

ORIGINAL RESEARCH

Patient Safety Competency and its Related Aspects in Professional Education among Nursing Students of Two Nursing Schools in Iran: A Comparative Study



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Article Info

Article History:
Received: 19 October 2021
Revised: 22 June 2022
Accepted: 5 July 2022
Online: 31 August 2022

Keywords:
Competence; nursing students;
nursing education; patient safety;
professional education

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Abstract

Background: The importance of patient safety competency in nursing students to enter the clinical environment has made continuous studies necessary. However, only few studies have been conducted to assess and compare patient safety competency and its related aspects among nursing students in various settings.

Purpose: This study aimed to compare patient safety competency and its related aspects among undergraduate nursing students of two nursing schools.

Methods: This descriptive comparative study was conducted at two nursing schools (A and B) in Iran. Using a census method, 240 undergraduate nursing students were enrolled from group A and 200 ones from group B. In total, 377 students completed the survey (response rate = 76.60 %). Data were collected using the adapted Health Professional Education in Patient Safety Survey (H-PEPSS). Data were analyzed using SPSS (version 21) and running descriptive statistics and independent samples t- test. The significance level was set at $p < 0.05$.

Results: Results showed that nursing students' means (SD) of patient safety competency in classroom (3.43(0.60)) and clinical setting (3.32(0.62)) were significantly higher in Group A compared with Group B (2.66(0.90) and 2.39(0.9), respectively). The means of the broader aspects of patient safety and comfortable speaking up about patient safety were significantly lower in Group A than Group B (3.58(0.71) and 3.31(0.59)) versus (3.79(0.71) and 3.55(0.72)).

Conclusion: Nursing students from two different nursing schools had varied levels of patient safety competency in the classroom and clinical settings. In addition, it was found that the participants had different perspectives on aspects of patient safety and perceptions of speaking up about patient safety ($p < 0.05$).

How to cite: Farokhzadian, J., Tayebi Myaneh, T., Khodabandeh Shahraki, S., Malakoutikhah, A., Nosratabadi, I., & Rafiee Sarbijan-Nasab, F. (2022). Patient safety competency and its related aspects in professional education among nursing students of two nursing schools in Iran: A comparative study. *Nurse Media Journal of Nursing*, 12(2), 223-232. <https://doi.org/10.14710/nmjn.v12i2.42122>

1. Introduction

Changes in science and technology along with modern conceptions of professionalism suggest quality improvement and patient safety in healthcare settings as the professional responsibilities of all medical practitioners, notably nurses and nursing students (Karami et al., 2017). Patient safety is defined as the prevention of harm to patients and has long been a topic of discussion around the world (Lee et al., 2016). According to a growing body of evidence, improving patient safety competency and reforming health professionals' curriculum are happening slowly in the health professions (Torkaman et al., 2022).

Nurses, due to their unique position, can ensure successful implementation of patient safety strategies because they spend a majority of their time with patients. To improve healthcare

system, patient safety competency expertise is required to be enhanced (Sherwood & Zomorodi, 2014). Nursing education aims to provide nursing students with sufficient competencies to guarantee patient safety and quality of care in future (Tella et al., 2014). Students' competencies should be upgraded before graduation (Pudpong et al., 2017). Improving patient safety competency through education and training has been validated for over a decade by studies done in this field. Incorporating patient safety education into undergraduate nursing curriculum and assessing patient safety competency properly are the initial steps toward enhancing patient safety in clinical settings (Torkaman et al., 2022).

In 2006, the Canadian Patient Safety Institute (CPSI) initiated the Safety Competencies Project with the aim of optimizing patient safety by enhancing health professional education in this area. The conceptual underpinning of these competencies is composed of six socio-cultural domains: contributing to a culture of patient safety, working in teams, communicating effectively, managing safety risks, optimizing human and environmental factors, and recognizing, responding to, and disclosing adverse events (VanDenKerkhof et al., 2017).

