JKMU
Journal of
Kerman University of Medical Sciences
https://jkmu.kmu.ac.ir
10.34172/jkmu.4118
JKMU. 2025;32:4118

Original Article

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Exploring Medical Students' and Graduates' perspectives on Learning in the Emergency Department: A Thematic Analysis

Amin Beigzadeh[1], Ali Raee[2], Majid Hajimaghsoudi[3], Milad Asadi[4], Sara Heydari[5*]

[1]Education Development Center, Sirjan School of Medical Sciences, Sirjan, Iran
[2]Emergency Department, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
[3]Clinical Research Development Center, Shahid Rahnemoon Hospital, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
[4]Department of Medical Education, Medical Education and Development Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
[5]Department of Medical Education, Medical Education and Development Center, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

*Corresponding Author: Sara Heydari, Email: s.heydari.287@gmail.com

Abstract

Background: The emergency department (ED) is a critical yet stressful environment for medical students to acquire essential skills of medicine. Proper training in the ED, while balancing the demands of patient care and education is crucial. This study aimed to explore students› and graduates' perspectives on their learning experiences in the ED at Yazd University of Medical Sciences in 2024.

Methods: A qualitative approach, involving semi-structured interviews with 22 participants (16 students and 6 medical graduates) was used. Participants entered the study by purposive sampling. Thematic analysis using the six steps proposed by Braun and Clarke was employed to identify and analyze key themes and concepts from the interviews. Data were validated based on Guba and Lincoln's criteria. Data analysis was performed using MAXQDA-10 software.

Results: The results indicated the emergence of four themes and 10 concepts. They included: (1) learning preferences, emphasizing the need for innovative teaching strategies and simulation-based learning; (2) curricular preferences, highlighting the importance of supervised clinical shifts and comprehensive training in acute care; (3) clinical experience, which revealed a desire for more hands-on practice, opportunities for decision-making, team collaboration; and (4) learning environment, addressing stressors, the physical environment and the need for supportive peer interactions.

Conclusion: Participants had a positive impression of their learning experience and believed that it has potential for further development; however, they felt a gap between their educational needs and the existing ED training structure. By fostering collaboration, providing structured supervision, and incorporating simulation-based learning, the educational experience in the ED could significantly improve. Ultimately, this prepares students for the complexities of emergency medicine more effectively.

Keywords: Emergency department, Medical education, Thematic analysis, Learning experience

Citation: Beigzadeh A, Raee A, Hajimaghsoudi M, Asadi M, Heydari S. Exploring medical students' and graduates' perspectives on learning in the emergency department: a thematic analysis. *Journal of Kerman University of Medical Sciences*. 2025;32:4118. doi:10.34172/jkmu.4118

Received: November 20, 2024, **Accepted**: April 22, 2025, **ePublished**: May 13, 2025

Introduction

There is a prevalent concern highlighting that the healthcare environment can be a stressful place to work (1,2). This issue is especially critical when taking into account the dual responsibility of ensuring quality patient care, and effectively teaching medical students in this environment. The emergency department (ED), a component of medical students' clinical education, is recognized as one of the most intricate and constantly changing environments within the field of medicine (3).

As future clinicians, medical students must develop an adequate knowledge base and skills to accurately and appropriately respond to many acute medical conditions and emergencies (4). Evidence suggests that care teams, including nurses and medical students, face challenges in applying classroom knowledge to patient care in the high-acuity, fast-paced educational environment of EDs (5). In addition, the lack of a systematic educational program in the ED hinders optimal outcomes, leading to significantly low levels of education and learning (6).

Given the critical role of clinical education in the advancement of medical students' careers (7-9), the

learning effectiveness of medical students' education in the ED setting has been recognized as an area in which research is needed and has remained under constant scrutiny. In this context, the prevailing challenges within the ED contribute to heightened stress levels and diminished confidence among graduating physicians, which in turn impairs their capacity to deliver optimal patient care (10).

Various factors have been identified to influence the medical students' perception and experience in the ED rotations. The environment of the ED is often transient, chaotic, and unpredictable, coupled with interruptions, time pressures, and major decisions potentially intimidating to many students (11,12). A distinguishing factor of the ED rotation is the type of clinical presentations seen that span from minor complaints to urgent/emergent conditions that may require a student to pivot quickly based on the clinical cues presented from the patient (13). The depth of supervision and feedback additionally provided by the attending physicians, and residents contributes substantially to the medical students' learning, development, and engagement in the often-chaotic experiences in the ED (14). A recent study on the medical interns' satisfaction with clinical teaching in the internal ED has found that 56% rated it as moderate and 38% as favorable. This indicates a need for improvement in clinical education quality to meet the standards set by the Ministry of Health and Medical Education (15).

