

## Research Article

### SCENARIO-BASED BLOOD PRESSURE MEASUREMENT APPLICATION: SKILL LEVELS AND VIEWS OF NURSING STUDENTS

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#### ABSTRACT

**Background:** Psychomotor skills have an important place in nursing education. Opinions of nursing students about psychomotor skills education were evaluated. **Methods:** First-year nursing students used a METIMAN© simulator to perform a scenario-based exercise and assessments were made via the State-Trait Anxiety Inventory (STAI), individual in-depth interviews, Bondy's skill performance criteria, descriptive statistics, paired sample t-test, inter-observer agreement tests and descriptive analysis. **Results:** Student STAI scores did not differ significantly and neither did observer agreement scores. Students reported positive opinions. **Conclusions:** The simulator was effective for development for blood pressure measurement skills and simulator use was recommended for learning other skills.

**Keywords:** Nursing, Blood pressure, Simulation, Training, Psychomotor skills.

#### INTRODUCTION

Psychomotor skills are defined as coordinated muscle activities consciously guided by the mind in order to carry out a task. These skills are important in nursing education and are learned primarily in laboratory environments (1-3). In addition to learning psychomotor skills, laboratories enable students to combine theory and practice, to prepare for real life, to gain experience through self-learning and to implement their clinical applications in the light of effective, efficient and ethical principles (1-7). For this reason, in skill laboratories, the psychomotor skills training process should be well structured. In the nursing student skill labs it is very important to determine student views related to the different methods used to develop psychomotor skills during clinical skills training such as the simulated patient and standardized patient. It is also very important to make the necessary arrangements related to the educational environment and to ensure the participation of students in the regulation process (7-9). Nursing students in clinical practice can experience anxiety because of the high intensity of the clinical application areas and due to their lack of experience, feelings of inadequacy, fear of harming the patient and of making mistakes, and as a result of the increasing student / instructor ratio. Continuous repetition through simulation-based training improves student performance and self-confidence. A high level of practical work boosts the students' self-esteem by reducing anxiety and improves the quality of their work (9-14). The use of low-fidelity simulation in nursing education began decades ago and has developed very rapidly. Empirical learning philosophy argues that students can develop knowledge through simulation education (15). The assumption that simulation is an important component of knowledge is widely supported (16). High-fidelity simulation is now accepted as a standard training tool. It provides a level of training that is realistic enough to be recognized as a patient. Research has shown that the proficiency shown in simulated environments can be accurately assessed. It is a method of measuring the subjective experience of the student in order to improve patient care and patient safety in a simulated environment as compared to a real clinical environment.

The advocates of medical simulation say that the scenario causes an emotional response in those undergoing training. This emotional response is fixed in the student's memory and is considered to be an important factor contributing to the effectiveness of the simulation (17). Life-saving measures are essential in health care and delay in initiating them is unacceptable. Nursing students should be taught to recognize and respond to symptoms of change in patients at an early stage. The rapid response system has been developed to recognize changes in a patient's condition and to accelerate the response. The use of high-fidelity simulation to train nursing students to recognize and respond to changes in the patient is of vital importance for patient safety and as a student tool. Rapid recognition and intervention in patients with early warning symptoms can alter patient outcome (18). Himes, Ravert, and Tingey (19) in their laboratory study of simulation-based scenarios, reported that student opinions were positive. In the study of Terzioğlu *et al.* (20), when students were asked about their thoughts on performing clinical practice skills training in a virtual environment using scenario-based computer and model simulation, they all stated that this training would be useful for them. Sarmasoğlu *et al.* (9) in their study using a standard patient, determined that the first practices carried out with the standard patient had a negative impact on the students' feelings of comfort and security. However, the method attracted interest and curiosity, made a positive contribution to learning professional responsibilities, strengthened the students' self-confidence, decreased their nervousness in performing the practice with a real patient and made communication with the patient easier. Gürol, Akpınar, and Apay (21) determined that the rate of correctly performing most of the process steps in measuring arterial blood pressure increased after simulation training.

#### MATERIALS AND METHODS

The study included 34 students selected at random via power analysis from among 180 first-year nursing students. The METIMAN© prehospital simulator was used in the study and the anxiety of the students was evaluated via the State-Trait Anxiety Inventory (STAI) before and after the blood pressure measurement application. Individual in-depth interviews were conducted with the students whose anxiety levels had increased after the application. Data were

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collected between February and May 2017. Signed informed consent was obtained from all students; in addition, a signed consent form was obtained for individual in-depth interviews. During the application, students were evaluated while performing the practice within the framework of a scenario by two independent observers and each student's level was determined according to Bondy's psychomotor skills acquisition stages. The quantitative data of the study were evaluated by using descriptive statistics, the paired sample t-test and inter-observer agreement tests. The descriptive analysis method was used for qualitative data.

