Improving patient safety awareness in nursing students through low-fidelity simulation and clinical practice: Pre-experimental study

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Abstract

Background: The incidence of patient harm is increasing globally, with nursing students contributing to errors during training and clinical practice. However, research on nursing students' awareness of patient safety following simulation-based training and clinical practice remains limited.
Purpose: This study analysed nursing students' awareness of patient safety before and after low-fidelity simulations and clinical practice.
Methods: A one-group pretest–post-test interventional design was used. The study involved 446 first-year nursing students at Universitas Pelita Harapan, Tangerang, Indonesia. The independent variable was participation in structured low-fidelity simulation sessions followed by clinical practice, while the dependent variable was patient safety awareness. Awareness was measured before and after the intervention using the World Health Organization Patient Safety Questionnaire, consisting of 33 items rated on a five-point Likert scale. It contains five domains: knowledge of patient safety, safety of the healthcare system, ability to influence patient safety, personal attitudes toward patient safety, and workplace safety. Data were analysed using descriptive statistics and paired-samples t-tests with a significance level of 0.05.
Results: Total patient safety awareness scores increased significantly after the intervention (118.25 ± 9.90 vs. 120.78 ± 10.76, t = -4.90, p < 0.001). Significant improvements were observed in knowledge of patient safety, perception of healthcare system safety, and perceived ability to influence safety. Students with a science background in senior high school demonstrated higher awareness.
Conclusion: Low-fidelity simulation and clinical practice significantly improved nursing students' patient safety awareness, supporting early integration of structured patient safety education in nursing curricula.

Keywords: awareness; clinical practice; nursing students; patient safety; simulation-based training

OPEN ACCESS

Jurnal Keperawatan Padjadjaran (JKP)

Volume 14(1), 51-61

http://dx.doi.org/10.24198/jkp.v14i1.2834

Article Info

Received : May 26, 2025
Revised : April 08, 2026
Accepted : April 13, 2026
Published : April 16, 2026

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Citation

Lumbantoruan, S. M., Saputri, A., Juhdeliena, J., & Wardani, R. S. (2026). Improving patient safety awareness in nursing students through low-fidelity simulation and clinical practice: Pre-experimental study. *Jurnal Keperawatan Padjadjaran, 14*(1), 51-61. http://dx.doi.org/10.24198/jkp.v14i1.2834

Website

http://jkp.fkep.unpad.ac.id/index.php/jkp

E-ISSN: 2442-7276
P-ISSN: 2338-5324

Introduction

Patient safety is paramount in healthcare and has become a primary objective for hospitals worldwide (World Health Organization, 2023). It is fundamental in providing superior-quality patient care, particularly within the nursing domain (Agency for Healthcare Research and Quality, 2019; World Health Organization, 2023). The attainment of patient safety objectives of healthcare providers will ensure that patients receive safe, and high-quality care (World Health Organization, 2023). Since its introduction in the 1990s, patient safety has evolved and continues to be utilized today (Donaldson, 2020). The World Health Organization (WHO) urged all hospitals to guarantee patient safety throughout service delivery (World Health Organization, 2023). In addition to the WHO, numerous groups advocate for patient safety, including

Joint Commission International, whose standards are extensively implemented in hospitals across Indonesia (Afriani et al., 2022). Failure to adhere to patient safety standards can result in significant harm to patients (Higham & Vincent, 2020).

Globally, approximately 1 in 10 patients experience harm during healthcare delivery (World Health Organization, 2023). This harm may result from various preventable causes, including adverse drug reactions, urinary tract infections, infections associated with intravenous catheters, hospital-acquired pneumonia, venous thromboembolism, patient falls, and pressure ulcers. Additionally, 1 in 20 patients (5%) suffer preventable patient safety incidents, with Southeast Asia and Africa showing some of the highest rates of preventable medication-related harm at 9% (World Health Organization, 2024). Of 108 countries responding to a global patient safety survey, 55% reported that patient safety is a national policy priority, including Sri Lanka, Brunei Darussalam, Ireland, and Myanmar. These findings highlight the need to further strengthen patient safety efforts at the national level in Indonesia (World Health Organization, 2024).