Efforts to include patient safety competency in a healthcare professional education have increased. It is important to obtain trainees and new health professionals' perspectives of their own patient safety competency. Nursing educators play a critical role in the formation and development of nursing students' competencies. The collaboration of nursing educators in both academic and clinical settings is crucially important to make sure of the effectiveness of patient safety trainings in different environments (Bijani et al., 2019; Torkaman et al., 2022). Moreover, by assessing students' self-perceived patient safety competency in different educational environments, they can help adjust curricula to students' needs (Pudpong et al., 2017).

The literature review showed that few studies investigated nursing students' competency in two different contexts, while many studies done in a single educational system (Alquwez et al., 2019; Ginsburg et al., 2013). Ginsburg et al. (2013) assessed patient safety competency of newly registered nurses, pharmacists, and physicians in Canada. Their participants stated that effective communication with patients and other health care providers made them feel more confident in the dimension of patient safety learning. They also believed that learning about patient safety in the clinical settings gave them more confidence than learning it in the classroom. Alquwez et al. (2019) evaluated patient safety competency in undergraduate nursing students at several Saudi universities and revealed that nursing students had good attitudes toward patient safety competency. They also found that nursing students' patient safety competency differed significantly in terms of universities, gender, and year of study. These findings supported international accreditation organizations' claims on that patient safety competency should be evaluated in all clinical healthcare settings. Two studies in Canadian universities showed that junior and senior students had lower levels of confidence regarding patient safety competency than freshmen and sophomores (Duhn et al., 2012; Lukewich et al., 2015). Another study also revealed that patient safety educational interventions were not explicit and students scared of reporting adverse events. They suggested the need for more explicit patient safety education in the classroom and clinical settings (VanDenKerkhof et al., 2017).

However, to the best of our knowledge, only one study assessed nursing students' perception of patient safety competency and patient safety education-related aspects in Iran by using Health Professional Education in Patient Safety Survey (H-PEPSS) (Torkaman et al., 2022). Furthermore, assessment of students' self-perceived competency can help identify the conditions and gaps in integration of patient safety trainings into nursing education programs as well as in adjusting curricula to the students' needs on patient safety competency and aspects related to patient safety education. Moreover, assessment of patient safety competency in nursing students and discovering their views on patient safety-related aspects, such as broader patient safety issues in health professional education and comfortable speaking up about patient safety in vocational training, are essential to establish patient safety compliance. Therefore, the present study was conducted to compare patient safety competency between nursing students of two universities of medical sciences, assess students' perspectives on broader patient safety issues in health professional education, and understand their perceptions of comfortable speaking up about patient safety.

2. Methods

2.1 Research design

The present study employed a cross-sectional descriptive-analytical study to compare patient safety competency and its related aspects among undergraduate nursing students.

2.2 Setting and samples

This study was carried out in two nursing schools, one is affiliated to the University of Medical Sciences in the Southeastern (Group A) and the other is affiliated to the University of Medical Sciences in the center of Iran (Group B). Group A represents a new university that is located near the northwest and center of Iran and next to the political capital of Iran, Tehran, and this has caused many volunteers to study there. Meanwhile, Group B represents a university with a long history (about half a century) in the southeast of Iran. Therefore, the main question of researchers in this study is whether there is a difference in patient safety competency among nursing students in two universities that are different in terms of geography and age.

The target population included all undergraduate nursing students studying in the second, third and fourth year in two aforementioned nursing schools. Inclusion criteria included nursing students who successfully had passed the “Fundamentals of Nursing Course”, had started learning in clinical settings, and not employed in a hospital. Therefore, students in the first year were not considered as the target population. The exclusion criteria included those failing to complete the questionnaires. Given that the sample size was equal to the target population, all eligible nursing students were included in the study by a census method. According to the inclusion criteria, 240 undergraduate nursing students were enrolled from group A and 200 ones from group B. Among 240 eligible nursing students in group A, 40 questionnaires were not completed, which resulted in a response rate of 83.33%. Out of 200 eligible nursing students in group B, 63 questionnaires were not completed due to the participants’ lack of cooperation, which resulted in a response rate of 68.50%. As a result, a total of 337 undergraduate nursing students participated in the study. The overall response rate was 76.60%.

