to 40 - 65 minutes. After each interview, the researcher referred to the emergency department and took notes from her observations about nurses' educational needs, challenges, and strategies to meet these challenges and needs. The observations were made in morning, evening, and night work shifts, and each observation session lasted around 2 - 5 hours. The interviews were begun with a general question, and further questions were asked based on the participants' responses. The main question was, "What is one of your working days in the emergency department like? Please describe your experience while focusing on your educational needs". Then, the following questions were asked:

While working at a patient's bedside, what educational needs do you feel?

What are the challenges to meeting educational needs, in your opinion?

What are the strategies to meet these educational needs?

How would you like your educational needs to be eliminated?

All the interviews were recorded by a recorder and were immediately transcribed by the researcher.

3.4. Data Analysis

The present study used the conventional content analysis method suggested by Graneheim and Lundman. All transcripts were read several times; accordingly, the researcher was immersed in the data, developed an overall understanding, and identified the underlying meanings. The words, sentences, and paragraphs containing key points related to the nurses' educational needs and strategies to meet challenges against the elimination of educational needs were defined as meaning units. Then, each condensed unit was labeled with a code, and the codes with similar meanings were assigned to a category. In this way, subcategories were created. Based on the qualitative content meanings and nurses' descriptions, the subcategories were combined, and categories were created. After all, nine categories and three main themes were obtained. Data analysis was performed simultaneously and continued until reaching data saturation, when the new data did not show any new information (14). The research team and two qualitative research experts examined the codes to verify that the data were saturated. Data analysis was conducted using MAXQDA software (version 10).

3.5. Rigor

The criteria suggested by Lincoln et al. were used (15) to validate data analysis. Credibility was determined through prolonged engagement with the data (14 months), member checking, peer debriefing, and integration of different individuals (i.e., nurses with different ages, genders, educational levels, and job tenures), times (i.e., data collection from the nurses working in different work shifts), and places (i.e., different hospitals). Dependability and confirmability were determined by integrating methods (i.e., semi-structured interviews and observation) and audit trails, including correct interviewing techniques and accuracy in note-taking and analysis. Finally, transferability was ensured via the complete and accurate description of the intended phenomenon, participants' characteristics, data collection methods, and data analysis, together with the provision of examples of participants' statements (12).

3.6. Ethical Considerations

This study was approved by the Ethics Committee of Shiraz University of Medical Sciences (IR.SUMS.REC.1398.308). Before the interviews, the participants were provided with information about the study objectives, voluntary participation, data collection methods, reasons for recording the data, roles of researchers and participants, confidentiality of their data, and anonymity. Then, the participants were asked to complete informed consent forms for participating in the study. The participants were also ensured that they could withdraw from the study at any stage.

4. Results

The participants included 15 nurses aged 24 - 43 years who worked at the emergency departments of Namazi and Faghihi hospitals in Shiraz. Table 1 shows the participants' demographic characteristics. Data analysis resulted in the development of three main themes, including the need for comprehensive and continuous education, strategies to meet educational needs, and challenges against the management of educational needs. Moreover, 9 categories and 36 subcategories were identified (Table 2). An example of coding and development of subcategories, categories, and themes is shown in Table 3.

4.1. Need for Comprehensive and Continuous Education

In this study, the need for comprehensive and continuous education comprised three categories of training routine care in the emergency department, management of patient safety, and the need for continuous training, which were highly interrelated.

Table 1. Demographic Characteristics of the Participants

Participants ID	Gender	Age, y	Educational Level	Working Experience in the Emergency Department, y
P1	Female	28	Bachelor's degree	5
P2	Female	31	Bachelor's degree	7
P3	Female	37	Bachelor's degree	13
P4	Female	24	Bachelor's degree	1
P5	Female	26	Bachelor's degree	3
P6	Male	38	Bachelor's degree	12
P7	Female	41	Bachelor's degree	6
P8	Female	29	Master's degree	3
P9	Male	33	Master's degree	7
P10	Female	24	Bachelor's degree	2
P11	Male	31	Bachelor's degree	9
P12	Female	26	Bachelor's degree	3
P13	Female	35	Master's degree	3
P14	Female	43	Bachelor's degree	11
P15	Male	34	Bachelor's degree	3

