



Exploring undergraduate medical students' perception of learning procedural skills and its outcomes in clinical settings

MOHAMMAD REZA MANSOORIAN¹, PhD Candidate; MOHAMMAD JALILI², MD; SHAHLA KHOSRAVAN³, PhD; MOHAMMAD SHARIATI⁴, MD

¹Department of Medical Education, Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran; ²Emergency Medicine, Department of Medical Education, Tehran University of Medical Sciences, Tehran, Iran; ³Management and Community Health Nursing Department, Social Determinants of Health Research Centre, Gonabad University of Medical Sciences, Gonabad, Iran; ⁴Department of Community Medicine, Medical Education Department, Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Abstract

Introduction: Learning procedural skills is one of the essential aspects of undergraduate medical education. However, learning procedural skills in clinical settings is less widely considered. This study aimed to explore the Iranian undergraduate medical students' perception of learning procedural skills and its outcomes in three universities of medical sciences in Iran.

Methods: A descriptive exploratory qualitative methodology with an in-depth unstructured, face-to-face interview, and content analysis was used in this study. Sixteen students in clinical phases of general medical education programs from educational hospitals were selected using purposive sampling. According to the preferences of the participants, the interviews were conducted in medical schools or in hospitals.

Results: The students participating in this study included 7 females and 9 males (totally 16 people) with a mean age of 23.7 years old with a range of 21-27 years. The three main themes of this study were "the gap of transferring formal teaching from skill lab to clinical placement", "learning self-leading procedural skills in clinical settings", and "students' dissatisfaction with patients' vulnerability" with 8 subthemes which were extracted and explained based on the students' perception.

Conclusion: Unsupervised and self-learning by medical students and weakness in controlling the learning process have undesirable results for patients and students.

Keywords: Skills, Learning, Qualitative research, Medical students

*Corresponding author:

Mohammad Shariati, MD;
Department of Community
Medicine, Department
of Medical Education,
Faculty of Medicine, Tehran
University of Medical
Sciences, Tehran, Iran
Tel: +98-9121951065
Email: shariati.ir@gmail.
com

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Introduction

The ability to diagnose in the "cognitive domain" is traditionally prior to interventional one in the psychomotor domain in medicine (1), but medicine has recently become more interventional (2) and procedural skills and their desired execution, such as placement and removal of nasogastric tube, suturing, foley catheter, intravenous placement, and injection venipuncture are among the physicians' duties

in many countries, and training medical students for doing these procedural skills is an essential part of the general medicine curriculum (3, 4). Clinical skill centers have been designed and established since 1960 to meet these needs and bridge between theories and practice (5-7). These centers are specially designed for teaching procedural skills in a safe and controlled environment based on learning theories for the psychomotor domain before

entering the real clinical settings (2, 8, 9). Some studies have reported the positive effects of these centers (10-13), including the increase in the mental preparedness, feeling of self-efficacy, and students' ability in correct conduction of procedures on moulages (4, 10). However, some studies indicated the insufficient competence of medical students in doing procedural skills and the feeling of inefficiency for doing such skills (14-16). The students who have learned such skills through practicing on patients have shown more ability and self-confidence (4, 17). Thus, learning the procedural skills requires acquiring clinical experience in the patients' bedside (17, 18). For improving this ability, the development of bedside teaching, along with mentorship and cooperation of nurses in teaching procedural skills, has been used for the medical students (19, 20). Some students reported that they learned clinical procedures through self-learning and learning by doing on the patient without instructors' monitoring and feedback (17, 21). This type of education not only reduces the student's trust in the learned skill, but also causes violating ethical aspects such as the possibility of damaging the patients (21). Therefore, it seems that learning procedural skills in medicine has remained as the challenge of the 21st century (22).