The imperative for undertaking this research is reinforced by the recognition that the ED, characterized as one of the most high-pressure environments, can profoundly influence the educational experience of medical students. It seems that medical students frequently encounter difficulties in applying theoretical knowledge to practical applications within the ED setting. Furthermore, it is essential to explore the factors that contribute to these learning challenges, as they may result in reduced confidence and competence, ultimately impacting the quality of patient care. Given the exploratory nature of this research, a qualitative approach was deemed most appropriate. This methodological framework allows for an in-depth investigation into the richness of participants' lived experiences (16). Qualitative research methods are particularly well-suited to uncover the nuanced and multifaceted dimensions of learning in the ED, offering insights into how medical students navigate and interpret their roles within this high-pressure environment. By emphasizing the subjective and contextual elements of these experiences, this approach facilitates a deeper understanding of the key factors that influence medical education in such a critical clinical setting. Consequently, this study was designed to explore the perspectives of medical students and graduates on their learning experience in the ED at Yazd University of Medical Sciences. Educators can leverage key stakeholders' insights to enhance ED education, better prepare medical students for future demands in emergency medicine, and improve overall clinical practice.

Methods

Study design

This qualitative study involved conducting semi-structured interviews with medical students and medical graduates. Interviews were analyzed using a thematic analysis of the collected data. The thematic analysis approach enabled a comprehensive exploration and identification of the perspectives held by medical students regarding their learning experience in the ED. The consolidated criteria for reporting qualitative research checklist (COREQ) was used in the reporting of this study (17).

Setting

This study was undertaken in the ED of the educational hospitals affiliated to Shahid Sadoughi University of Medical Sciences in Yazd. These hospitals are the largest medical centers in Yazd that provide a series of specialized and sub-specialized medical services to patients and act as educational institutions and facilitate clinical teaching for medical students in major and minor departments. A considerable part of the medical curriculum at Yazd Medical School is allocated to clinical education, with medical students engaging in substantial training within the ED.

Research team

The research team consisted of scholars with backgrounds in medical education and emergency medicine. The principal investigators with significant experience in research design and execution (AB and SH) hold Ph.D. in Medical Education and are currently the managers of Education Development Centers in their universities. AR and MH are esteemed medical teachers in the field of emergency medicine, dedicating significant portions of their time to the education of medical students both in hospital settings and during clinical rotations. In a similar line, AR serves as the head of the emergency medicine department, while MH, who possesses a master's degree in Medical Education, holds the position of associate professor in the same discipline. Additionally, MH fulfills the role of research deputy at Shahid Rahnamoon Hospital and at the affiliated medical school. MA as an enthusiastic researcher undertook this project as his research thesis in General Medicine.

Participants

In order to recruit participants and obtain a comprehensive understanding of the diverse perspectives, participants were deliberately selected in the internship level, who had received clinical training in the ED, as well as graduates

who graduated from Yazd University in the last two years. In this regard, participants comprised current students engaged in clinical rotations within the ED, as well as those who had completed their rotations within the preceding years and are currently practicing medicine as general practitioners in the ED of hospitals or clinics that are affiliated to Yazd University of Medical Sciences. Participants were chosen using a non-probability, purposive sampling technique.

To facilitate the recruitment of participants for interviews, we established a timeline for participant engagement and disseminated relevant information through social media platforms frequented by student groups, inviting individuals who expressed interest and willingness to participate in the study to reach out to a member of the research team. Medical graduates entered the study based on their interest. Interested individuals underwent a screening process to confirm their eligibility based on the following inclusion criteria. The demographic information of participants is depicted in Table 1.

Inclusion and exclusion criteria

The selection of participants for the study was based on specific criteria: (a) enrollment in the medical education program at Shahid Sadoughi University of Medical Sciences, (b) students in the internship level with clinical training experience in the ED, (c) students graduated from Yazd University in the last 2 years, (d) a demonstrated willingness to engage in the study and provide informed consent. In contrast, students experiencing psychological or emotional distress were excluded from participation. Additionally, individuals who lacked adequate time or willingness to partake in the interview process were also excluded from the study.