Patients are harmed not only by professional healthcare providers, including nurses, but also by nursing students. A systematic review revealed that nursing students contribute to adverse patient occurrences, particularly medication errors (Triantafyllou et al., 2023). In that review, among 1,904 nursing students, the most commonly reported medication errors were wrong dose (17%), wrong time (13.6%), and omission errors (16.4%) (Triantafyllou et al., 2023). That study concluded that numerous errors may occur among nursing students due to insufficient competencies, inadequate supervision, and deficient critical judgment (Triantafyllou et al., 2023). This study highlights the importance of implementing a program to improve students' competence in medication safety (Park & Yeom, 2025), which may be incorporated into the present study.

Recent studies indicate that nursing students possess enough knowledge and attitudes about patient safety (Bressan et al., 2021; Dimitriadou et al., 2021). However, there is still a report that many nursing students reported lower knowledge of patient safety (Levett-Jones et al., 2020). These studies, however, were conducted in the third year and final year. A study about the awareness of patient safety is required in the first year. Additionally, understanding patient safety among students in Indonesia remains moderate and requires further practice for enhancement (Suryani et al., 2022).

Simulation-based learning is widely recognized for improving patient safety in medical education, including nursing education, as it allows students to encounter and learn from errors in a safe learning environment, thereby reducing the likelihood of such errors occurring in real clinical practice (Elendu et al., 2024; Shahzeydi et al., 2024). As a part of simulation learning, a low-fidelity simulation also has been widely utilized to enhance patient safety (Graf et al., 2024). Low-fidelity simulation has been shown to be effective in improving students' confidence, knowledge, and skills in performing clinical procedures (Massoth et al., 2019). However, limited research examines the efficacy of low-fidelity simulation in preparing novice nursing students to practice their skills in a hospital setting.

Clinical practice is also one of the methods to increase patient safety in nursing students. A study in Thailand found improved patient safety after clinical practice in second-year nursing students (Bandansin et al., 2022). Limited studies combine low fidelity and clinical service to examine students' patient safety awareness. Moreover, first-year nursing students are less researched, even though they are expected to understand and practice patient safety from the start of their education. Therefore, this study analysed patient safety awareness before and after low-fidelity simulation about patient safety following by clinical practice in first-year nursing students.

Materials and Methods

Design

This study utilized a pre-experimental study with a one-group pre- and post-design. The respondents were assessed before and after intervention to observe any changes over time within the same subjects.

Sample and setting

The population in this study was first-year nursing students at Universitas Pelita Harapan, Tangerang. A total sampling technique was used, in which all students who met the inclusion criteria were invited to participate. The inclusion criteria were being enrolled as a first-year nursing student during the study period and enrolled in the Principle Basic Nursing course. All eligible students were invited to participate in this study; however, those who did not complete the questionnaires, who dropped out, and duplicate response in both pretest and post-test were excluded from the final analysis. Of the 543 eligible students, complete data was obtained from 446 respondents, resulting in a response rate of 82.13 %. The study was conducted from September to December 2024.

Variables

The independent variable in this study was low-fidelity simulation training following clinical practice. The dependent variable was awareness of patient safety, which consists of five sections including error and patient safety, safety of healthcare system, personal influence over safety, personal attitudes to patient safety, and safety at the workplace.

Instruments

Patient safety awareness was assessed using the World Health Organization Medical School

Curricular Guide for Patient Safety questionnaire (World Health Organization, 2011). There are five sections in this questionnaire, including 1) Knowledge of patient safety (7 questions), 2) Safety of the healthcare system (6 questions), 3) Ability to influence patient safety (7 questions), (4) Personal attitudes to patient safety (4 questions), and 5) Safety at the workplace (9 questions). The questionnaire consists of 33 items, with 5 Likert scales with "1" indicating "*strongly disagree/very poor*" and "5" indicating "*strongly agree/very good*. The minimum score was 33, and the maximum score was 165. The higher score indicated a higher awareness of patient safety. This questionnaire was broadly used in measuring the awareness of patient safety in medical students (Al-Nawafleh et al., 2024; Walton et al., 2010). The questionnaire has good validity (Farley et al., 2015) and reliability (Cronbach alpha 0.70) based on previous study (Ghosh et al., 2024).