4.1.1. Training the Routine Care in the Emergency Department

The subcategories of training routine care in the emergency department consisted of the need for clinical skills education, education regarding drugs and sera, education regarding disease diagnosis, nursing care education, and education regarding accurate documentation in the emergency department. All the study participants believed that comprehensive nursing knowledge was needed for working in the emergency department. Nevertheless, some participants emphasized that although the emergency department was quite complicated, there was no preclinical education for the nurses working in this department. Since patients with different ages and diseases refer to the emergency departments, physicians and nurses working in these wards have to receive training regarding their profession accordingly, which will be effective in the promotion of patient care, enhancement of satisfaction among patients and their families, and reduction of mortality rate.

"I think training on COVID-19 is a significant issue. There is little information. We have to know the symptoms indicating the improvement or worsening of the condition to be able to take appropriate measures soon." (Participant 3)

Another nurse stated that:

"I sometimes have problems in calculating the medications that have to be injected through the syringe pump, or I do not know the duration of injection of some new drugs; I need to receive training in this regard. Another ed-

ucational need is about the accurate principles of suction." (Participant 15)

4.1.2. Patient Safety Management

According to most of the participants, it was essential to train nurses on the principles of infection control, especially in the emergency departments, which is the key point for patients entering the hospitals. The participants also believed that training about comprehensive patient assessment and learning teamwork and collaboration with different occupations involved in patient care and treatment could lead to the improvement of patient care and patient safety.

"Sometimes, especially in emergency conditions, we encounter various signs and symptoms in patients that confuse us. We need to be trained about the priorities of measures we can take in these situations." (Participant 12)

According to another participant:

"Consulting with people who are involved in the care and treatment of the patients helps not to miss information about the patient's condition and greatly contributes to the treatment of patients; however, unfortunately, training teamwork and its implementation is weak." (Participant 5)

4.1.3. Need for Continuous Education

From the participants' viewpoints, professional performance in the emergency departments depended on having a professional team with up-to-date knowledge and

Table 2. Main Themes, Categories, and Subcategories That Emerged in This Study

Themes	Categories	Subcategories
Need for comprehensive and continuous education	Training routine care in the emergency department	Need for clinical skills education
		Need for education regarding drugs and sera
		Need for education regarding disease diagnosis
		Need for nursing care education
		Need for education regarding accurate documentation in the emergency department
	Patient safety management	Need for infection control principles education
		Need for training about comprehensive patient assessment
		Need to learn teamwork and interprofessional collaboration
	Need for continuous education	Need for in-person retraining programs
Need for virtual retraining programs		
Challenges against the management of educational needs	Organizational barriers	High workload, Numerous work shifts
		Lack of educational facilities
		Prohibition of using cell phones in the ward
		Lack of enough space in the emergency department
		Noise pollution
	Personal barriers	Excessive fatigue of emergency department nurses
		Low self-confidence
		Low level of motivation
	Strategies to meet educational needs	Participation of nurses in physicians' clinical rounds
Motivate to learn more by participating in physicians' rounds		
Monitoring, evaluation, and feedback system		Evaluation of nurses' learning after training
		Managers' attention to the educational needs of nurses
		Repeat training if needed
		Giving feedback to individuals ignoring individual educational needs
Developing the infrastructure to use the mobile health applications		Understanding the importance of mobile health by hospital managers
		Designing a simple educational application
		Academic education application
		Training nurses about mobile health applications
Using mobile-based specialized educational health applications		Drug education application
		Para-clinical education application
		Patient education application
		Educational application regarding common emergency disorders
		Educational application regarding clinical procedures
	Educational application on COVID-19	

being competent in clinical practice. The subcategories of this category included the need for in-person and virtual retraining programs for nurses working in the emergency department. Most nurses stated that they did not have up-to-date knowledge, skills, and procedures about many diseases and routinely performed what they had previously

learned. Therefore, these pieces of training were recommended to be updated periodically. Considering in-person retraining programs, most nurses preferred participating in learner-centered practical workshops. Concerning virtual retraining programs, on the other hand, the utilization of mobile phone potentials and educational applica-