Data collection

Students and graduates who reached out to the corresponding author of this study were invited to participate. Before participating in the study, all participants provided written consent. Interested students and graduates received an information sheet outlining the study's objectives, procedures, and benefits. After reviewing this information, they signed a consent form to indicate their voluntary agreement. These signed forms were stored securely to maintain confidentiality. Importantly, no incentives were offered; participants joined solely based on personal interest.

Table 1. The demographic information of study participants of Yazd University of Medical Sciences, 2024

Demographics	
Gender, No. (%)	
Male	9 (41)
Female	13 (59)
Age (year)	29.5±2.7
Grade, No. (%)	
Students	15 (68.2)
Graduates	7 (31.8)
Marital status, No. (%)	
Single	14 (63.6)
Married	8 (31.8)
Residence, No. (%)	
Native	4 (18.2)
Non-native	18 (81.8)

A select group of students and graduates participated in semi-structured interviews to share their perspectives on learning experiences in the ED, addressing key research questions of the qualitative study. The interviews were administered by a member of the research team (SH) who possesses extensive expertise in qualitative research methodologies.

Interviews were conducted in private, comfortable settings at participants' convenience, including quiet university rooms or private offices. Locations were chosen based on preferences and communicated in advance to ensure familiarity and comfort. Each interview lasted approximately 35-40 minutes, facilitating open discussions. The interviews were audio recorded and transcribed verbatim, and participants were briefed on the study objectives and the confidentiality of data was guaranteed. Data saturation finalized the final number of participants. In this respect, sampling continued until no new information or data was added to the previously obtained data. Totally, 22 interviews were conducted.

In this study, follow-up interviews were conducted to gain deeper insights and clarify ambiguities from initial interviews. Participants were contacted via telephone two weeks later, encouraged to reflect on their experiences and share additional thoughts. Participation was entirely voluntary, allowing them to decline if they chose not to engage further, ensuring a thorough understanding of their perspectives. In order to delve into the topic under investigation and obtain rich data, an exploratory interview guide was developed based on the experiences of the research team and the exploratory characteristics of the research. The interview guide commences with a welcoming introduction delineating the study's objectives. Demographic inquiries are included to collect background information, while the primary, follow-up, and exploratory questions probe into participants' experiences of ED rotations. Specifically, participants were asked interview questions: (a) How can your learning experience in the ED improve? (b) What should be added to your learning in the ED? (c) What makes your learning experience unpleasant? and (d) What are the positive aspects of learning in the ED? Following these questions, the interviewer added questions and expanded the topics according to the answers to understand the participants' real perceptions. A concluding summary question invites

further insights, expresses gratitude to participants, and offers opportunities for post-interview communication regarding inquiries. To ensure the interview guide's validity, it was reviewed by four specialists in the field of Medical Education for their expertise. Their feedback led to necessary modifications. A pilot test with two student participants assessed question coherence, interview length, and understanding. After testing, no changes were made to the interview guide, confirming its effectiveness. Two members of the research team (AB and SH) analyzed and discussed the data after each interview. We continued to collect and analyze the data until the data were saturated.

Data analysis

Data analysis was conducted using thematic analysis approach. In this regard, the six-step framework established by Braun and Clarke was used for the analysis of data (18). Initially, two members of the research team (AB and SH) independently read the transcript to gain a comprehensive understanding of its content. Subsequently, the transcript underwent a coding process. During the open coding phase, the transcripts were segmented into distinct units, which were then defined and labeled. After the initial coding of each transcript, a discussion ensued to refine the coding for enhanced credibility. In the axial coding phase, the relationships among the codes were explored, leading to their organization and grouping into overarching concepts. The third step involved identifying relationships and patterns among these concepts, culminating in the amalgamation of codes into a coherent theme. The fourth step entailed a thorough review and enhancement of the identified themes by the research team. In the fifth step, each theme was assigned a name and a clear definition. Finally, in the sixth step, the interrelationships among the themes were delineated, and the findings of the analysis were documented. Throughout this process, we engaged in a continuous cycle of data collection and analysis, ensuring that no new codes emerged, ultimately resulting in the development of concepts and themes.