As the questionnaire was adapted from WHO Medical School Curricular Guide for patient safety, the Indonesian version was not available. The translation process was conducted using a premium language tool, followed by iterative review and discussion within the research team to ensure the conceptual and contextual. This pragmatic approach to translation has been reported in the previous study (Danielsen et al., 2015). This present study was focus on linguistic adaptation of established WHO-based instrument rather than full cross-cultural adaptation.

Intervention Procedure and Data Collection

The study began with a baseline assessment of participants' patient safety awareness. Participants then underwent a low-fidelity simulation focused on patient safety, followed by a one-time clinical practice session. After completing the intervention, patient safety awareness was reassessed using the same questionnaire administered at baseline. Students' baseline awareness of patient safety was measured for the initial assessment. This assessment was carried out after students had learned the concept of patient safety through lecture materials available on learning management systems. Students independently completed the questionnaires via an online form.

The low-fidelity simulation was held two days after the baseline assessment and implemented over one week for all students. They were divided into groups of five people, with each group member assigned a role: nurse, doctor, patient, children, and spouse. Every student was required to take on the nursing role at least once before rotating through the other roles. Every student had similar experience of simulation, with minor variations due to role rotation.

A low-fidelity simulation training consisted of four stages: pre-learning, pre-briefing, simulation activity, and debriefing. During the pre-learning stage, learning material were uploaded to the learning management system one week prior to the simulation day, and students were expected to do self-study. In pre-briefing stage, facilitator explained about the simulation objectives, scenario context, and expected learning outcomes. Simulation activity lasted approximately 10 minutes and involved in scenario on oral feeding, focusing on patient safety issues like identification, correct treatment, and infection control. The simulation activity focused on situations that students were likely to encounter during clinical practice. A 10-minute of structured debriefing was conducted after the simulation activity to facilitate reflection and reinforce the learning outcomes. Following the simulation, students participated in a one-time, 5-hour clinical practice, assisted by lecturers and nurses in the hospital. The clinical practice was placed in an inpatient ward at a private hospital in Indonesia. In clinical practice setting, the students were expected to perform basic nursing skills, including bed bathing, oral feeding, vital sign measurement, positioning, and perineal hygiene. Through these skills, nursing students were exposed to patient safety issues. After finishing simulation training and clinical practice, the students were given one week to reassess their awareness of patient safety.

Data analysis

The data were analysed using a licensed version of Statistical Package for Social Science (SPSS) version 29. All variables were evaluated using descriptive analysis; categorical data were studied using percentages, and numerical data were analysed using mean and standard deviation. The normal distribution is verified for bivariate analysis to ensure that it meets the assumptions of bivariate analysis parametric. The normality test utilizes the Kolmogorov-Smirnov test, with the p-value total pretest being 0.04 and the post-test being 0.20, indicating the patient' safety awareness data were normally distributed. Based on this result, a paired sample t-test was employed in this study to differentiate the significance of the difference before and after the intervention. The alpha value for the bivariate tests was 0.05.

Ethical consideration

Ethical approval for this study was granted by the Institutional Review Board of Universitas Pelita Harapan (IRB UPH) under approval number 094/IRB-UPH/X/2024 on October 29, 2024. This approval is valid for one year from the date of issuance. Participation in this study was voluntary, and an online consent form was obtained from each participant prior to data collection. Students were informed prior to data collection that their decision to participate or not would not influence their academic grade or evaluation. Respondents were orally explained the study's purpose and the research process during the pre-class period. Participants were also assured they could withdraw from the study without any negative consequences. The questionnaires administered were anonymous.