## RESULTS

The findings of the study are presented below in accordance with the descriptive statistics and analyses. The distribution of the students included in the study according to sociodemographic characteristics is shown in Table 1.

**Table 1. Distribution of student demographic characteristics**

Demographic Characteristics of Students	n	%
Age	18	7 20.6
	19	15 44.1
	20	9 26.5
	22	1 2.9
	26	1 2.9
	27	1 2.9
Residence status	With family	15 44.1
	Alone	1 2.9
	With friends	9 26.5
Sex	Female	27 79.4
	Male	7 20.6
Voluntarily selected nursing	Yes	27 79.4
	No	7 20.6
Health vocational high school graduate	Yes	6 17.6
	No	28 82.4
Total	34	100.0

Of the students, 44.1% were 19 years old, 44.1% were living with their family, 79.4% were female, 79.4% had voluntarily chosen nursing and 82.4% had not graduated from a health vocational high school.

**Table 2. Comparison of State-Trait Anxiety Inventory scores (n: 34)**

Anxiety	Mean + SD	Test
State (Before)	38.55 ± 6.28	t = -1.65
State (After)	40.41 ± 6.15	p > 0.05
Trait (Before)	46.55 ± 4.94	t = -0.60
Trait (After)	46.97 ± 6.25	p > 0.05

No statistically significant difference was found between the STAI scores (p > 0.05) (Table 2).

**Table 3. Comparison of inter-observer agreement scores (n: 34)**

Observer-1- Bondy	Observer-1- Bondy	Observer-2- Bondy
Pearson Correlation Sig.	1	0.550 0.001

There was no statistically significant difference between the inter-observer agreement scores (p > 0.05) (Table 3)

### Descriptive Analysis

Individual in-depth interviews were conducted with the students whose anxiety levels had increased after the application. The questions directed to the students in the individual interviews, their

responses and the results of the descriptive analysis are presented below.

#### Question 1: What did you think/feel during the simulation practice?

##### Student 1 Response:

- Now, I knew I would be measuring blood pressure or something, but I never thought about a relative of the patient being there. I just thought the mannequin would make a sound when I measured his blood pressure and then I would go, but it wasn't like that.

- I was nervous because it was the first time we had encountered the simulator and we didn't know what was going to happen. Only it wasn't like measuring the BP in the lab-it was different.

##### Student 2 Response:

- At first it felt different so that I took it seriously, thanks to the scenario. I was a little confused- so much so that I felt psychological pressure on myself. Now, I'm normally a person who can empathize, but at that moment I didn't know what would happen because there was a mannequin in front of me, so I didn't care very much about his feelings.

##### Student 3 Response:

- I felt something for the patient's relative- how can I say it- but I couldn't express it. When taking care of a patient, the behavior of the relative, that is, how he treats you, is also important because whether the person behaves well or badly may even change your state of mind. I mean, it can raise your anxiety. I was already anxious there, and the shouting of the patient's relative sent me through the roof. So, I got a little nervous and anxious about not being able to do the task.

##### Student 4 Response:

- During the practice I wanted to take the BP and get an accurate measurement. But I just made up the blood pressure in my own head and told the patient's relative there was no problem in order to calm him down. In fact, the patient had a brain hemorrhage, but I just said the patient was bleeding. This only made the patient's relative more worried.

- From this, I learned that we should not say anything one way or another, like the patient is suffering from bleeding, to the patient's relatives. I realized that I didn't know how to communicate with the patient's relatives.

It was observed that the students stated that they had experienced anxiety and fear during their laboratory practice, but that they gradually overcame this.

#### Question 2: What were the points that hindered or helped you during this practice?

##### Student 1 Response:

- I couldn't hear. I thought the cuff was connected to the mannequin, but it wasn't attached. When I inflated it, the cuff came off the mannequin and opened up. When the patient's relative pressured me because I hadn't been careful about the cuff, I couldn't hear anything.

