RESEARCH ARTICLE

Examining the Effect of Simulation-Based Teachıng in Internal Medicine Nursing on Nursing Students

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Abstract

Background: The use of simulation in the teaching of internal medicine nursing is important to ensure patient safety during clinical applications.

Aim: This study aimed to examine the effect of simulation applications used in the teaching of the 2nd-year internal medicine nursing course and the perceived self-efficacy levels on anxiety, satisfaction with learning, and self-confidence in students taking the course at the Faculty of Nursing.

Methods: In this study, mixed methods both qualitative and quantitative methods were used. The research was carried out with 127 second-year students at the faculty of nursing between September 2019 and May 2020. Data were collected using Demographic and Descriptive Data Form, Generalized Perceived Self-efficacy Scale, Spielberg State Anxiety Inventory, Student Self-Confidence Scale and Satisfaction Scale. Interview Form consisting of semi-structured questions was used for qualitative data.

Results: Students' state anxiety level was moderate before the simulation. The pre-simulation anxiety level of the students was higher than the post-simulation level; the generalized perceived self-efficacy was at a good level. Satisfaction and self-confidence regarding the simulation were high after both applications. As students' generalized perceived self-efficacy scores increased, their anxiety levels decreased (except after the first application), satisfaction with learning and self-confidence increased, but academic achievement was not affected. From the qualitative data, two main themes and two sub-themes under each main theme were determined. The main themes were grouped as "Reactions during simulation" and "Self-evaluation after simulation".

Conclusion: It was determined that simulation activities were effective in improving the teaching of internal medicine nursing and that these practices positively affected the anxiety and learning satisfaction and self-confidence of those who perceived their self-confidence as high. It is considered that the use of simulation method in internal medicine nursing courses will increase teaching success.

Keywords

Mixed research method, Nursing, Simulation, Students, Teaching

Introduction

The teaching of internal medicine nursing, which is one of the main fields of nursing, aims to apply current knowledge to patients individually, together with clinical observation. Along with the changing health problems in the world, internal medicine nursing education requires modifications and updates. There is a need to educate nurses in accordance with this change [1].

In World Health Organization's 2011 report, it was recommended to use student-centered teaching methods to ensure patient safety [2]. In recent years, the use of simulation, which is one of the student-centered teaching methods, has increased in nursing education, enabling students to acquire and develop various skills [3]. Simulation-based learning creates the opportunity to experience and react to situations in a setting without real consequences. These activities can also allow students to gain insight and understand patients before working with them [4]. Furthermore, simulation provides safe environments to develop practical skills in nursing education and health-related disciplines [5,6].

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Nurse students have limited opportunities to be directly involved in patient care due to the protection of patient rights and privacy. Therefore, simulation-based teaching has become an important part of clinical teaching in nursing [7]. Simulation applications were found to improve nursing knowledge, nursing and communication skills, empathy skills, critical thinking skills, leadership, and self-efficacy in nursing students [8,9]. It was also found that learning with simulation contributes to the development of students' self-confidence and satisfaction [10,11].

In internal medicine nursing practice, initial clinical experiences and skill practices can cause significant anxiety and attention deficit among students. Students may experience high levels of anxiety since they encounter many new and unusual situations [12]. The role of simulation teaching in reducing anxiety is undeniable. However, a limited number of studies on the specific use of simulation in internal medicine nursing are available in the literature [10,13].

This study aimed to examine the effect of simulation applications used in the teaching of the 2nd-year internal medicine nursing course on the students taking the course.

Material and Methods

Research design

This study had a mixed research design including qualitative and quantitative data and was carried out at one of the nursing faculties in xxxxxx between September 14, 2019, and May 1, 2020.

Sample

The population of the research consisted of 163 second-year students studying at a nursing faculty in Turkey and taking the internal medicine nursing course in the 2019-2020 academic year. No sampling method was used in the study since it was aimed to reach the entire population. A total of 30 students did not complete the questionnaire and 6 students did not agree to participate. These students were excluded. The study was completed with 127 (77.91%) students.

Internal medicine nursing course is one of the basic courses given in the second year of the nursing faculty. The course consists of 84 hours of theory, 42 hours of simulation applications, and 72 hours of clinical practice. The research was carried out during simulation applications. Quantitative applications of the research were performed with 127 students. Among them, 50 students volunteered for the qualitative interview.