General medical teaching in Iran lasts for seven years. The undergraduate medical curriculum includes basic sciences, physiopathology, and clinical rotations (4). The students are expected to achieve the required competency through teaching in the skill labs on moulage and simulation and during the internship on real patients. Like some other countries, the studies in Iran also indicate the insufficient dominance of students on procedures and inadequate satisfaction from clinical teaching (23, 24). Learning the procedures is a process that is affected by several factors, such as the features of the trainer and trainee and environmental factors (25). These procedural skills are not simple because, in addition to cognitive aspects, emotional and psychomotor elements also influence them (26-28). Learning procedural skills requires a deep understanding of learning to complete the knowledge and better design of the educational program (28), which are not readily available through quantitative studies. Therefore, this qualitative research has been conducted to explore the Iranian undergraduate medical students' perception of learning procedural skills and its outcomes. We hope that the findings of this research can help to improve the medical students' clinical performance.

Methods

This is a descriptive exploratory qualitative study with unstructured interviews and content analysis.

This study was conducted in November 2017-June 2018 in three universities of medical sciences in Iran. We used purposeful sampling technique with heterogeneous method to reach maximum variation in perspective and experience. Most of the Medical Sciences Universities in Iran have residency education programs, while some other universities do not have this program. Regarding different educational environments in these two types of medical universities in Iran, two medical universities with residency education and a university without this course were selected. Sixteen (seven females and nine males) undergraduate medical students who were studying in the internship period were included in this study from three selected universities (two with residency education and one without residency education) and sampling continued till data saturation.

Participants were selected through interviews by the authors from the educational hospitals of Tehran, Mashhad, and Gonabad Universities of Medical Sciences. After explaining the objectives of the research to the students, an unstructured, in-depth, face-to-face interview was done. The interview started with a general question "How are the clinical and procedural skills learned in the real clinical setting and at the bedside?" The interviews were audio-recorded, and as a complement of the audiotape, the first author wrote field notes.

The tempo of the conversation was flexible and probing questions like "Tell me more about ..." with why, what, where and when were used to get more information. Data gathering ended after saturation of the data (29). Each interview lasted for 50-70 min.

The interviews were transcribed by the corresponding interviewer. The transcripts were analyzed using qualitative content analysis (29). The data collection and analysis were carried out concurrently, and each transcribed interview was analyzed before proceeding to another interview.

Rigor

The interviews conducted by the first author, and all four authors participated in formulating the main research question and also probing questions to expand understanding of the data. Also, they participated in the process of sampling to reach maximum variation (29). All the authors were involved in the data analysis,

and they reached consensus about the selection of examples for the kind of meaning units, the coding process, categories, and themes. Member-checking was used for exploring the credibility of the results. It was done by restating and summarizing the information and asking the participant to determine the accuracy. The transcribed interviews with codes returned to the participants for checking the accuracy and their agreement with the researchers about the meanings obtained. We also conducted a peer review and asked two colleagues who were familiar with qualitative research and data analysis to encode some of the interviews. Then, the agreement of their designated codes and concepts with the established codes and concepts by researchers were examined and corrected, if necessary.

Ethical Consideration

The study protocol was reviewed and approved by the Ethics Committee of Tehran University of Medical Sciences in Iran, as an approved committee by the National Ethics Committee in Biomedical Research, Iranian Ministry of Health and Medical Education, with the code of (IR.TUMS. MEDICINE.REC.1395.1688). Before the beginning of this research, coordination was made by the deputies of research of the three universities. Participation in this study was voluntary. Written informed consent was obtained before data collection and recording of the students' voices. The students had the right to withdraw from the study at each stage. All the interviews were conducted in a private location according to the preferences of the participants. The duration of the interviews was determined by agreement with the interviewees.

Results

The mean age of the students participating in this study was 23.7 years old, with a minimum of 21 and a maximum of 27. The main themes of this study were "the gap of transferring formal teaching from skill lab to clinical settings," "self-guided learning of basic skills in clinical settings," and "students' dissatisfaction and patients'

vulnerability" which were extracted based on the students' perception, as explained below. Themes and subthemes are shown in Table 1.

1-The Gap of Transferring Formal Teaching from the Skill Lab to Clinical Settings

This theme explained about designing a training gap for procedural skills, especially on the patient's bedside by four sub-themes.