2.3 Measurement and data collection

The study questionnaires included a demographic questionnaire and the Health Professional Education in Patient Safety Survey (H-PEPSS) (Ginsburg et al., 2012). The demographic questionnaire comprised of questions on the students’ age, gender, attendance at patient safety training, observation of medical and nursing errors in clinical practices, and experiences of reporting errors to clinical educators, hospital staff, and peer students.

The H-PEPSS (with 38 items) was developed to assess patient safety competency in the socio-cultural dimensions of patient safety and its related aspects such as broader patient safety issues in health professional education and comfortable speaking up about patient safety. The H-PEPSS consists of three parts. The first part, which investigates “learning about specific patient safety content areas” (27 items), contains seven domains, namely, (1) issues related to clinical safety, for example safe medication, hand hygiene, infection control, and safe clinical practice in general (four items), (2) working in teams (six items), (3) communicating effectively (three items), (4) management of safety risks (three items), (5) optimizing human and environmental factors (three items), (6) recognizing, responding to, and disclosing adverse events and close calls (four items), and (7) contributing to a safety culture (four items). Considering the theoretical and practical nature of patient safety, items were designed for in two classroom and clinical training settings. The participants were required to answer the items individually according to what they had learned about patient safety in the classroom and clinical settings. Therefore, scores of the domains were calculated for the classroom and clinical settings separately. All 27 items of the first section were scored on the scale value of one (strongly disagree) to five (strongly agree), and the option of “don’t know”. Mean scores are calculated from the items in each dimension for each learning setting.

The second and third parts of the H-PEPSS investigate aspects related to patient safety in professional education, such as “how broader patient safety issues are examined in health education” (seven items) and “comfortable speaking up about patient safety” (four items), respectively. The second and third parts are scored based on the scale value of one (strongly disagree) to five (strongly agree). Higher scores indicate better positive perceptions about patient

safety competency, broader aspects of patient safety, and comfortable speaking up about patient safety.

The original H-PEPSS had confirmed internal consistency (Cronbach's $\alpha=0.81-0.85$) (Ginsburg et al., 2012; Ginsburg et al., 2013). In a study in Iran, the H-PEPSS was used with the developers' permission. The cross-cultural adaptation and translation of the H-PEPSS involved forward translation of the original H-PEPSS into Persian. Later, a proficient English translator conducted the backward translation of the Persian version into English. Next, the translated version was matched with the original version. Face validity of the instrument was also examined and confirmed by nursing students' perception and understanding of the items. The Persian version of the H-PEPSS received content validity confirmation from 10 nursing faculty members. The Content Validity Index (CVI) of the questionnaire and items was 90%. In addition, its reliability was corroborated using Cronbach's alpha coefficients of 0.72-0.83 and 0.78-0.85 for the class and clinical settings, respectively (Torkaman et al., 2022).

The data in this study were collected from September to October 2020. In order to collect data, two WhatsApp groups were created and the participants were added to each related group. Later, participants were provided with the required instructions to complete the questionnaires as well as the links of the study questionnaires via e-mail and WhatsApp groups. The questionnaires were sent back to the researchers automatically.

2.4 Data analysis

The data were analyzed by using version 21 of Statistical Package for the Social Science (SPSS, Inc., Chicago, IL). Descriptive statistics were expressed as mean and standard deviation for continuous variables and as frequencies and percentages for categorical variables. The independent samples t-test was applied to compare nursing students' H-PEPSS scores in two groups as well as investigate the difference of H-PEPSS scores with respect to demographic characteristics. The significance level was set at $p<0.05$.

2.5 Ethical considerations

This research with No. 98000996 was approved by the Ethics Committee of Kerman University of Medical Sciences (IR.KMU.REC.1399.030). In addition, the necessary permissions were presented to the Nursing and Midwifery Schools. The participants were explained about the study purpose, study process, and voluntary participation in the study. They were also assured that they could withdraw from the study at any time without any negative consequences and about the confidentiality of information they would provide.