Table 3. An Example of Coding and Development of Subcategories, Categories, and Themes

Themes	Categories	Subcategories	Coding
Need for comprehensive and continuous education	Training routine care in the emergency department	Need for clinical skills education	Need for education regarding, airway management and suctioning
			Need for education regarding cardiopulmonary resuscitation procedure
			Need for education regarding nasogastric tube placement
			Need for education regarding peripheral pediatric intravenous catheters insertion
			Need for education regarding electrocardiogram interpretation
			Need for infusion pump devices training
			Need for defibrillator training
		Need for education regarding the interpretation of arterial blood gas	
		Need for education regarding drugs and sera	Need for education regarding new drugs
			Need for education regarding chemotherapy drugs
			Need for education regarding medications used in pediatric emergency
			Need for education regarding sera compounds and their uses
		Need for education regarding disease diagnosis	Need for education regarding the antidote of common drugs and poisons
			Need for education regarding common heart diseases
			Need for education regarding diseases requiring emergency surgery
			Need for education regarding the diagnosis of common pediatric emergency disease
			Need for education regarding the diagnosis of stroke disease
			Need for education regarding the diagnosis of diabetic ketoacidosis
		Need for nursing care education	Need for education regarding the diagnosis of coronavirus diseases
			Need for education regarding the diagnosis of syncope disease
			Need for nursing care education of patients' revival after cardiopulmonary resuscitation
			Need for nursing care education of diabetic ketoacidosis patients
			Need for nursing care education of patients under mechanical ventilation
			Need for nursing care education of patients with gastrointestinal bleeding
		Need for education regarding accurate documentation in the emergency department	Need for nursing care education for stroke patients
			Need for nursing care education of chronic obstructive pulmonary disease patients
			Need for nursing care education of patients with ostomy
			Need for education regarding the documentation of nursing notes based on guideline
	Patient safety management	Need for infection control principles education	Need for education regarding accurate documentation in patient education
			Need for education regarding correctly recording information in the triage form
			Need for education regarding the correct documentation of nursing errors
		Need for training about comprehensive patient assessment	Need for education regarding the principles of isolation of patients with weakened immune systems
			Need for infection control and prevention education in facing patients with coronavirus
			Need for education regarding the control of hospital infections
			Need for education, regarding the importance of assessing the patient's signs and symptoms
			Need for education regarding the assessment of religious and cultural issues of patients
Need for education regarding the importance of the patient's medical history			
Need for learning teamwork and interprofessional collaboration		Need to learn to exchange patient information with care team members	
		Communication skills and compatibility training with other members of the treatment team	
		Need to learn to exchange patient information during shift handover	
Need for continuous education	Need for in-person retraining programs	Need for holding in-person training workshops on clinical skills	
		Need for holding learner-centered practical workshops	
		Need for bedside teaching	
	Need for virtual retraining programs	Need for online educational workshops	
		Need for mobile-based educational programs	
		Need for training through simulation	

tions was noted.

“Numerous beneficial tasks can be developed to train personnel using mobile phones. For example, WhatsApp groups can be created, in which educational materials can be shared by head nurses.” (Participant 9)

According to another participant:

“Holding in-person workshops is beneficial for training and eliminating learning deficiencies, and it is better to provide practical work opportunities for all personnel in the workshops.” (Participant 12)

4.2. Challenges Against Management of Educational Needs

Before mentioning the educational needs, most participants referred to the challenges against the management of their educational needs that, included personal and organizational barriers. In this context, almost all nurses stated that high workload, numerous work shifts, lack of educational facilities, prohibition of using cell phones in the ward, lack of enough space, noise pollution, excessive fatigue, and low self-confidence and motivation prevented the elimination of their educational needs. The removal of educational obstacles can provide the ground for eliminating nurses' educational needs, eventually improving the quality of care for patients.

4.2.1. Organizational Barriers

The majority of the participants pointed to organizational barriers as a major obstacle to the removal of educational needs. High workload, numerous work shifts, lack of educational facilities, prohibition of using cell phones in the ward, lack of space, and much ambient noise were extracted as the subcategories of organizational barriers. The elimination of these barriers could result in lower stress levels and greater appropriate opportunities for learning at patients' bedsides and increase appropriate conditions for training and willingness to learn. It could also enhance the nurses' interest in learning.