Data collection tools

Demographic and descriptive data collection form: The form was prepared by the researchers. It consists of questions about age, gender, marital and economic status, place of residence, grade point average, and previous simulation experience.

Generalized Perceived Self-Efficacy Scale (GPSS): The scale was applied to measure students' perceived self-efficacy. This form was applied once at the beginning of the study and its relationship with anxiety, grade point average, satisfaction with learning, and self-confidence was examined. The XXX validity and reliability of the scale were established by Eric in 2016 [14]. Scale items are scored between 1-4 and consist of positive items; the scale is evaluated over the total score. Scale items are ranked as wrong (1), somewhat correct (2), more correct (3), totally correct (4). The total score ranges between 10 and 40. A high score is considered as a high perception of self-efficacy.

Spielberg's State Anxiety Inventory (STAI-S): The scale was applied before and after the simulations to measure students' anxiety levels. The xxxxxx adaptation, validity, and reliability study of the scale was performed by Oner and Le Compte in 1983 [15]. The scale measures the level of state anxiety. It includes 20 questions that are ranked on a 4-point Likert-type scale. A score of 1 indicates that the situation stated in the question does not reflect oneself at all; a score of 4 indicates that the situation stated in the question fully reflects oneself and that the individual's anxiety is high.

Student satisfaction and self-confidence scale: The scale was applied after the simulations to evaluate the students' satisfaction and self-confidence levels. The xxxxxx adaptation, validity, and reliability study of the scale was performed by Unver, et al. [16]. The scale was developed to measure students' satisfaction and self-confidence in simulation-based learning. It consists of two subscales, "satisfaction with learning" and "self-confidence", and 13 items. Students are asked to choose the option that expresses their opinion best "5 = Strongly agree, 4 = Agree, 3 = Indecisive, 2 = Disagree, 1 = Strongly disagree". The 13th item of the scale is scored reversely. The highest score obtainable from the scale is 65 and the lowest score is 13. An increase in the scale score indicates that satisfaction and self-confidence increase.

Semi-structured questionnaire: The form was prepared in order to guide student interviews and consists of five questions. It was designed to acquire more information about simulation-based learning. It aims to reveal participants' complex personal experiences, insights, feelings, beliefs, perceptions, attitudes, knowledge, and perspectives quickly and effectively. In addition to the questions in the interview form, elaborative questions were asked during the interview and in-depth opinions of the students on the simulation were obtained.

Procedure

The application part of the research was carried out in the simulation laboratory of the nursing faculty where the research was conducted. In the laboratory, a classroom with a high-reality simulator, a virtual patient

classroom, and a standard patient training classroom were used for training. A standard patient, who was female and had taken part in such student simulation studies before, was assigned. Here, students provided one-on-one training to the standard patient.

Simulation applications consisted of 2 parts and 3 stations.

First part of the application: The first application was made after the students took 42 hours of internal medicine nursing theoretical course. Below are the stations provided in the application.

Station 1: *In the classroom with a high-reality simulator:* Training on nursing care for a patient with myocardial infarction.

Station 2: *In the standard patient training classroom:* Training on oral anticoagulant drug use for a standard patient.

Station 3: *In the virtual patient classroom:* Training on nursing care for Chronic Obstructive Pulmonary Disease.

Second part of the application: The second application was made after the students took the internal medicine nursing theoretical course for another 24 hours. Below are the stations provided in the application.

Station 1: *In the classroom with a high-reality simulator:* Training on nursing care for a patient with terminal cirrhosis

Station 2: *In the standard patient training classroom:* Discharge training with type 2 diabetes patient.

Station 3: *In the virtual patient classroom:* Training on nursing care for diabetes mellitus patient.

Each student was rotated to take all stations.

Application stages

The application stages of the simulation are shown in Figure 1.

Before the training: The Demographic and Descriptive Data Collection Form, Spielberg's State Anxiety Inventory, GPSS were applied.