**Student 2 Response:**

- I don't know, I was at loose ends. The patient was breathing so noisily that I could barely hear. I couldn't hear there- so I wasn't able to hear anything at all. If it had been a real patient, for example, breathing in such a loud noisy way, I think it would have made it difficult for me in terms of hearing.

**Student 3 Response:**

- That was my only problem. First, anxiety, second, not being able to hear the measurement. I wasn't anxious at that time because our teacher wanted to correct our mistakes. I had to learn to do it then and there. Our teacher wanted to help us, so I wasn't anxious. The only thing I was worried about was making a mistake in the measuring.

- The conditions were created just like a hospital environment. I mean, there was no anxiety- the only hindrance to my taking the BP was the patient's relative.

**Student 4 Response:**

- I felt that I was a bit passive towards the interference of the patient's relative- such as saying that we "didn't measure it like so...", you know, we "were looking from here" and so on. I thought I couldn't intervene too much. It was like that. I would have been calmer if it hadn't been for the patient's relative. Yes, the patient's relative was my inhibitor. Yes, it was the patient's relative, and it was so bad for me that his relative interfered so much in so many things.

- It was my first experience, but I didn't expect that we were going to encounter anything like that. I am still not so sure about what I should have done or said to the patient's relative. Whatever I said, the patient's relative was still there, absolutely would not leave and refused to be separated from his father. The relative should have been taken outside, but I couldn't do it- no way. The relative constantly interrupted me, checking the patient's legs, trying to find the place of the bleeding that I had mentioned- "There is no bleeding...where is the bleeding?... blah, blah..." like that.

It was observed that students had difficulty because it was their first experience working in a constructed real hospital environment and in a scenario where a patient's relative was displaying a high level of anxiety.

**Question 3: After completing the practice, what did you think / feel when you watched the video?****Student 1 Response:**

- Different- I don't know. On the one hand, I was watching and thinking "if only we had done this..." and so on, or I was saying to myself "I could have done this..."- I was angry with myself.

- For instance, I said to myself, "I'm angry at myself -Why didn't I take the relative of the patient out?" After that, "Why didn't I check the mannequin to see if the cuff was attached or not?" I was so mad at myself for those two things. On the other hand, you knew that the video was being recorded- you know-you saw it was being recorded whether you wanted it or not. Come on-you were being watched by the teachers. I said to myself that if I had a fight with the patient's relative now, the teachers would be there watching.

- If I were in the hospital, maybe I would raise my voice..., I thought "Is it right to raise my voice?" maybe because of that I was holding back.. If I had been at the hospital and alone in the room, I might have raised my voice against the patient's relative. I am not sure.

**Student 2 Response:**

- I was focused on doing my job. I wasn't concerned about the patient's relative being there.

**Student 3 Response:**

- I felt like I was a nurse. The patient's relative was facing me, I had the patient in front of me, I was a nurse and I had to take care of this patient. And I would write the real thing, I mean, what I had heard. I would never have said that I heard something when I hadn't heard anything.

**Student 4 Response:**

- Yeah, it was different. Seeing myself like that- seeing myself in a positive way doing this work, I felt I that I would be able to do it. Seeing myself doing this job made me happy. It showed me I could do it.

- Afterwards I saw how anxious I had been- you know, how I approached a patient like this. When I viewed the video I told myself that I had done many things wrong and said to myself that I'd laugh at this when I watched it later.

It was observed that students were aware of their mistakes while watching the video recordings. They stated that they would not make similar mistakes if they were to repeat the same application.

**Question 4: What did you think of the simulation practice for measuring blood pressure?****Student 1 Response:**

- I've learned this about the benefit of simulation- Of everything that will affect our practice, the first thing you need to do in order to remove the pressure the nurses are under is to eliminate everything you have to in order to make us comfortable in the environment.

- I think the simulator should be made more commonplace, not only for blood pressure but also for other applications. This would make learning more meaningful for us besides providing experience before we start to work in the hospital.

**Student 2 Response:**

- I did not see any negative effect. In fact, I think it contributed a great deal because some of my friends who are studying nursing were surprised- as they hadn't had any simulation experience. They were surprised, they thought it was a good idea.

**Student 3 Response:**

- Oh-At that moment I saw myself as a nurse. So I was going to do this - for the sake of Allah.

- I mean, I don't want to say the patient's relative was bad- even when the patient's relative talked too much- That is to say, the main thing was to treat a patient who was in a poor state of health. How can I tell you...