Table 1. Demographics and nursing interest of respondents (N = 446)

Characteristics	n	%
Gender		
Male	53	11.9
Female	393	88.1
Reason to enter nursing school		
Own choices	373	83.6
Family choices	52	11.7
Other	21	4.7
Interest in study nursing		
Interest	407	91.3
Not interest	4	0.9
Confuse	35	7.8

Table 2. Mean score pre and post every section of WHO Patient Safety Questionnaire

Item	Pre-test		Post-test		[95% CI]	t	p
	Mean	SD	Mean	SD			
Knowledge of Patient Safety	25.09	3.89	26.53	3.91	-1.43 [-1.85, -1.01]	-6.72	<0.001***
Safety of the Health-care System	21.10	2.52	21.42	2.73	-0.32 [-0.05, -2.34]	-2.34	0.02*
Ability to influence patient safety	23.84	2.97	24.55	3.19	-0.70 [-1.00, -0.41]	-4.71	<0.001***
Personal Attitudes to Patient Safety	17.66	1.97	17.48	2.04	0.18 [-0.04, 0.40]	1.61	0.10
Safety at the Work-place	30.55	3.17	30.80	3.33	-0.24 [-0.59, 0.10]	0.08	0.16
Total score	**118.25**	**9.90**	**120.78**	**10.76**	**-2.53 [-3.54, -1.51]**	**-4.90**	**<0.001***

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Results

A total of 543 students were invited to complete the pre-test questionnaire. Of these, 521 students responded, and 6 duplicate responses were identified. All 543 students then participated in a low-fidelity simulation, followed by clinical practice. After completing the learning activities, 543 students were invited to fill in the post-test questionnaire. During data cleaning, 101 students were excluded because they completed only the pre-test or only the post-test, meaning their data could not be paired for comparison. Participation was voluntary; therefore, no information was gathered regarding the reasons for incomplete responses. As a result, 446 students with complete pre- and post-test data were included in the final analysis. The study process flow chart is shown in Figure 1.

Table 1 presents the data on student characteristics. Most of the respondents were female (88.1%). They entered nursing school based on their choices (83.6%), and almost all respondents were interested in studying nursing (91.3%).

Table 2 presents the total patient safety scores and the scores for each questionnaire section. There was a significant difference in the total scores before and after the intervention (118.25 [9.90] vs. 120.78 [10.76], $t = -4.90$, $p < 0.001$). Among the five questionnaire sections, Section 4 (personal attitudes to patient safety) and Section 5 (safety in the workplace) showed no significant differences between pre- and post-intervention scores (17.66 [1.97] vs. 17.48 [2.04], $t = 1.61$, $p = 0.10$; and 30.55 [3.17] vs. 30.80 [3.33], $t = 0.08$, $p = 0.16$, respectively). In contrast, three sections demonstrated significant increases following the intervention: Section 1 (knowledge of patient safety) (25.09 [3.89] vs. 26.53 [3.91], $t = -6.72$, $p < 0.001$), Section 2 (safety of the healthcare system) (21.10 [2.52] vs. 21.42, $t = -2.34$, $p < 0.05$), and Section 3 (ability to influence patient safety) (23.84 [2.97] vs. 24.55 [3.19], $t = -4.71$, $p < 0.001$).

The mean differences for each item are presented in Table 3. All items in Section 1 (knowledge of patient safety) showed significant differences between pre- and post-intervention scores. In Section 2 (safety of the healthcare system), significant differences were found in items related to healthcare workers

Table 3. Mean difference item of WHO Patient Safety Questionnaire (N = 446)