Some participants felt uncomfortable and hopeless due to the overcrowding of the department and lack of attention to their educational needs. One of the nurses in this regard said:

“The emergency department is very crowded so that we do not have time to learn what we do not know, and managers do not pay attention to it.” (Participant 1)

Another nurse stated that:

“Sometimes, it is necessary to use a mobile phone, for example, to calculate the dose of medicine or search for medical information; however, because the use of mobile phones is prohibited in the department, we cannot use it easily.” (Participant 13)

Most participants emphasized that the number of patients admitted to the emergency department exceeded

the capacity of the ward, which prevented the elimination of educational needs. Crowdedness and high levels of noise were also mentioned as obstacles to the elimination of educational needs and training of clinical skills.

“There are stretchers, beds, and patients even in the corridors. If it were not the case, there would be a ground for information exchange and training among colleagues at patients' bedsides.” (Participant 2)

4.2.2. Personal Barriers

High fatigue levels, low self-confidence, and poor motivation among emergency department nurses were among the personal barriers to removing educational needs. In this regard, some nurses stated that they were not willing to participate in workshops and meet their educational needs due to high fatigue levels and lack of motivation resulting from the high workload. Furthermore, low self-confidence and a lack of knowledge about working in the emergency department prevented them from asking their questions and removing their educational needs.

“It is true that workshops may be beneficial, but individuals are not willing to take part in these workshops due to fatigue.” (Participant 6)

Another nurse stated that:

“I do not have enough knowledge about some necessary measures in the emergency department; my self-confidence is so low that I feel ashamed to ask the head nurse or my colleagues about things I do not know.” (Participant 10)

4.3. Strategies to Meet Educational Needs

The exchange of information between nurses during patient visits, motivating learning by attending physicians' clinical rounds, managers' attention to nurses' educational needs, evaluation of nurses' learning after training, and managers' understanding of the benefits of mobile-based educational applications were recommended as solutions to eliminating needs and barriers. Furthermore, using academic and practical educational applications, which are easy to use, was among other strategies expressed by the nurses to meet their educational needs. This theme consisted of some categories, namely the participation of nurses in physicians' clinical rounds, using monitoring, evaluation, and feedback system, developing the required infrastructure for using mobile health applications and using mobile-based specialized educational health applications.

4.3.1. Participation of Nurses in Physicians' Clinical Rounds

Based on the experiences of the participants, the exchange of information between nurses and physicians during patient visits could be a good strategy to meet their

educational needs, including knowledge about diseases, medications, and patient care protocols. In addition, they mentioned that the participation of nurses in the physicians' clinical rounds at the patient's bedside could increase their motivation to learn and consequently contribute to eliminating their educational needs.

"Many times, we learn about new drugs or changes in a patient's condition during physicians' clinical rounds, and this helps to meet our educational needs." (Participant 7)

4.3.2. Monitoring, Evaluation, and Feedback System

Emergency department nurses believed that nursing managers' supervision and attention to the educational needs of nurses, accurate evaluation of nurses' learning, and provision of feedback could be an important strategy to meet educational needs. Based on the experiences of the participants, paying attention to the evaluation of the knowledge of nurses and giving feedback to them, especially those who are indifferent to their educational needs, by supervisors, hospital education authorities, and nurses in charge of training personnel in the ward, was one of the important strategies to overcome the educational needs of nurses.

"Our head nurse pays attention to our educational needs and helps us to learn." (Participant 1)

Another participant said:

"When dealing with individuals who neglect their educational needs, they take this issue seriously and try to overcome their educational needs." (Participant 15)

Most of the nurses stated that according to the nature of the educational content, holding a practical or written test and giving feedback based on the test results could eliminate their educational needs.