- Let me tell you how the practice helped me. First, you weren't there and I wanted support because I was dealing with a patient for the first time. So I didn't have a problem with the simulator. I mean, it was nothing. Everything was in order, so it was good.

- I felt that if I spoke in a good way I could communicate with the patients' relatives.

- Everything went very well for me. That simulator-how can I say it- is really a beautiful application because you need to evaluate the progress of the student's psychology at that moment. When the student is there, you have to learn what he will do at that moment. For us and for you too it was a great practice- I am delighted about this.

#### Student 4 Response:

- For us it was a very good practice -like we were seeing the hospital setting for the first time, how we should behave with the patients, you know, we saw what we had to do in the hospital. It was an experience for us.

- I think it had a good effect on our communication with patients and patients' relatives.

- For example, doing this increases our knowledge more, even before we start to work under real hospital conditions and with real patients. It makes us realize the situations we will encounter and start to think about it and learn where we went wrong... Instead of making a mistake on a real patient, it is good to see our mistakes and correct them on a simulator. It's great.

- I felt the most intense emotion that you can imagine- Let it end- I wanted it to get over. Everything was so confused and everything was like that. He was there, he was here, he was shouting. There was such an atmosphere of chaos.

The scenario-based simulation provided support to the students before they began their hospital practice by helping them cope with anxiety and communicate with patients and their relatives. At the same time it was determined that such applications would be suitable to use in other fields.

## DISCUSSION

In our study, which was designed with the aim of evaluating the opinions of nursing students about psychomotor skills training, a blood pressure measurement scenario was applied. In general, the students were nervous and because the simulator was not alive, they could not fully look at it realistically. They were quite anxious about making mistakes. They experienced the feeling of being nurses. The videotaping had positive effects and was useful in terms of communication and their feedback was acknowledged by the students. Himes *et al.* (19) reported that students expressed positive opinions of their laboratory practice with simulated scenarios. In the study of Terzioğlu *et al.* (20), when the students were asked about their thoughts on performing clinical practice skills training using scenario-based computer and model simulation in a virtual environment, all of them stated that this training would be beneficial for them. Both of these findings support our study (19-20). In the study of Eyikara and Baykara (22), the scores of the students who measured blood pressure in the simulation were found to be statistically significant and it was concluded that the simulation had a positive effect on the nursing students' measurement of vital signs. This finding also supports our study (22). Gürol *et al.* (21) determined that the rate of correctly performing most of the process steps in

measuring arterial blood pressure increased after simulation training. In the study conducted by Sarmasoğlu *et al.* (9) with a standard patient, the first practice carried out with the standard patient adversely affected the students' feelings of comfortable and safety. However, it was found that the method aroused interest and curiosity, contributed positively to the learning of professional responsibilities, strengthened the self-confidence of the students, reduced their nervousness in performing the practice with a real patient and facilitated communication with the patient (9,21). Ballard, Piper, and Stokes (23) investigated whether nursing students' blood pressure measurement skills could be improved by one hour of additional simulation training. In a three-year nursing program, a post-experimental test was applied to measure the outcome of blood pressure measurement by simulation in addition to the normal curriculum of the nursing students. As a result, the additional simulation training lasting one hour enabled nursing students to measure blood pressure accurately. The systolic and diastolic sensitivity of the blood pressure measurement statistically differed between the experimental and control groups (23). High-fidelity simulation concentrates on cognitive capacities and creates anxiety. Bauer *et al.* (24) included 23 participants (8 females, 15 males) in a prospective observational study to evaluate state anxiety and fear, and a low level of anxiety was identified in those practicing in first-year anesthesiology and intensive-care (24).