Trustworthiness and rigor

Validity and accuracy of data were provided based on Guba and Lincoln's criteria (19). To ensure the credibility of the data, member-checks were used. In this regard, the extracted codes were shared with participants and modifications were applied to the data. Furthermore, in order to reduce subjectivity, a reflexive journal was maintained to facilitate the bracketing of biases. This approach contributed to obtaining more profound insights and, as a result, enhanced the credibility of the study. To establish dependability, two experts in qualitative research, reviewed codes and categorizations. In terms of confirmability, an external observer experienced in qualitative research verified and validated data collection and analysis processes. For transferability, an attempt was made to capture all details, from sampling to collecting and analyzing data, as much as possible. Researchers also documented comprehensive and thick description of the entire research process to allow the applicability and pertinence of the study's outcomes to different contexts.

Ethical consideration

Participants were briefed on the study protocol and had the freedom to opt out of the research at any time. To maintain confidentiality and encourage open dialogue, no other individuals were present during the interviews aside from the participants and the researcher. Written informed consent was granted from participants. The Ethics Committee of Yazd University of Medical Sciences approved this study (Approval Code: IR.SSU.MEDICINE.REC.1402.375).

Results

The study participants included 9 males and 13 females with the mean age of 29.5 years from different grades (15 interns, and 7 graduates). In terms of marital status, 8 were married, and 14 were single. Concerning place of residence, 4 were native, and 18 were non-native. Of the whole batch, 16 had a desire to pursue their career development in the future, and 6 participants did not have any plan (Table 1).

Upon analysis, four themes (learning preferences, curricular preferences, clinical experience, and learning environment) and 10 concepts were emerged (Table 2).

The participants expected a different teaching experience in the ED and looked for new topics and approaches. They felt that there was a gap between the reality and ideals of emergency medicine learning experience and exposure to clinical situations. Furthermore, the learning working environment of the ED plays an important role in their learning.

Learning preferences

Innovative teaching strategies

The application of innovative teaching strategies in the

Table 2. Four themes and their concepts using thematic analysis

Main theme	Concepts
Learning preferences	Innovative teaching strategies
	Simulation based-learning
Curricular preferences	Supervised clinical shifts
	Comprehensive training
Clinical experience	Hands-on practice
	Decision making
	Team collaboration
Learning environment	Stressors
	Physical environment
	Supportive peer interaction

ED such as teaching models and case-based discussions, enhances medical students' critical thinking and clinical skills. The majority of graduates stated that due to the unpredictable nature of the ED setting, they need approaches that enhance their engagement and understanding. They valued teaching strategies that promote participation and critical thinking.

One of the participants stated:

"I appreciate when medical teachers used active learning strategies like group discussions. It not only keeps us engaged but also deepens our understanding of the clinical cases, and now that I am responsible for patient management, I appreciate it even more." (Graduate No. 16).

Another participant stated:

"Effective teaching strategies, such as the use of case-based learning, allow us to apply theoretical knowledge in practical situations, which is crucial in emergency medicine" (Graduate No. 22).

One of the interns stated:

"I find that when the teaching aligns with established educational models and theories, it resonates more with us. For instance, when there is a fundamental learning notion behind teaching, we might not know it, but it indirectly helps us. It makes learning more interactive and helps us grasp complex concepts better" (Intern No. 8).

Simulation-based learning

Participants especially interns stated that they need to practice emergency clinical cases in a safe and controlled environment where the room is given to mistakes, and patients are under no harm. They also valued simulated patients in fostering the intangible skills of medicine such as communication skills, empathy, and professionalism. They recognized the importance of simulations in bridging the gap between theory and real-world application.

One of the participants stated:

"I feel anxiety and fear of harming the patient as I have not gained expertise in all clinical skills. If we find an opportunity to practice procedures away from real patients, our learning improves" (Intern No. 3).

Another participant stated:

"I believe that the use of high-fidelity mannequins in simulations helps us develop our technical skills and gain confidence before we enter actual clinical settings" (Intern No. 11).

A graduate stated:

"I believe that students can excel in their skills if they find opportunities to working with simulated patients. They can receive immediate feedback, which is invaluable for their learning and growth as future physicians" (Graduate No. 22).

Curricular preferences

Supervised clinical shifts

Participants felt that the teaching based on the milestones highlighted in the curriculum cannot equip medical students with a spectrum of clinical skills. They emphasized the importance of working under supervision. Students preferred a curriculum that includes structured clinical shifts where they can apply theoretical knowledge in real-world settings while receiving guidance.