Need to Experience on the Real Patient

The students learn procedural skills, usually in a planned and structured way in skill labs. This learning occurs under the supervision of medical teachers, being regarded as a positive experience; for example, a female medical student said:

"It was a good course. It was a quiet environment and there was the opportunity for adequate explanation. The models, mannequins, films and trainings were also good; there were feedback and the possibility of practice and repetition. Human damage was not because of probable errors; the time was ours and each job could be planned".

According to the students, the experience of learning procedures in skill labs, despite being useful, is unreal and insufficient, and they mentioned the necessity of continuing training and learning skills in real environments. One of the students said:

"The student should do the procedures on real patients to overcome her/his fears. She/he should use the laryngoscope and experience the tracheal intubation on her/his own. The instructional films may provide us with knowledge, but they do not give us the skills. We have to admit that teaching medical practical skills should start from skill lab and continue in clinical settings".

Continuing Formal Education in Skill Lab in the Patient's Bedside

Although the students attended the clinical settings with patients, tools and facilities for caring and curing patients, the training was simulation-based in skill labs and there was no use of real patients at bedside.

"Even though we got more familiar with

Table 1: Themes and subthemes of the study

The gap of transferring formal teaching from skill lab to clinical settings	Need to experience on the real patient
	Continuing formal education in skill lab in bedside
	Theory-based skill evaluation in clinic
	Lack of planning, being free
Learning self-leading basic skills in clinical setting (the solution of filling gap of formal teaching)	This is not my main task, but I have to learn it
	Active self-learning in low controlled space
Students' dissatisfaction- patients' vulnerability	Inability to achieve required competencies
	Vulnerable patients

theories and films of the procedures and conducting on mannequins in skill labs, in the internship and apprenticeship courses, when the patients are available, we need to continue the techniques which are taught in the skill labs”.

Theory-Based Skill Evaluation in Clinics

Another characteristic of the clinical skill lab, which students discussed, was theory-based training and not evaluating their skills in doing procedures on real patients. Also, they talked about the ineffectiveness of acquiring these abilities to do skills in the course tests. They considered progress to their theoretical knowledge:

“The professor of each section asks us some questions orally or in written form. They score us from morning report or description of the patient. There is no practical activity, based on which we are scored. Practical work is not important. The score of the exams (knowledge-based exams) is important”.

Logbook, as an educational and assessment tool, has not been efficient for students due to reasons such as lack of precise tracking for completion and weakness in controlling the educational system. For example, a student said:

“We have to complete logbooks to get its score, but our actual action in a clinical setting is not evaluated”.

Lack of Planning, Being Free

The feeling of most undergraduate students regarding the program of teaching procedural skills compared to other skills in clinical settings was lack of planning and being free. There were not any plans, prioritizing lack of skill training on hospital bedside by teachers, lack of control and supervision of learning by professors, lack of a resident professor to accompany the students to create or use learning opportunities. Students reported:

“... Basically, teaching procedures in clinical settings is not the priority of training. No planned goals have been predicted for teaching skills, at least not proposed to the students; the student is free in clinical settings and there is no clear and precise plan for learning which procedure, in what ward, from whom, and who should monitor the procedure accurately. Yet, getting history, diagnosis and the treatment order from patients are precisely investigated and controlled...”; “... even in the emergency ward, no professor monitors us”; “... and there is no effort to create a teaching –learning situation and follow it up in different rotations by medical teachers”.

2-Learning Self-Leading Basic Skills in Clinical Setting (the Solution of Filling the Gap of Formal Teaching)

In this theme, the need to learn the procedures and how to learn them for students is explained with two subthemes.

This Is Not My Main Task, but I Have To Learn It

The students have not received documented information from the task description and required qualifications for the general physician. In the process of being professional, they consider the performance of other physicians and professors' expectations. According to them, performing the procedures is the nurses' duty and is not prioritized as the prerequisite skills for becoming a physician.

“We learn what our professors want us to do; we have not received a document about the duties of a general physician. We look at professors (what they do) and realize our duties. I think diagnosis and treatment are more important for me (as a physician); there are other people, especially nurses, for skills”.