During the training: The prepared case scenarios were explained at the pre-briefing and what was expected from the student was told. Each station took 30-40 minutes. It took. Student applications were carried out in groups of 5 in the classroom which has a high-reality simulator and in the virtual patient classroom. A total of 26 groups were created and the last group consisted of 4 students. Students whose applications were completed at the stations were given debriefing of approximately 15-20 minutes by the researchers. Debriefing was made with a group of 8-10 students. In the analysis of these sessions, the collect/analyze/interpret technique

was used [17]. Here, the students expressed their feelings during the simulation, made a self-evaluation of their applications, and made suggestions about the contributions of the simulation to the students and the simulation improvements.

After the training: Spielberg's State Anxiety Inventory was applied before and after each simulation. The Student Satisfaction and Self-Confidence Scale was applied after each simulation.

Feedback (focus group) interviews

Students who completed their training at simulation stations were invited to participate in focus group discussions to further explore their feelings, thoughts, and opinions on simulation. 50 students who accepted the invitation were included in the interviews. In the interviews, the "Semi-Structured Interview Form" was given to the students and their feedback was received in writing. Then, verbal interviews were held. The interviews were conducted by three researchers in 35-45 minutes. The interview groups consisted of 7-8 students.

Interview questions

1. The simulation helpful in your learning?

2. How did you feel before the simulation?

3. How did you feel during the simulation?

4. How did you feel after the simulation?

5. How would you like this simulation to be made?

Data analysis

The quantitative part of the research was analyzed using IBM SPSS Statistics for Windows, Version 21.0. Mean, standard deviation, frequency, and percentage were used to analyze some descriptive characteristics. The Kolmogorov-Smirnov test was used to test the distribution of data for normality. Paired-sample t-test and Spearman correlation test were used to compare mean pretest and posttest scores. A level of $p < 0.05$ was considered statistically significant. Interview analyses were performed by three researcher faculty members. A code number was assigned to each student and written and verbal answers to the interview form were transferred to the computer environment. Then, themes were created using content analysis. The themes were determined as below after consensus was reached by all researchers.

Beginning: Feedback was read repeatedly in order for researchers to understand the overall data. Meaning units were created by underlining the similarities and differences.

Construction: The meanings reached were coded and classified. The researchers created themes to understand concepts and experiences of codes. The