Item	Pretest		Post-test		t	p
	Mean	SD	Mean	SD		
Knowledge of Patient Safety						
Types of human error	3.55	0.73	3.72	0.73	-3.94	<0.001**
Factors contributing to human error	3.44	0.77	3.66	0.74	-4.71	<0.001**
Factors influencing patient safety	3.90	0.76	4.11	0.74	-4.60	<0.001**
Speaking up about error	3.36	0.79	3.57	0.83	-4.41	<0.001**
Things to do if an error happened	3.53	0.77	3.75	0.76	-4.70	<0.001**
Report an error	3.53	0.77	3.81	0.82	-5.76	<0.001**
The role of healthcare organizations	3.78	0.86	3.92	0.79	-2.79	<0.001**
Safety of the Healthcare System						
Healthcare workers make errors.	3.01	0.83	3.28	0.93	-5.63	<0.001**
Availability of safe system in the country	3.76	0.73	3.76	0.75	-0.06	0.95
The commonality of medical error	3.30	0.88	3.48	0.89	-3.92	<0.001**
Unusual given wrong drug	3.21	0.94	3.09	0.90	2.25	0.02*
Training of patient safety	4.38	0.72	4.35	0.72	0.69	0.48
Experience of adverse event	3.43	0.95	3.46	0.96	-0.52	0.59
Ability to influence patient safety						
Telling other about error	2.94	0.96	3.21	0.97	-5.43	<0.001**
Find someone to blame	2.12	1.04	2.21	1.03	-1.75	0.08
Confidence to speak	3.38	0.91	3.55	0.89	-3.28	0.001**
Talk to people about error	3.49	0.68	3.57	0.71	-1.84	0.06
Able to ensure patient safety	3.74	0.93	3.84	0.89	-2.02	0.04*
Filling reporting forms	4.30	0.68	4.28	0.70	0.35	0.72
Filling reporting forms improve patient safety	3.88	0.74	3.90	0.76	-0.32	0.74
Personal Attitudes to Patient Safety						
Contribution to patient safety	4.11	0.63	4.07	0.64	0.93	0.35
Learning from mistake	4.54	0.63	4.46	0.64	2.16	0.03*
Acknowledge and dealing with errors	4.47	0.62	4.45	0.59	0.50	0.61
Learn to acknowledge and dealing with errors	4.55	0.59	4.50	0.61	1.40	0.16
Safety at the Workplace						
Nurses identify and address patient safety	4.52	0.58	4.46	0.60	1.99	0.04*
Nurses will not criticize	2.08	0.94	2.06	0.91	0.38	0.70
Doctors identify and address patient safety	4.28	0.71	4.22	0.69	1.36	0.17
Doctors will not criticize	1.94	0.86	2.01	0.89	-1.57	0.11
Support from healthcare managers	3.52	0.80	3.71	0.81	-3.92	<0.001**
Managerial prioritization of performance targets	2.33	1.02	2.41	1.02	-1.55	0.12
Managerial expectation	4.20	0.69	4.23	0.71	-0.72	0.46
Acceptability of openness and honesty	3.91	0.86	3.92	0.83	-.24	0.80
Just and fair treatment by management	3.78	0.83	3.79	0.82	-0.37	0.71