"After the ventilator workshop, the teacher conducted a practical test, and anyone who made more than two mistakes had to repeat the course; this strategy was excellent." (Participant 11)

4.3.3. Development of the Infrastructure to Use Mobile Health Application

Most of the participants believed that the capabilities of mobile technology should also be used in hospitals. According to the participants' experiences, the use of mobile health technologies could help educate both nurses and patients. The participants also stated that understanding the importance of mobile health applications by managers and using easy-to-use educational applications could be a strategy to meet the educational needs of emergency department nurses. One of the nurses acknowledged that:

"By using an educational application on my mobile phone, I was teaching a stroke patient about discharge in-

structions. However, the supervisor warned me not to use the content of this application, although it was useful." (Participant 2)

Some nurses stated that due to the crowdedness of the emergency department and shortage of time, training nurses about mobile health applications could give them a sense of independence, contribute to time management, and increase accuracy in the workplace.

The experience of one of the nurses in this regard was as follows:

"The preceptor taught me about how to work with injectable drugs application. From then on, I calculate drug doses, such as heparin, and teach the drug instructions to the patient quickly and more accurately." (Participant 5)

4.3.4. Using Mobile-Based Specialized Educational Health Applications

Based on the experiences of some participants, due to the high workload of nurses and shortage of time, the use of mobile health applications as an available tool could contribute to meeting the educational needs of nurses.

"By using a mobile application during nasogastric tube placement, I could manage some of my educational needs." (Participant 14)

Concerning her experience of using the application for COVID-19, another nurse working in the pediatric emergency department stated:

"In a situation where we did not have much medical information about managing COVID-19 patients, I used a foreign mobile health application on patient care tips." (Participant 8).

Based on the experience of four of the participants, emergency department nurses' use of an educational application to strengthen psychological skills, especially in crisis situations, such as the COVID-19 epidemic, could adequately remove their need for workshops related to stress management and self-mastery.

"I was using an educational application on strengthening psychological skills, and I learned a lot about coping with stress and positive thinking." (Participant 4)

5. Discussion

One of the findings of this study was the need for comprehensive and continuous education for all nurses who occupy the emergency departments of hospitals. In this context, the need for training in clinical skills, drugs, sera, disease diagnosis, nursing care, documentation, and patient safety management was claimed as the main educational need for emergency nurses. In sum, the findings of this study indicated that emergency department nurses

need virtual or face-to-face retraining as a continuing educational program. Furthermore, using technologies, such as mobile health applications, can help trainees to be educated and use their knowledge faster at patients' bedside, especially in work-overloaded times.

Farahmand Rad et al. performed a study on emergency department workers and found no significant difference between face-to-face and virtual training groups regarding practical test scores. However, the face-to-face training group had better post-test scores than the virtual training group in all skills. Farahmand Rad et al. also concluded that according to the nature of the subject matter, the skills which wanted to be trained, and the conditions of the learners, both methods can be used in education (16). Similarly, other studies demonstrated that continuing education was crucial to nurses (17, 18), and nursing education was among the predictors of patient outcomes (19).

In another study, nurses perceived that they were qualified in basic skills, such as the assessment of breathing or circulation and administration of oxygen; nevertheless, approximately more than half of nurses emphasized that they need to learn other clinical practices, such as electrocardiogram interpretation, shock management, and intubation (5). Another study showed a lack of continuity in nursing educational programs based on occupational needs. The authors suggested proper training concerning the use of medical equipment (20). Retraining clinical skills could help nurses retain their knowledge and promote their clinical practice (18), thereby improving their self-confidence (21).

The results of the current study revealed that patient safety management is one of the educational needs of emergency department nurses, which consisted of some categories, namely the need for infection control principles education, the need for training in comprehensive patient assessment, and the need for learning teamwork and interprofessional collaboration. Another study showed that emergency department personnel were exposed to a wide range of stressors, including workload, time shortage, insufficient personnel, and lack of teamwork, which endangered patient safety (22). Patient safety results from the interaction of system components; therefore, training teamwork and interprofessional collaboration should be performed as a necessary prelude to patient safety and as a process that is formed organizationally in relationships among colleagues (23).