The flow diagram of the study

Figure 1: Flow chart of the study.
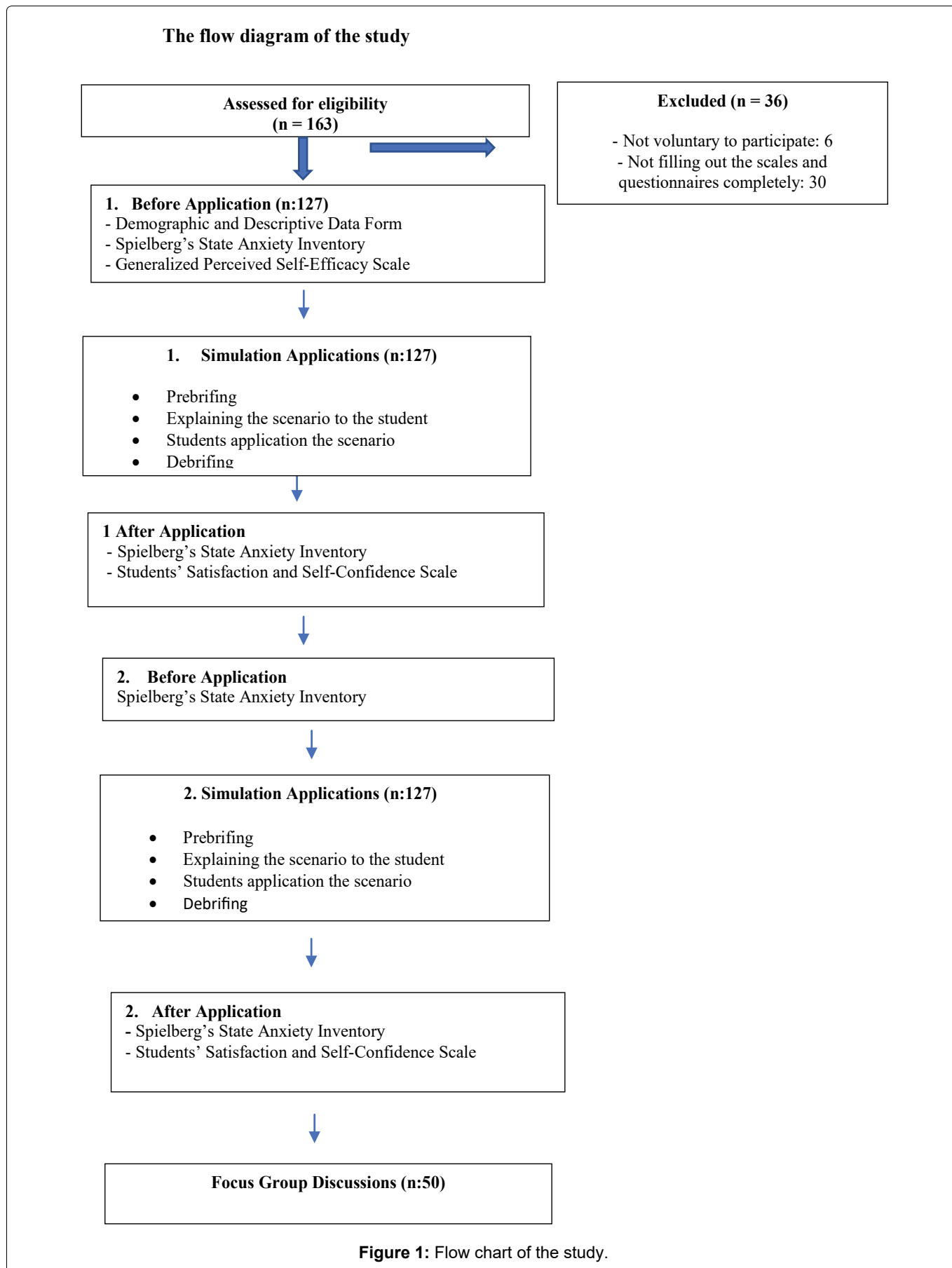
feature of the relationship between themes and data was determined.

Correction: Themes were verified and checked. Hidden meanings in the data were revealed. Sub-

themes were also determined.

Conclusion: The analysis process was completed after the qualitative data reached saturation [18].

Ethical considerations

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For the study, permission was taken from the University of Health Sciences xxxx Nursing Faculty administration; research approval was obtained from the Ethics Committee of xxxx Training and Research Hospital (Decision Number: 19/392, Date: 26/11/2019); written and verbal informed consent was taken from the students who constituted the sample of the study.

Results

Table 1 shows the demographic and some descriptive characteristics of the students. A total of 127 nursing students participated in the study. The mean age of the participants was 20.69 ± 1.19. 89.8% of the students were female. The students' first-year grade point average was 2.88 ± 0.38. 57.5% of the students had no previous simulation experience (Table 1).

Table 2 shows students' anxiety, self-efficacy, satisfaction, and self-confidence levels in simulation training. STAI-S scores were found to be moderate before and after both applications. After the first and second simulation applications, the mean scores of the students on the Satisfaction and Self-Confidence Scale were quite high and the GPSS score was at a good level of 25.92 ± 5.72 (Table 2).

Table 3 shows the intra- and inter-group comparisons of pre-simulation and STAI-S scores. There was a statistically significant difference between the STAI-S

Table 1: Demographic and some descriptive characteristics of the students (N = 127).

Characteristics	n	%
Age (years) ± SS (yıl)	20.69 ± 1.19	
Gender		
Male	13	10.2
Female	114	89.8
Marital Status		
Single	127	100.0
Longest Lived Place		
City Center	68	53.5
Town	41	32.3
Small Town	5	3.9
Rural	13	10.2
Economic Status		
Good	20	15.7
Middle	105	82.7
Worse	2	1.6
Overall Academic Average (Calculated on a 5-point Rating System)	2.88 ± 0.38 (min: 2.01; max: 3.60)	
Previous Simulation Experience		
Yes	54	42.5
No	73	57.5
Values are shown either as mean + sd or as a frequency table.		

Table 2: Students' anxiety, self-efficacy, satisfaction, and self-confidence levels in simulation training (N = 127).