The study of Megel *et al.* (25) investigated the effect on anxiety of the application of a high-fidelity baby simulator. Undergraduate nursing students were divided into two groups: experimental (n = 27) and control (n = 25). In the experimental group, postoperative evaluations were performed using the SimBaby™ mannequin. Anxiety (STAI), self-confidence and satisfaction from the learning experience were measured. In their first clinical practice days, their anxiety scores were much lower and the students proposed additional pediatric simulation practice (25). Using the thematic analysis of video data and reflective interviews, Endacott *et al.* (26) found significant differences during the processes used by the students. Identifying, intervening in and systematically evaluating the deteriorating condition of patients was stressful for the nursing students (26). In the study of Kharasch *et al.* (17), in a scenario involving a critical patient in the simulation, student heart rate and blood were measured objectively and the anxiety levels were found to be high. In the scenario during which the nursing students experienced the simulation, their growing fear and anxiety may have arisen due to "stage fright" (17). Nielsen and Harder (27) observed that in the simulated learning style, the anxiety pattern in the students appeared to be simulation-specific and suggested that cognitive intervention models should be used for performance and anxiety (27). In the study of Mills, Carter, Ruddy, Claxton, and O'Brian (28), significantly higher degrees of anxiety and poor performances were seen in students who were together with more people in the room during the simulation. These results show the effect of social manipulation. They emphasized that undergraduate students should practice stressful events with high-fidelity simulation training before clinical practice (28). The study conducted by Shepherd, McCunnis, Brown, and Hair (29) sought to provide an evidence base for the selection of appropriate teaching methods. Two different simulation methods were applied for teaching clinical skills to nursing students and the cognitive, motor and affective performances of the students were evaluated. The students also evaluated their own levels of confidence and anxiety. As a result of the study, students who were given simulated instruction in different ways did not exhibit a significant difference in terms of cognitive and motor field performance. However, simulation was more effective in enabling students to learn in the affective domain. An unexpected finding was that the students were unable to measure vital signs manually. As a teaching strategy,

simulation can contribute to the learning of students. However, educators and clinicians should accede that excessive use of automated equipment could destroy the potential capabilities of future generation nurses(29).

Bambini, Washburn, and Perkins (30) used a quasi-experimental structure and repeated measurements to increase the self-efficacy of nursing students beginning their clinical practice and to evaluate their clinical experiences. Before and after the simulation experience, 112 nursing students completed questionnaires on various skills required for postnatal and neonatal nursing. As a result, it was observed that the students experienced a significant increase in self-sufficiency in general ( $p < .01$ ). Students also experienced self-confidence in the evaluation of vital signs, in breast, fundus, and lochia assessment, and in providing patient education. The three themes that arose in the qualitative results were communication, confidence and clinical decision (30). Radhakrishnan, Roche, and Cunningham (31) advocated the use of Human Patient Simulator (HPS) mannequins with electronic controls as patient models, although no study has been able to corroborate the impact of systematic practice with HPS on the clinical performance of nursing students. In this pilot study, they tried to determine the clinical performance of 12 nursing students in five categories (safety, basic evaluation skills, prioritization, intervention, delegation and communication) in a complex two-patient HPS application. Students working with HPS in addition to their routine clinical practice received significantly higher scores than the control group on patient identification and assessment of vital signs. The performances of the control and experimental groups were found to be similar in every category and it was proposed that this pilot study be repeated using larger samples (31).

Bogossian *et al.* (32) emphasized that senior nursing students may have difficulty in recognizing and responding to negative changes in the patient. It was pointed out that development of prerequisite information, rehearsal of primary intervention and team management strategies should be an important component of undergraduate nursing student education and that clinical performance, teamwork and situational awareness especially should be addressed (32). Studies evaluating nursing and medical students have revealed differences between them and concluded that peer pressure can directly affect professional decision making and patient safety (33,34). In order to investigate the clinical decision-making process of physiotherapists, Thackray and Roberts (35) applied a simulation scenario in which respiratory functions acutely worsened. The main purpose of this observational study was to define actions, thoughts and behaviors. Experienced physiotherapists practicing within a 50-mile radius of the university were included in the study ( $n = 79$ ). Participants evaluated their thought processes using the "thought-sound" method and made video recordings throughout the treatment. Interaction with the patient and recognition, matching, discrimination, cognitive skills, synthesis and prediction were used sequentially. The findings from this study were used to develop a new conceptual model of clinical decision making for cardiorespiratory physiotherapy. It was emphasized that this conceptual model could be used to determine educational strategies and to ensure the readiness of physiotherapists and nurses to work in cases of acute respiratory intervention (35). When the literature is examined, it can be said that our study results show similar characteristics to those of other previously conducted studies.

## Conclusion

Our study was designed to determine the students' skill at measuring blood pressure, which is an important psychomotor skill for nursing students. In addition, it was designed to determine the students'

opinions about their behavior during the implementation process. The students reported positive views and felt that simulation practice before the hospital practice would be useful. Instead of making mistakes with real patients, making them with the simulator made them feel safer. They learned how to communicate with patients and their relatives in an environment similar to that of a hospital, and they felt like they were nurses and saw what they would need to deal with. The use of a simulator under a scenario was found to be effective for the development of the students' blood pressure measurement skills and this procedure has been recommended for application in other skills.

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