The results of Boeira et al.'s study showed that failure to teach nursing students about the principles of infection prevention and control could reduce the quality of care and patient safety. The aforementioned study concluded that there is a need to review the educational programs of nursing students and include their educational needs

in the curricula (24). Similarly, another study demonstrated that a comprehensive and rapid assessment of patients was the basis of effective nursing care, which required good cooperation between health workers. It was also revealed that this strategy promoted patient safety; therefore, patient outcomes would be improved (25). Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) aims at introducing a patient safety culture based on interdisciplinary communication, patient condition monitoring, and patient support. A study showed that training TeamSTEPPS led to a reduction in the occurrence of adverse events caused by poor cooperation among personnel and had a positive effect on the personnel's satisfaction and morale (26).

The present study's results indicated that some personal, structural, and organizational characteristics might prevent nurses from meeting their educational needs. According to the nurses' perspectives, high workload, numerous work shifts, lack of training equipment, and prohibition of mobile use in the department were the major organizational obstacles to education. These findings are in line with the findings of a study regarding the barriers to sufficient training among nurses (27). In this context, time constraints, workload, lack of vacation for education, and numerous work shifts were the indicators of inadequate staffing in organizations, which had a negative impact on participation in continuing education (17, 27). Financial constraints and costs of courses were yet other barriers limiting training among nurses (28). A lack of organizational support was also a major barrier to nurses' continuation of education (29). Studies showed that electronic learning might overcome some of these barriers and, consequently, be effective in enhancing learning among nurses (30). Nevertheless, organizational support is required to deal with barriers to continuing education among nurses (29).

In the current study, a lack of physical space and overcrowding were observed as some of the other organizational obstacles to training nurses. Shahhosseini and Hamzehgardeshi et al. (27) revealed that other structural barriers, such as geographical distance from sites of continuous education, might limit education. Moreover, in some cases, specialized continuous educational programs were limited or not available (31). Generally, emergency nurses are exposed to high workloads, a lack of nursing staff, and many work shifts as organizational barriers, which can lead to exhaustion and burnout (32). On the other hand, the lack of education might affect nurse-patient communication (33).

Exhaustion and family obligations were also mentioned by Baxter et al. (17) as personal barriers to continuing education. Another study indicated that non-

participation in education was associated with lower occupational satisfaction (28). In the current investigation, personal factors, such as exhaustion, low self-confidence to participate, and embarrassment for asking questions in classes, were perceived by the nurses as barriers to participation in continuous education, which are consistent with the findings of previous studies.

Another finding of the present study was related to strategies to meet educational needs. This theme consisted of some categories, including the participation of nurses in physicians' clinical rounds, using monitoring, evaluation, and feedback system, developing the required infrastructure for using mobile health applications, and using mobile-based specialized educational health applications. Studying nurses' experiences showed that participation in the physicians' clinical rounds at the bedside contributed to information exchange between the physician and the nurse and enhanced the motivation for learning. Alcantara found that structured and standardized multidisciplinary rounds had the potential to change bedside care and led to an accurate, timely, and more integrated patient care process, thereby resulting in the increased quality of patient care, positive patient experiences of received care, and reduced costs (34).

Based on the experience of participants, monitoring, evaluation, and feedback by head nurses and nursing managers could facilitate the elimination of personnel's educational needs. The results of another study showed that head nurses could play a potential, dynamic, and strong facilitating role in training clinical nurses with insufficient knowledge and skills (11). The results of another study demonstrated that nursing managers spent little time on nurses' direct training; however, it is one of their traditional tasks. The evidence in this study demonstrated that nursing managers are not directly engaged in the daily training of nurses, and they should also assess the individual learning needs of clinical staff. Their major role is to guide and facilitate nurses' learning by changing the processes and encouraging the professional development of individuals. It is also emphasized that training should focus on the role of nursing managers as mentors and preceptors (35). The results of another study on the strengthening supervision during clinical practice model indicated that strengthening the supervision of hospital ward supervisors in practice led to the acquisition of cognitive and clinical skills, self-confidence, autonomy, and a greater ability to reason in many nursing students (20).