One of the participants stated:

"Having supervised clinical shifts is essential for medical students to learn. It allows us to apply what we've studied in a safe environment while still having experienced clinicians to guide us. For several months after graduating, I felt I still needed the care of an emergency physician (Graduate No. 17).

Another participant stated:

"I am a novice and need to know a lot concerning patient management in the ED. The opportunity to engage directly with patients during clinical shifts greatly enhances my understanding of emergency care" (Intern No. 15).

Comprehensive training

Comprehensive training in the ED is vital for developing competent healthcare professionals to handle complex situations. Interviews highlighted essential topics like morbidity and mortality conferences, trauma management, and resuscitation techniques. Skills in differential diagnosis, history taking, and physical exams are crucial. This holistic approach equips medical students with the knowledge and skills needed for effective patient care, improving outcomes and enhancing confidence in emergency scenarios.

The majority of participants, especially graduates highlighted the educational value of morbidity and mortality (M&M) conferences, where clinical cases are reviewed to discuss outcomes, complications, and areas for improvement. They believed that M&M conferences play a critical role in the reflective learning aspect of emergency medicine.

One of the participants stated:

"Morbidity and mortality conferences provide critical insights into patient care. They teach us about accountability and the importance of learning from past cases. These conferences allow us to critically analyze clinical decisions, which is vital for our development as future physicians" (Graduate No. 18).

Participants argued that the curriculum lacked appropriate education of managing acute life-threatening cases, trauma management and resuscitation techniques, which may limit their actions in initiating life-saving interventions, and imposing longer hospital stays for patients.

One of the participants stated:

"Learning the basic management of acute life-threatening illnesses is crucial. It equips us to act swiftly

and effectively when every second counts. I feel more prepared for real-life emergencies after focusing on the management of critical conditions during our training" (Graduate No. 20).

Another participant stated:

"The emphasis should be given to trauma management and resuscitation techniques which are invaluable. It's empowering to know how to handle such critical situations. I believe that hands-on training in resuscitation techniques builds our confidence and ensures we are ready to respond in emergencies" (Graduate No. 19).

Participants viewed differential diagnosis as a critical process in the ED. They recognized that this process requires not only a solid foundation of medical knowledge but also keen observational skills and critical thinking. They valued it as it fosters a deeper understanding of the complexities of medical conditions.

One of the participants stated:

"Understanding how to formulate differential diagnoses is a key component of our training. It helps us think critically and consider various possibilities" (Graduate No. 16).

Another participant stated:

Participants put a great emphasis on improving skills related to history and physical examination. They recognize these skills as foundational to effective patient assessment and management in emergencies.

One of the participants stated:

"The ability to conduct a focused history and physical exam is crucial in emergency medicine. It's often the first step in determining the right course of action" (Intern No. 1).

Clinical experience

Hands-on practice

Participants admired engaging directly with patients to apply their theoretical knowledge in practical settings, honing their skills in history-taking, physical examination, and clinical reasoning. They believed that the variety of cases in the ED challenges them to apply their theoretical knowledge efficiently. They mentioned that by engaging with diverse cases, they learn to appreciate the importance of thorough history-taking, physical examination, and the integration of diagnostic tests, ultimately refining their clinical reasoning skills as well.

One of the participants stated:

"Having opportunities for hands-on practice in the emergency department is invaluable and very important. It helps solidify our learning and prepares us for actual patient interactions" (Graduate No. 17).

Another participant stated:

"Each case we encounter teaches us something new, which is essential for building our clinical acumen" (Intern No. 5).

Decision making

Participants reported feeling unprepared to make swift, informed decisions in high-pressure situations, often relying heavily on supervisors rather than trusting their own judgment. This reliance not only undermines their confidence but also stifles their ability to engage actively in patient care.

One of the participants stated:

"In critical moments, I often freeze because I don't feel equipped to make quick decisions. I wish I had more practice" (Intern No. 7).

Another participant stated:

"We need more practice on decision-making skills. In the ED shift, I was challenged by clinical cases as I had to weigh options and consider consequences. I did not manage to succeed. This learning experience is vital for our growth as future physicians" (Graduate No. 21).

Team collaboration

The students and graduates expressed significant dissatisfaction with the current state of this critical aspect of their training. They reported a lack of effective collaboration within teams, often feeling isolated and unsupported in high-pressure situations.

One of the participants stated:

"There are times when I feel completely alone in the chaos. I am not completely proficient in the procedural skills of the ED. It seems like everyone is too busy to communicate, and that makes it hard to work effectively" (Intern No. 14).