		Ort ± SS	Lowest-Highest Score Received during the Application
STAI-S	1. Before Application	42.45 ± 10.06	21-76
	1. After Application	36.35 ± 8.29	23-73
	2. Before Application	41.21 ± 8.74	21-64
	2. After Application	37.24 ± 9.46	20-70
Students' Satisfaction and Self-Confidence Scale			
Satisfaction with Learning	1. After Application	4.28 ± 0.62	2.20-5
	2. After Application	4.22 ± 0.71	1-5
Self-confidence	1. After Application	4.13 ± 0.57	2.86-5
	2. After Application	4.11 ± 0.63	1-5
Generalized Perceived Self-Efficacy Scale		25.92 ± 5.72	12-40

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scores before and after both applications and this difference was found to be due to the high state anxiety scores before the application (p < 0.001). No significant difference was found between before and after both applications (p > 0.05) (Table 3).

Table 4 shows the relationship between the students' perceived self-efficacy levels and their anxiety, satisfaction with learning, and self-confidence levels. In the comparison of GPSS and STAI-S levels, a weak negative correlation was found except after the first application (p = 0.26). A weak positive correlation was found between the students' GPSS score and their satisfaction with learning and self-confidence subscale scores after both applications (p < 0.05). No significant relationship was determined between self-efficacy and students' grade point averages (p = 0.951) (Table 4).

Content analysis

Two main themes and two sub-themes under each main theme were determined according to the content analysis of the qualitative data. Themes are presented in the theme box below.

Themes

Main Theme	Sub-theme
1. Reactions during simulation	The reality of experience
	Enjoyable and instructive experience
2. Self-evaluation after simulation	Regret for incomplete applications
	Recognition of deficits and compensation plans

Reactions during simulation

Students mostly stated that the reality of the simulation was high. Although this led them to get excited and panic, they stated that the simulation applications were enjoyable and instructive.

1. Sub-theme: The reality of the experience; The majority of the students perceived the reactions of the high-reality simulation model as real. They reported that they experienced a lot of excitement, fear, and anxiety, panicked during the applications, and could not make the necessary applications properly. They also stated that they understood the importance of thinking quickly, making appropriate decisions, and practicing calmly.

"I couldn't perform a physical examination because I panicked when the patient's saturation decreased. I could only listen to its breathing. I was very worried like it was a real patient. I should have been calmer." (Student: 1)

"I was very scared when the patient vomited. The vomiturition sounds made me panic as if it were real. I didn't know what to do." (Student: 27)

2. Sub-theme: Enjoyable and instructive experience; The students said that they had a lot of fun during the simulation training, that the applications attracted their attention, that it was not monotonous, and that they would like this method to be included in other courses.

Table 3: The intra- and inter-group comparisons of pre-simulation and post-simulation STAI-S scores.

		1. Application			2. Application			1.ve 2. Application	
		Ort ± SS	t	p*	Ort ± SS	t	p*	t	p
STAI-S	Before	42.45 ± 10.06	6.752	< 0.001	41.21 ± 8.74	5.727	< 0.001	1.484	0.140**
	After	36.35 ± 8.29			37.24 ± 9.46			-0.903	0.368**

t: Paired samples t-test;

*comparison of before and after values in the groups;

**comparison of before and after values between the groups.

Table 4: The relationship between the students' perceived self-efficacy levels and their anxiety, satisfaction with learning, and self-confidence levels (N = 127).

	Applications		Generalized Perceived Self-Efficacy Scale	
			r	p
STAI-S	1. Application	Before	-0.378	< 0.001
		After	-0.099	< 0.269
	2. Application	Before	-0.248	< 0.005
		After	-0.291	< 0.001
Satisfaction with Learning	1.After Application		0.178	< 0.046
	2.After Application		0.267	< 0.002
Self-confidence	1.After Application		0.376	< 0.001
	2.After Application		0.333	< 0.001
Overall Academic Average			0.005	0.951

r: Pearson korelasyon.

"Simulation training was different and enjoyable for me. I laughed a lot at myself. I think such practical applications are very memorable and I find them useful." (Student: 32)

Self-evaluation after simulation

Most of the students stated that they experienced the sadness of the things they could not do properly during the application after the simulation. However, they stated that they realized these deficits and would make compensations for these.