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

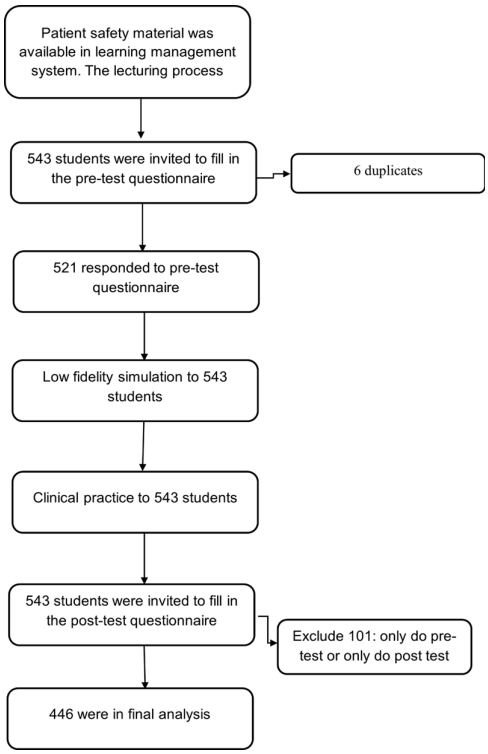

Figure 1. The study process flow chart

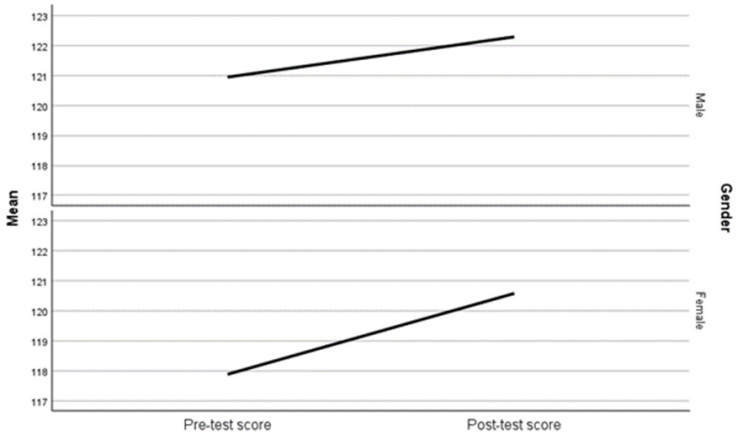

Figure 2. Mean Pre- and Post-Test Scores of WHO Patient Safety Questionnaire by Gender

making errors (3.01 [0.83] vs. 3.28 [0.93], t = −5.63, p < 0.001), the perception that errors are common in hospitals (3.30 [0.88] vs. 3.48 [0.89], t = −3.92, p < 0.001), and views regarding being blamed for giving the wrong drug (3.21 [0.94] vs. 3.09 [2.25], t = 2.25, p < 0.05). In Section 3 (ability to influence patient safety), three items showed significant improvements: willingness to tell others about errors (2.94 [0.96] vs. 3.21 [0.97], t = −5.43, p < 0.001), confidence in speaking up (3.38 [0.91] vs. 3.55 [0.89], t = −3.28, p = 0.001), and perceived ability to ensure patient safety (3.74 [0.93] vs. 3.84 [0.89], t = −2.02, p < 0.05). For Section 4 (personal attitudes to patient safety), only the item related to learning from mistakes showed a significant difference before and after the intervention (4.54 [0.63] vs. 4.46 [0.64], t = 2.16, p < 0.05). In Section 5 (safety in the workplace), significant differences were found for the items “nurses identify and address patient safety issues” (4.52 [0.58] vs. 4.46 [0.60], t = 1.99, p < 0.05) and “support from healthcare managers” (3.52 [0.80] vs. 3.71 [0.81], t = −3.92, p < 0.001).

Overall, most items showed higher mean scores after the intervention, except for the items related to learning from mistakes and nurses identifying and addressing patient safety issues, which showed slightly lower post-intervention scores.

The mean score of patient safety between students’ gender and educational background is shown in Figures 2 and 3. After the intervention, the mean score is higher for both females and males. Patient safety awareness scores also increased after

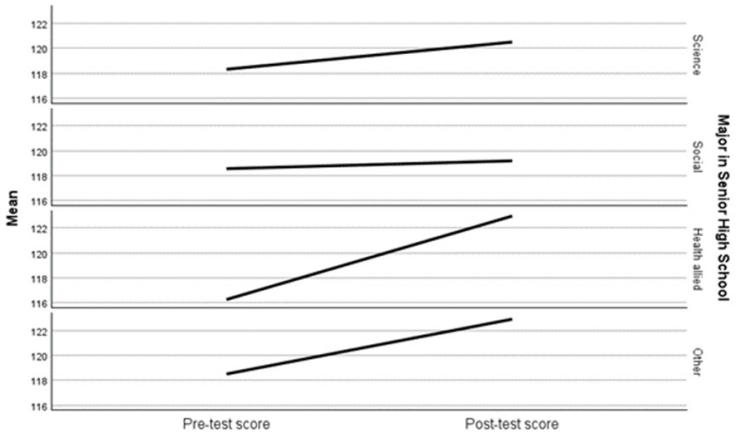

Figure 3. Mean Pre- and Post-Test Scores of WHO Patient Safety Questionnaire by Major in Senior High School

intervention across all educational backgrounds. However, students with a social science as their major in senior high school show only minimal improvement, with their score increasing by one point, from 118 to 119.