Another participant stated:

"I often feel like I'm just following orders rather than being part of the team. It's frustrating because I want to learn and grow" (Intern No. 10).

Learning environment

Stressors

Participants worried about the inherent stressors present in the ED, such as high patient volumes, time constraints, and complex cases. They believed that these stressors can impact their learning and performance.

One of the participants stated:

"The fast-paced environment of the emergency ward can be overwhelming. The constant pressure to make quick decisions adds a layer of stress that affects our learning" (Intern No. 5).

Another participant stated:

"Experiencing stress in the ED is part of the reality of emergency medicine. It teaches us resilience, but it can also be challenging to focus on learning amid the chaos" (Intern No. 11).

Physical environment

Participants stated that the physical aspects of the clinical

setting (a well-equipped environment), including the availability of medical resources, technology, and the overall condition of the facilities can enhance their learning experience.

One of the participants stated:

"Having access to modern facilities and resources significantly impacts our training. It allows us to practice effectively and learn with the best tools available" (Intern No. 9).

Another participant stated:

"The physical environment of the emergency department can either facilitate our learning or hinder it. Adequate resources are crucial for our development as medical professionals" (Graduate No. 22).

Supportive peer interaction

Many students expressed a desire for more collaborative opportunities to engage with their fellow trainees, recognizing that these interactions are crucial for developing both clinical skills and a supportive learning atmosphere. While some students noted positive experiences with peer collaboration, they also highlighted the need for structured environments that encourage open communication.

One of the participants stated:

"There have been moments where I've had great discussions with my classmates about patient care. Those interactions help me feel more connected and less overwhelmed. However, I wish we had more structured time for teamwork during our shifts" (Intern No. 1).

Discussion

The findings of this study revealed four themes and ten concepts pertinent to the ED within our context. They included learning preferences, emphasizing the need for innovative teaching strategies and simulation-based learning; curricular preferences, highlighting the importance of supervised clinical shifts and comprehensive training in acute care; clinical experience, which revealed a desire for more hands-on practice, opportunities for decision-making, team collaboration; and learning environment, addressing stressors, the physical environment and the need for supportive peer interactions.

The first theme identified pertains to students' learning preferences. Within this theme, participants engaged in discussions regarding two aspects of clinical education in the ED, encompassing the use of effective teaching strategies, and the utilization of simulation-based learning. It can be posited that bedside teaching in the ED embodies both an art and a skill, as each patient's experience is distinct and each learner possesses unique educational requirements. The role of a clinical teacher in providing new educational models, including learner-centered strategies for transferring learning experiences, is very effective (20-22). Furthermore, medical teachers bear the responsibility of shaping the education and development of future physicians, thereby necessitating their familiarity with effective teaching methods (23-25). A study showed that the use of teaching models such as one-minute preceptor model is an effective and efficient method of engaging learners in high-level case discussions of clinical problems in the ED (26). This finding corroborates our results. An Evidence-based guide to best practices from the Council of Emergency Medicine Residency Directors reinforces that it is of utmost importance to use techniques and teaching methods for clinical teaching in the ED (27). Medical students perceive simulation-based learning as a valuable opportunity to acquire new skills within a secure environment (28). This pedagogical approach is recognized as an effective educational strategy that is increasingly being integrated into the clinical training of medical students, particularly in ED settings (29). A clinical trial conducted by Herbstreit et al evaluated the efficacy of utilizing standardized emergency patients in comparison to conventional training methods. The findings indicated that the implementation of standardized patients significantly enhances the management of emergency cases (30). Another study showed that the use of simulation-based learning in the ED has the potential to improve student retention of clinical knowledge during the preclinical years (31).

The second theme identified pertains to students' curricular preferences. Within this theme, participants articulated issues related to supervised clinical shifts, and comprehensive training in the ED with respect to topics such as morbidity and mortality conferences, management of life-threatening illnesses, trauma management, differential diagnosis, and history/physical exam. Learners highlighted the need for better oversight of clinical teachers, indicating a demand for improved educational policies. Effective clinical supervision is vital for medical education; inadequate supervision can lead junior doctors to adopt suboptimal standards of care. Research indicates the necessity of establishing and nurturing systems that promote high standards of conduct and facilitate effective clinical teaching and supervision (32,33). A study conducted in Canadian medical schools explored the experiences of 81 medical students during an emergency medicine internship rotation. The findings revealed that students highly value close supervision and the opportunities to improve their clinical assessment skills throughout the internship (34). A study evaluated supervision adequacy for junior medical staff in Australian EDs, involving 37 hospitals and using quantitative and qualitative methods. Quantitative results indicated that clinical supervision and feedback were generally adequate, primarily from counselors and registrars. Qualitative analysis highlighted effective monitoring processes but identified challenges such as access block