1. Sub-theme: Regret for incomplete applications; It was remarkable that students who could not adequately fulfill the scenario's requirements during the simulation expressed their regrets. The students who expressed their regret constituted the majority. They also stated that they understood the importance of demonstrating theoretical knowledge in practical applications and the power of theoretical knowledge.

"Actually, I could have helped the patient more. I do not know why I did not think of it." (Student: 43)

"I am very sorry, I regretted what I could not do when I left the simulation. But if I go into the simulation again, I would perform better." (Student: 36)

2. Sub-theme: Recognition of deficits and compensation plans; Most of the students were sorry about the practices they thought they had done incompletely and started to plan how they could make up for those practices. They said that they would immediately go and read the subject that they had deficits in and do research on the computer. They also stated that they realized the importance of the profession and understood the importance of the courses.

"It made me see my own deficits and mistakes and it was a good experience for me. I need to learn to use time correctly, be fast, and be practical. I need to go and read my course topics a little more." (Student: 22)

Discussion

According to the results of the study, although simulation applications in internal medicine nursing teaching created anxiety before the simulation, it reduced anxiety after the simulation; students who perceived their self-efficacy high had low anxiety levels; the simulation increased their satisfaction and self-confidence. Furthermore, it was determined that simulation-based teaching is a method that will facilitate students' learning, increase their awareness of the aspects they need to develop, and enable them to learn with joy.

During the clinical practice of internal medicine nursing, students may experience fear and anxiety of harming the patient. This may prevent students from using their knowledge and skills in patient care [19]. Moreover, it is known that they experience the same anxiety with simulations since simulation training provides similar clinical settings. Nakayama, et al.

detected the anxiety of students by monitoring their heartbeats during the simulation. In the study, it was observed that 50 out of 74 students had increased heart rate and anxiety during the practices [20]. Likewise, Kaddoura, et al. reported that the participants felt discomfort and anxiety during the simulation [21]. In this study, it was determined students' anxiety levels were moderate before and after the simulation and that their anxiety levels were higher before the simulation than after the simulation but decreased after the application. In the study conducted by Mutlu, et al. (2020), nursing students defined their clinical practice experience as one of the most worrying components of their nursing education [22].

The anxiety levels of the students in the study decreased after both applications. This shows that they experienced the same anxiety at the beginning of both applications, but after the application, their anxiety decreased a little more with the peace of finishing the application. However, it was seen that there was no significant difference when the before and after of both simulation applications were compared. In fact, after the first application and before the second application, it was expected that the anxiety levels of the students would decrease due to their familiarity with the applications, but it was noteworthy that they experienced the same anxiety before the second application. It can be suggested that this might be due to the fact that the simulation applications were made on different cases and that the students were worried due to the unknown. Holland, et al. stated that the anxiety experienced by nursing students during simulations may increase and that this may create a significant obstacle against learning. For this reason, it can also improve the learning levels of students to reduce their anxiety during simulations [23]. In this case, educators have a great responsibility. In order to provide more effective educational support, educators should know and understand the students' level of anxiety and the concerning changes that accompany the simulation [20].

In internal medicine nursing teaching and practice, students often encounter new topics and new practices. Students' self-efficacy levels can affect their beliefs about initiating necessary actions in new situations and meeting their results [24]. In this study, it was observed that the anxiety levels of the students decreased slightly as their GPSS levels increased, except after the first application. Likewise, in the study conducted by Mutlu, et al., it was determined that students felt more comfortable in the clinic, they were in an effort to continue the practices, and their anxiety levels decreased as their self-efficacy levels increased [22]. Furthermore, in the study conducted by Sozen, et al. using the Self-Efficacy Scale, they found that nursing students with a high perception of self-efficacy had more problem-solving skills [25].

A high self-efficacy can be expected to increase students' academic achievement. Indeed, Nielsen et al. found that students with high self-efficacy also had high academic achievement [26]. Mutlu, et al. conducted a study using the General Self-Efficacy Scale (GSES) and found that the mean "perseverance-persistence" subscale score of those with a grade point average of 3.00 and above was statistically significantly higher than those with a grade point average below 3.00 [22]. However, in our study, no relationship was found between grade point averages and self-efficacy. It is thought that this is due to the individual characteristics of the students.