Discussion

Our results indicate that the awareness of patient safety is increasing significantly after low-fidelity simulation learning and clinical practice in nursing students. The total scores increased from pretest to post-test. The most notable gains were observed in knowledge of patient safety, understanding of the healthcare system's role in safety, and students perceived ability to influence patient safety. This study contributes to the growing of patient safety research by examining a structured low-fidelity simulation training and clinical practice exposure in first year nursing students, particularly in Indonesian context still limited.

A structured low-fidelity simulation training and clinical practice increases the patient safety awareness in this study. This result was similar to several previous studies about using simulation to enhance patient safety in nursing students (Hauff et al., 2025; Löber et al., 2020). This finding is supported by previous studies about enhancing patient safety using clinical practice (Bandansin et al., 2022). However, none of these studies mix simulation and clinical practice. Through simulation learning and clinical practice, nursing students faced both the realistic scenario and the real world of taking care of patients while also implementing the crucial of patient safety. As Durham and Alden (2008) mentioned, nursing education can use various simulations to enhance patient safety, including low fidelity, simulated patients, etc. However, limited studies have been reported in combination with clinical practice.

The knowledge about patient safety was significantly higher after the intervention in this study. First-year nursing students have limited understanding and unclear knowledge about patient safety. However, previous research found that first-year students had overconfidence about patient safety (Bressan et al., 2021), which can also be found in this study. The first-year nursing students with high patient safety scores may not reflect actual competence (Bressan et al., 2021). In this study, they choose 3 or 4 out of 5 from the scale in knowledge dimensions. Before joining the intervention, they only received knowledge about patient safety from lectures, handouts, and self-learning. However, from the bivariate analysis, it can be found that the simulation and clinical practice have a positive impact on increasing their knowledge about patient safety (Bressan et al., 2021; Durham & Alden, 2008; Elendu et al., 2024).

The ability to influence patient safety was the second section of the patient safety questionnaire, showing a higher significant difference after intervention in this study. Before the intervention, first-year nursing students have a low ability to influence patient safety due to a lack of confidence. A previous study revealed that sufficient knowledge about patient safety boosts their confidence in talking about patient safety (Shin & Baek, 2023). The significance of the ability score increases as the students follow the simulation and clinical practice, as reported by a recent review (Kohanová et al., 2023).

Safety of the healthcare system was the last dimension to show a significant difference before and after the intervention. Although the score increased slightly, the students improved their perception of this issue following simulation and clinical practice. First-year nursing students lack knowledge of how the healthcare systems, including organizational structure, training, and policy, can affect patient safety. First-year nursing students never see the real world of safety in the healthcare system (Ramírez-Torres et al., 2023), so their score before intervention may reflect their perception of what the healthcare system faces in patient safety. This modest improvement indicates that simulation and

clinical practice learning methods shape students' awareness of patient safety in healthcare systems.

The interesting finding in this study is that item 11," *Unusual given the wrong drug*" was significantly lower after the intervention. After simulation and clinical practice, the students became more aware that giving the wrong medication is not rare. Rather than indicating this result as a negative outcome, this shift can actuate how nursing students can be more realistic that giving the wrong medication can happen while caring for patients. As revealed in a previous study, nursing students contribute to the high medication errors in clinical practice (Stolic et al., 2022).

After the intervention, item "*learning from mistakes*" showed a decrease in score. In this study, nursing students in clinical practice were under the full supervision of clinical educators for every action and contact with patients. Full supervision was carried out to maintain patient safety during care and ensure students made no mistakes. Patient safety violations can severely affect patients and nursing students (Higham & Vincent, 2021). The consequences of mistakes make students less likely to be involved in carrying out patient safety goals during clinical practice because they are afraid of making mistakes. Previous research found that the fear of making mistakes is related to reactions to mistakes. Students who have high self-confidence are more likely to be able to correct their mistakes after getting feedback (Lauzier & Bilodeau Clarke, 2024). However, if students do not get enough feedback, they have difficulty identifying the cause of their mistakes. So, the process of learning from mistakes is hindered. Previous research has found that feedback is crucial in helping students identify errors (Zhang & Fiorella, 2023). Therefore, clinical educators need to understand how to give feedback and what type of feedback to give so that they can create a clinical practice environment that facilitates students to understand their mistakes and make improvements.