However, based on the recommendation of professors and residents, they consider the learning skills necessary for future work conditions such as the expectations of the patients in the absence of nurses in rural areas or emergency cases. Given the lack of educational system concentration on teaching skills, especially in an internship period, students are worried about not learning such skills:

“... as a general physician, I might be somewhere at the beginning of my service where there is no nurse or expert to do the required practical skills, so I am worried about what I should do there!”

Active Self-Learning in Low Controlled Space

According to the participants, teaching and monitoring have been turned into an informal and optional duty, assigned for student and informal trainers such as residents in random occasions.

One of the participants said:

“Everything depends on the student! When we came to clinical setting, no one taught or asked us to do those procedures which we had learned in skill labs. The students need to be lucky to find an interested professor or resident who has either adequate time and there should be also conditions and patients for doing procedures sufficiently”.

Therefore, based on the need for learning and filling formal teaching gap of skills, according to the recommendations and experience of professors and residents, they try self-directed

learning.

"We almost faced all procedures in an internship course, and we had to remember them. I followed it up. First, I watched the New England training movies and when I memorized them well, I tried to do that procedure by a skilled person. When I felt prepared mentally to do that, I did it first with a supervisor and then independently. It is worth mentioning that sometimes I could not find anybody for supervision. Although I was not dominant, I did it and asked for help if there was a problem".

Students were free to do the procedures with or without adequate skill and due to the weaknesses in monitoring and regulations, there was no serious barrier for them:

"...If we want to do a procedure for a patient, no one (professor or personnel) will inhibit us".

Also, a positive and cooperative interactional atmosphere of informal trainees (residents, nurses and senior students) for accepting the responsibility of skills and being supported at the emergence of error and the absence of formal professors have been the underlying factors of practicing skills on patients in the clinical setting, as mentioned by students:

"At the first occasions, I usually used to ask the residents to be with me and they used to cooperate".

Some of the barriers of implementing interventions on patients are fear of error, inability to attract the cooperation of formal and informal trainers, and lack of collaboration between patients and companions at the absence of professors and training supervisors. For example, about the patients one student said:

"Some patients have no complaint. Some ask us who we are and when we say students, they accept reluctantly and some of them do not let us do the procedure".

3-Students' Dissatisfaction, Patients' Vulnerability

Self-learning has some outcomes. By this theme, self-learning outcomes for students and patients are explained in two subthemes.

Inability to Achieve the Required Competencies

Unplanned and informal teaching due to the feeling of lack of trust in clinical supervisors, inability to provide learning situations, lack of appropriate educational feedback, inappropriate training and evaluation method, and failure to achieve the required competencies result in the students' dissatisfaction with the formal educational system. Some of this can be found in the following quotation:

... There was no specific professor who monitored us and mentioned the problems. If we find someone for supervising, he/she does not usually explain the procedure, or his/her explanation is often short. She/he does not have time or interest in and I even think that some of them do not know the procedures as mentioned in references.

Vulnerable Patients

The conditions of "freedom for intervention", "lack of controlling the quality of skill executor before the intervention", "not supervising skills execution" and "the students' tendency to do the procedures on patients for learning" will be followed by consequences such as the possibility of more damaging and lack of meeting the patients' rights (not introducing themselves to the patient, nor receiving his/her consent, and abusing the condition of vulnerable patients such as anesthetized patients). A student said:

"We do not spontaneously introduce ourselves because if he knows we are students, he does not trust and let us to do the procedure".

Also, another student said:

"We learned to suture a patient's wound in the operating room because the patient was anesthetized and could not complain".