and overcrowding that threaten their efficacy (35). The findings of this study contradict our results. We assume that the challenges associated with insufficient clinical supervision in EDs can be addressed through strategic educational planning and effective management practices, including the promotion of teamwork. Participants emphasized that a well-designed curriculum is crucial for achieving educational goals and essential competencies. A study by Lane et al highlighted concerns among emergency medicine residents regarding high-value care understanding and the need for an optimal curriculum addressing educational challenges (36). A study by Lee et al with 48 pre-clinical students found that a significant majority were highly interested in skills like suturing (100%), splinting (97%), and basic ECG interpretation (97%), while topics related to organizational issues and health concepts were prioritized lower (37). In the present study, participants identified certain educational topics that clinical teachers deem to be of lesser significance. These subjects encompass morbidity and mortality conferences, the provision of opportunities and training for practical skills, including the basic management of acute life-threatening conditions, trauma management, resuscitation techniques, differential diagnosis, and focused history-taking and physical examination. Participants expressed the view that these topics warrant greater emphasis within the curriculum and the implementation of training programs in EDs. In another study, medical students identified curriculum priorities: advanced cardiac life support (ACLS) (26.4%), clinical shifts (20.6%), supervised shifts (17.8%), procedural training (14.8%), tutorials (10.8%), and preceptor-assisted sessions (9.8%) (34). We assume that variations in students' curricular needs are influenced by factors like instructional design, curriculum implementation methods, teaching hospital characteristics, patient demographics, and the quality of teaching from clinical educators.

The third theme identified pertains to clinical experience. Within this theme, participants engaged in discussions regarding three aspects of clinical education in the ED, including more hands-on practice, opportunities for decision making, and team collaboration. Hands-on experience in the ED is crucial for medical students, as it enhances clinical skills, fosters critical thinking, and builds confidence in high-pressure situations, ultimately improving patient care. A study conducted on the perceived needs of Ugandan medical students regarding Emergency Medicine skills acquisition during participation in an app-based EM course showed that they had a desire to learn EM predominantly through hands-on clinical rotations (38). This aligns with current research on clinical skills acquisition, as medical students express hands-on practice and learning from clinical seniors (39). Evidence accentuates the importance of learning clinical skills through hands-on experience. A study on emergency medical technicians' perspectives indicated a need for improved hands-on experience in medical science education to better prepare them for prehospital emergency care roles (40). Also, participants in this study expressed a preference for increased opportunities to enhance their skills in clinical decision-making. Collaborative decision-making in EDs is effective, with shared decision-making integrating scientific evidence and patient values. Despite challenges in the fast-paced environment, it is recommended that many healthcare decisions be made collaboratively to improve outcomes (41). The findings of a study indicate that within EDs, interactions between physicians and patients, characterized by collaborative decision-making, effective patient-centered communication, and a respect for patients' autonomy, significantly enhance patients' health literacy. Consequently, this empowerment enables patients to engage in the selection of optimal treatment plans, thereby facilitating the attainment of desired health outcomes and ultimately enhancing patient satisfaction (42). Participants emphasized that team collaboration in the ED is crucial for effective communication, enhanced patient care, and essential teamwork skills, with research showing that collaborative practice improves clinical outcomes and patient safety (43). It can be assumed that in high-pressure environments like EDs, teamwork allows for efficient problem-solving and resource utilization, which are crucial for managing acute cases. Furthermore, fostering a collaborative team environment where all staff members, including nurses, technicians, and support staff, work together seamlessly can significantly impact overall satisfaction (44).