Another result of the study was that the students with high GPSS scores had higher "self-confidence and satisfaction with learning" subscale scores after both applications and that there was a positive but weak relationship between them. A similar result was seen in the study of Saied, in which a positive correlation was found between GPSS and self-confidence and satisfaction with learning subscales [27]. In addition, there are studies in the literature reporting that student satisfaction and self-confidence increased after simulation applications [10,11,28,29]. This result is consistent with the literature. Thus, as a result of the study, it can be said that the simulation increased students' satisfaction with their learning and improved their self-confidence.

Most of our students expressed their satisfaction with the simulation applications in the qualitative data, as well. Students mostly stated that they were happy to receive training with simulation and that it facilitated their learning. Similarly, in the qualitative study conducted by Caba~nero-Martínez, et al. to examine students' perceptions at the end of training provided with high-reality simulation and standard patient, it was found that satisfaction with simulation was high. At the same time, students stated that they learned from the mistakes they made in the simulation [30]. In this study, it was observed in the sub-theme of the self-evaluation theme that the students recognized their own deficits with this application and started to think about how they would compensate.

It was determined that the students' reactions during the simulation, which was determined as the first main theme in the study, were due to fear of making a wrong application, excitement, panic, and anxiety. It can be suggested that these feelings can prevent learning. Similar results were obtained in the study of Beischel. In the study, it was reported that anxiety negatively affected learning in 33% of the participants [31]. However, in our study, students did not mention that their learning was negatively affected. On the contrary, our students stated that they had fun while learning and were satisfied that their course was not monotonous. There are studies in the literature

determining that achieving teaching goals through simulation is enjoyable [32,33]. In their study, Kelly, et al. stated that students had fun during the training with simulation, and that this situation made learning easier by reducing anxiety [33]. In the study conducted by Au, et al. to examine undergraduate nursing students' perceptions about simulation, 85% of the participants stated that high-reality simulation activities, instead of real clinical practice, provided a suitable environment for learning and students evaluated simulation as "relaxing", "exciting", "enjoyable" [34].

Simulation is a method that can be applied to students until they reach proficiency in terms of skills practice and can teach students to learn from their own mistakes [10,11,27,28]. In this study, the students evaluated themselves under the second main theme and they stated that they most regretted the practice they made wrong, that they noticed their deficits and sought ways to make up for them immediately. This can be considered an indication that the simulation had reached its goal.

The presence of an application and simulation laboratory with high technology equipment in the nursing faculty, where the study was conducted, enabled approximately 43% of even second-year students to receive training with simulation. This is considered to be a positive outcome for our faculty since it is predicted that this rate will increase until the last year of the faculty. Each student will be able to receive training with simulation in the remaining education process and this increases the probability of being safe nurses in their professional lives. Because studies showed that having more than one simulation experience in the following years increases nursing students' self-confidence and that they go to clinical practices and meet with real patients more confidently [28,29]. Therefore, it is considered important for nursing faculties to have equipped simulation laboratories.

Conclusion

As a result of this study, it was determined that although the use of simulation teaching method caused anxiety before the simulation application, it reduced anxiety after the simulation, that the students had a good level of GPSS, that the students who perceived their self-confidence high had a low level of anxiety, that and they were satisfied with the simulation teaching and were self-confident. It has been observed that the simulation teaching method can facilitate students' learning, increase their awareness of the aspects they need to develop, and enable them to learn with joy. For further studies, it is recommended to use a well-structured simulation method that is suitable for the content in the teaching of internal medicine nursing, conduct randomized controlled studies evaluating its reflection on clinical practices, and use simulation-based teaching in other courses of nursing education.

Authors' Contributions

Author's contribution to the paper

Conception: AD, IC. Design: AD, IC. Literature review: AD, IC. Data Collection: AD, IC, EÖK, BK. Data Analysis and interpretation: IC, AD, BK. Drafting of the article: AD, IC, BK,EÖK.

Conflict of interest

No conflict of interest has been declared by the authors.

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Suplementary materials

None.

Declarations of interest

None.

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