Discussion

This study was conducted to receive the students' perception of learning procedural skills. The first proposed theme was the emergence of the gap of transferring the training from the skill lab to the clinical setting (bedside) with four subthemes including "Need to experience on the real patient", "Continuing formal education in the skill lab in bedside", "Lack of planning, being free", and "Theory-based skill evaluation in the clinic". The results showed that learning in the skill labs is acceptable; the same results were reported by other studies (10-14, 30). The students mentioned the gap in transferring training from the skill lab to the clinical setting; this result was similar to that of another study by Coberly et al. (31). According to some other studies, there is a weak relationship between learning in the skill lab and doing the skill in the real clinical setting (17, 31). Teaching the procedures in the skill lab is considered as a promoter and supplementary method, not an alternative for its bedside education (13, 32). Therefore, the skill lab should be merged with bedside teaching (33). This opportunity should be provided for students to convert the theoretical knowledge to psychomotor skills at the bedside (2). The results of this study also showed that controlling the students' learning was not

structured, and evaluation of the skills was often conducted through completing logbooks and as self-evaluation or by written tests. According to Miller's Pyramid, doing the skills in the skill lab is measuring the level of "show how", and in the level of "do" should be measured in the clinical setting (34). Thus, the skills cannot be evaluated through written tests. There was also no relationship between the theoretical and clinical performance scores (35). Therefore, more supervision on doing the procedures by students and more accurate evaluation are required (36). According to the findings, educational courses on the procedures are unplanned, and students in the learning procedures are free. According to the students, during their presence in teaching hospitals, professors focus on teaching the skills of examination, narration, diagnosis, and treatment of the disease. A few procedural skills are shown on patients, and students often practice without the supervision of the professor. Most of the professors are less available in clinical settings, and the students are left alone, especially in the internship course. In another study, the priority of teaching skills has been less than other skills, according to the professors' views (15) even though internship courses have a significant role in formation of psychomotor abilities in physicians (33).

Learning procedural skills in the clinical setting was the second theme of this study. Two subthemes were derived from this theme; "this is not my main task, but I have to learn it," and "active self-learning in low controlled space." In this study, students regarded the execution of some of the procedural skills as the nurses' duties and tried to learn these skills based on interest, not as a professional task, while doing such skills are the educational and professional duties of physicians (37). Lack of systemic teaching for procedural skills and not prioritizing education and executing them as a duty reduce the student's effort and motivation in learning these skills (38). Since being a good role model for students is the feature of a good teacher (37), ignoring some tasks makes problems in the process of developing professionalism in medical students. Learning the skills is considered a personal and self-learning duty by students. Procedures have been taught on the patient, but executing and practicing have been done without the presence of a supervisor. This finding was similar to that of another study by Konje et al. (36). The participants of the present study have to provide learning conditions such as satisfying the patient, time, place, instructor, and supervisor. The same results were reported in a study by Katowa et

al. (39). Although the methods of self-leading and student-orientation are common in clinical teaching, this issue is complicated in clinical courses, especially internships, and providing an environment needs a supporter (40). Students tend to be supervised for learning, preventing error, and receiving feedback from the medical professors in doing procedural skills. In other studies, also, the tendency toward the learning and supervising procedure has been mentioned, which creates more satisfaction and trust in students (41, 42). It should be noticed that self-awareness and motivation of students are effective factors in clinical learning (38, 43). Professors' feedback to the students can compensate for the lack of case in clinical sections and increase the students' motivation (32). These are the duties for which clinical professors do not try enough for the student based on the present study.

The third theme in this study was students' dissatisfaction, patients' vulnerability with two sub-themes, i.e. inability to achieve the required competencies and vulnerable patients. One of the students' concerns in this study, similar to other students, was graduating without appropriate learning of the procedural skills because they usually learn the procedures in an informal context (15, 16, 23, 24). Some of the students did not introduce themselves to the patients. The results of these actions, as experienced by some students and mentioned in other references, are wrong and damaging interventions (44).

Limitations

The results of this study were related to the students' perception of learning procedural skills in clinical settings only in three universities; therefore, they cannot be generalized to other universities of medical sciences in Iran. The results are also based on the students' experience, so it is recommended that the students should acquire the experiences of the professors and other experts participating in teaching medical students to create a more comprehensive perception.

Conclusion

The results of this study showed that teaching procedural skills in the skill lab is not enough for students' learning in three universities of medical sciences. There is no developed plan for teaching skills in a clinical setting. Students compensate for this deficiency through self-learning, which is followed by undesirable results for the patients and themselves. We hope the results of this study can be considered in the teaching-learning process of procedural skills to medical students, especially in these three universities.

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