The last theme extracted from the participants' discussions pertained to the learning environment and included issues related to stressors of the ED, physical environment, and the need for supportive peer interactions. Stressors in the ED, such as high patient volumes, time constraints, and complex cases, can hinder students' learning by overwhelming them, reducing their ability to absorb information, and impacting their overall confidence and performance. A study showed that the complex and often high-pressure environment of the ED can pose various safety challenges for the care team (45). A study found that while clinical workload and teacher availability minimally impacted teaching quality, significant factors included teachers' clinical competencies, willingness to teach, interpersonal skills, and a supportive learning environment, with skilled educators receiving higher evaluations (46). By the same token, the management of complex cases can pose considerable emotional and physical challenges to the ED care team. Therefore, emergency workers remain vulnerable to the resultant stress, underscoring the necessity for adequate preparation and support to

help them navigate these stressors (47). Participants stressed that the availability of medical resources, advanced technology, and well-maintained facilities in the ED enhances their learning by facilitating hands-on experiences, improving access to essential tools, and fostering a conducive environment for effective clinical education and patient care. We believe that an enhanced ED environment contributes to a positive learning aura, reduces distractions, and allows students to focus on their education. According to many studies, a well-organized ED physical environment enhances the efficacy and improves the speed and precision in providing services (48,49). Evidence indicates that the physical environment of EDs requires more attention than other departments (50). Many students expressed a strong interest in enhancing collaborative opportunities with peers, recognizing their importance for developing clinical skills and fostering a supportive educational environment. While some shared positive experiences, they emphasized the need for structured settings that promote open communication. Evidence shows that in a high-acuity academic ED, effective communication between residents and non-physician staff is essential for safe patient care (51). Gabay underscored that communication is a key element of patient satisfaction in the ED, with positive interpersonal exchanges playing a significant role in the overall experience of patients (52).

We recommend future research focus on the impact of revised educational practices on medical students' confidence and competence in emergency medicine. Also, the implications of this study extend beyond individual educational practices to influence policy-making in medical education. By advocating for systemic changes based on the findings, stakeholders can work towards creating more supportive and effective learning environments in EDs. This may ultimately lead to better-prepared healthcare professionals who can deliver high-quality patient care in high-pressure situations.

This study has several limitations that should be considered when interpreting the findings. Firstly, the participants' perspectives obtained in this study may not fully represent the diverse experiences of all medical students and graduates across different institutions. Additionally, the purposive sampling method could introduce selection bias, as those who chose to participate may have had stronger opinions about their educational experiences. Furthermore, the context-specific nature of the study, conducted at Yazd University of Medical Sciences, may limit the applicability of the findings to other settings. Temporal factors are another concern, as perceptions may change over time, and the study may not have fully explored all relevant factors influencing participants' perspectives.

Conclusion

This study identified four key themes critical to medical students' educational experiences in the ED: learning preferences, curricular preferences, clinical experience, and the learning environment. Participants emphasized the need for innovative teaching methods and simulation-based learning, alongside improved supervision during clinical rotations, highlighting structured mentorship's importance for high care standards. There is a strong demand for more hands-on practice and collaborative decision-making to build confidence and clinical competencies in high-pressure situations. Additionally, participants noted that stressors in the ED can hinder learning, underscoring the need for a supportive peer network and a conducive physical environment. These findings provide a framework for enhancing medical education in EDs, ultimately aiming to improve students' educational experiences and the quality of patient care.

Acknowledgments

The authors wish to extend their heartfelt thanks to the students and graduates who participated in the interviews, as this study would not have been possible without their valuable contributions.

Authors' Contribution

Conceptualization: Amin Beigzadeh, Sara Heydari.
Data curation: Amin Beigzadeh, Sara Heydari, Ali Raee, Majid Hajimaghsoudi, Milad Asadi.
Formal analysis: Amin Beigzadeh, Sara Heydari.
Funding acquisition: Sara Heydari.
Investigation: Amin Beigzadeh, Sara Heydari, Ali Raee, Majid Hajimaghsoudi.
Methodology: Amin Beigzadeh, Sara Heydari.
Project administration: Sara Heydari.
Software: Amin Beigzadeh, Sara Heydari.
Supervision: Sara Heydari, Ali Raee.
Validation: Amin Beigzadeh, Majid Hajimaghsoudi.
Writing–original draft: Amin Beigzadeh, Sara Heydari, Ali Raee, Majid Hajimaghsoudi, Milad Asadi.

Competing Interests

The authors declare that they do not have any conflict of interest.

Ethical Approval

This study was based on a general medicine thesis (project code No. 17828) and approved by the Ethics Committee of Yazd University of Medical Sciences (Ethical code: IR.SSU.MEDICINE.REC.1402.375). Written informed consent was obtained from participants.

Funding

This study was financially supported by Shahid Sadoughi University of Medical Sciences.

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