In the statement section, nurses identify and address patient safety. Although there is a significant difference, the average score decreases after the intervention. This indicates that students become realistic about nurses' roles in recognizing and addressing patient safety issues after seeing the complexity of practice in the clinic. These findings align with Stolic et al. (2022), who mentioned that students experience disharmony between academic ideals and clinical realities, such as a culture of silence and a lack of courage to report mistakes.

Another interesting finding was the significant increase in perceived support from healthcare managers after the intervention. Students realized the important role of managers in creating an environment that supports patient safety, especially when they saw real interactions between nurses during clinical practice. Support from healthcare managers is an important factor in fostering a culture of patient safety, especially for novice practitioners such as nursing students (Järvisalo et al., 2024). The involvement of instructors and clinical managers in guiding nursing students through reflective questioning and critical thinking significantly increased students' awareness of patient safety risks and prevention strategies. Managers who provide a culture of transparency and non-punitive behaviour encourage students to report near misses and errors, which promotes learning that is important for patient safety (Park & Yeom, 2025). The support of healthcare managers and full supervision by clinical educators will create a structured and psychologically safe environment where nursing students can confidently engage in patient care while applying patient safety principles.

The nursing students with science and nursing majors in senior high school showed a higher awareness of patient safety than those with social majors. A previous study only found that first-year students entering medical school, including medicine and nursing, had higher sensitivity and motivation about patient safety than non-medical students (Kohara et al., 2024). These findings suggest that students from a science background show initial interest in the nursing profession and patient safety. A more focused approach to interest in nursing study is important to non-science students before entering nursing school.

Implication of the study

The findings of this study highlight important implication for nursing education and practice. The use of low-fidelity simulation combined with clinical practice was shown to enhance first-year nursing student's awareness of patient safety, supporting its integration into nursing curricula, especially in courses with clinical practice components. In addition, early exposure simulation-based learning in the first year enables nursing students to experience situations that closely resemble real word of clinical practice and to apply patient safety principle while performing basic nursing skills, which may help reduce error in future.

Limitation of the study

This study acknowledges several limitations. First, the results can only be generalized to the same characteristics. Even though patient safety is a broad topic in health sciences, students from different majors are limited to generalizing the results. However, the number of respondents who participated in this study was large, strengthens the study by increasing the robustness of the findings within this population. Second, variations in clinical placement across different inpatient wards may affect their responses to the questionnaire. Nonetheless, placement in inpatient ward ensured that students were exposed to relatively similar clinical settings and patient conditions. Lastly, the instrument used in this study was not formally cross-validated in Indonesian context. However, as it adapted from WHO patient safely curriculum, which

designed to compressively address key aspects of patient safety.

Conclusions

This study concludes that low-fidelity simulation and clinical practice significantly improve patient safety awareness in first-year nursing students. The students gained better understanding, confidence, attitudes, and thoughts about patient safety in real hospital situations. However, first-year nursing students may report higher scores that do not reflect their competence in patient safety, as they tend to rely more on theoretical knowledge rather than real clinical experience. Given this study relied on self-reported measures, which may not reflect actual awareness of patient safety, a qualitative study about the perception of patient safety is recommended in future research to gain deeper into nursing students understanding and the application of patient safety principles in clinical setting. This study also highlighted the importance of preparing a non-science education background to enhance patient safety.

Declaration of Interest

The authors declare there are no conflicts of interest related to this study.

Acknowledge

The authors sincerely acknowledge all nursing students who participated in this study, as well as Universitas Pelita Harapan for their support, including ethical approval and funding of the publication charges.

Funding

Universitas Pelita Harapan

Data Availability

The data was available in request based on consideration.

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