Developing the infrastructure and using mobile-based specialized educational health applications was another proposed strategy to meet the educational needs of nurses, especially younger nurses. Generally, mobile applications have been observed to be effective in continuing learn-

ing among nurses (36). Another study demonstrated that educational managers should adapt to new technology changes and focus on the benefits of mobile devices as an educational tool to effectively teach theoretical topics and practical skills (37). Overall, creating a global infrastructure for mobile medical applications is essential to provide "common standards and guidelines" and has been proposed as a repository for shared resources and best practices (30).

In the present study, the nurses believed that mobile applications should be scientific, easy to use, applicable on all smartphones, and free for all nurses. Nikpeyma et al. showed that one of the features of mobile-based educational programs was the possibility of updating the applications installed on mobile devices. This means that some nursing training programs, care plans, or/and clinical guidelines can be updated, and students can have access to the newest and most up-to-date information (37). In the nursing profession, the potential capabilities of mobile health can be used for both patient care and the education of clinical nurses. In other words, mobile health has considerable potential for both education and practice (38). Moreover, other studies have indicated that mobile-based education can have financial benefits since it is a shared resource, and individuals do not need to travel or ask for days off to participate in classes (36).

The outbreak of COVID-19 has made all aspects of nursing education challenging (39, 40). In this regard, online education (40) and mobile health-based learning have been mentioned as a solution to reduce challenges and make education flexible and innovative. Training regarding COVID-19 has been proposed by interviewees as an emergency need for nurses. Moreover, mobile health-based applications facilitate service provision by healthcare providers during epidemics and pandemics when healthcare centers and hospitals face critical conditions and increased workloads (41). In this respect, clinical and para-clinical skills, clinical procedures, and mental skills have been needed training explained by emergency nurses. Nonetheless, nurses' educational needs and clinical information have been changing rapidly (42). Therefore, to prevent substandard care, the information provided through mobile applications must be updated, and evidence-based information must be provided for continuing learning (43). The ubiquity of mobile health increases the possibility of education among staff nurses (44) and subsequently improves their basic and advanced skills, eventually exerting a great impact on the quality of care, self-efficacy, and occupational satisfaction (45).

Although mobile-based education lacks discussion during training on specialized courses (46), using mobile health as a learning assistant can have positive effects on

the improvement of nurses' specialized clinical knowledge, especially in terms of tests interpretation (47), and increase their tendency to complete courses and participate in future training (46). In this study, two participants mentioned impaired concentration while working as the negative consequence of using mobile health. In a systematic review of the impact of mobile technology on teamwork and communication in hospitals, it was revealed that the small screen size of mobile phones, the cost of buying smartphones in developing countries, the short life of mobile batteries, disturbance of other colleagues, and interruptions by coworkers or family members were reported as the negative impacts of mobile use in the healthcare settings (48). However, considering the progress in health technologies, ensuring patient safety, and supporting innovation in development, using mobile health and medical applications is essential (49).

5.1. Implications for Practice

The findings of this study can help hospital and nursing managers to pay more attention to the educational needs of hospital emergency nurses while noticing barriers and challenges. Considering the high workload and lack of time for emergency nurses, the implementation of innovative strategies to meet educational needs, such as using mobile-based educational applications while being available, can lead to increasing nurses' knowledge and dealing with challenges. In turn, by providing nurses' educational needs, the improvement of quality of services, positive outcomes for patients, and nurses' increased satisfaction will be expected.

5.2. Limitations and Recommendations

The most important limitation of this study was the emergency nurses' restricted time to participate in the interviews. The nurses' high workload and numerous tasks made the data collection phase too long. Another study limitation was related to the low generalizability of the results due to the nature of the qualitative design of this study. Furthermore, due to the COVID-19 pandemic that caused the emergency department to become crowded, four nurses were not interviewed in a face-to-face manner. As a recommendation, it is proposed to carry out similar studies on nurses who occupy other parts of hospitals and perform interventional and cost-benefit studies on using mobile-based educational and consultation applications.

5.3. Conclusions

The emergency department nurses' perceived needs were categorized into three themes, including the need for comprehensive and continuous education, the challenges

against the management of training needs, and strategies to meet training needs. Furthermore, it is required to test the advantage and disadvantages of technologies, especially mobile health applications, which are used for the education of nurses.

Supplementary Material

Supplementary material(s) is available [here](#) [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Footnotes

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