3. Results

3.1 Demographic characteristics of the respondents

Based on the results of this study, in group A, about 59.3% of the participants ($n=121$) were female, and 90% ($n=180$) were younger than 25 years old. About 70.9% ($n=144$) of the participants had no attendance at patient safety training; 92.2% ($n=188$) had observed medical and nursing errors in clinical practices; 80.9% ($n=165$) had reported errors to clinical educators; 57.4% ($n=117$) had not reported errors to hospital staff; and 81.9% ($n=167$) had reported errors to peer students.

In group B, 51.4% of the participants ($n=75$) were female; 89% ($n=130$) were younger than 25 years old; 59.3% ($n=83$) had no attendance at patient safety training; 60.3% ($n=88$) had observed medical and nursing errors in clinical practices; 55.5% ($n=81$) had reported errors to clinical educators; 60.3% ($n=88$) had not reported errors to hospital staff; and 70.3% ($n=79$) had reported errors to peer students (Table 1).

Table 1. Demographic information of nursing students in two groups ($n=337$)

Variables	Categories	Group A		Group B	
		f	%	f	%
Gender	Male	83	40.7	71	48.6
	Female	121	59.3	75	51.4
Age groups	<25	180	90	130	89
	≥ 25	20	10	16	11

Table 1. Continued

Variables	Categories	Group A		Group B	
		f	%	f	%
Attendance at patient safety training	Yes	59	29.1	57	40.7
	No	144	70.9	83	59.3
Observation of medical and nursing errors	Yes	188	92.2	88	60.3
	No	16	7.8	58	39.7
Reporting errors to clinical educators	Yes	165	80.9	81	55.5
	No	39	19.1	65	44.5
Reporting errors to hospital staff	Yes	87	42.6	58	39.7
	No	117	57.4	88	60.3
Reporting errors to peer students	Yes	167	81.9	79	70.3
	No	37	18.1	67	29.7

3.2 Comparison of H-PEPSS domains and self-reported PS competency in different learning settings

Table 2 shows results on comparison of two groups regarding H-PEPSS domains and patient safety competency. Results showed that nursing students' total scores of patient safety competency in classroom (3.43(0.60)) and clinical setting (3.32(0.62)) were statistically significant higher in group A compared with total scores of patient safety competency in classroom (2.66(0.90)) and clinical setting (2.39(0.9)) in group B ($p=0.001$).

Table 2. Comparison of nursing students' H-PEPSS domain scores in classroom and clinical settings in two groups (n=337)

Patient safety domains	Settings	Group A	Group B	t-test	p-value*
		Mean(SD)	Mean(SD)		
Issues related to clinical safety	Class	3.89(0.81)	2.71(1.28)	10.55	0.001
	Clinical	3.83(1.18)	2.38(1.5)	10.06	0.001
Working in teams	Class	3.26(0.84)	2.56(1.11)	6.49	0.001
	Clinical	3.28(0.81)	2.34(1.29)	8.32	0.001
Effective communication	Class	3.61(0.95)	2.75(1.15)	7.55	0.001
	Clinical	3.60(0.87)	2.54(1.56)	8.08	0.001
Management of safety risks	Class	3.37(0.94)	2.67(1.19)	6.13	0.001
	Clinical	3.38(0.86)	2.41(1.30)	8.31	0.001
Optimizing human and environmental factors	Class	3.31(0.99)	2.51(1.05)	7.22	0.001
	Clinical	3.21(0.95)	2.36(1.33)	6.95	0.001
Recognizing, responding to and disclosing adverse events and close calls	Class	3.27(0.83)	2.66(1.43)	5.01	0.001
	Clinical	3.22(0.85)	2.31(1.27)	7.93	0.001
Contribute to a safety culture	Class	3.45(0.86)	2.72(1.15)	6.76	0.001
	Clinical	3.22(0.95)	2.35(1.29)	7.24	0.001
Total of patient safety competency	Class	3.43(0.6)	2.66(0.9)	9.11	0.001
	Clinical	3.32(0.62)	2.39(1.12)	9.97	0.001

Note. *p-values are significant at level of ≤ 0.05

3.3 Broader aspects of patient safety and comfortable speaking up about patient safety in both learning settings

Table 3 shows results on comparison of two groups in terms of nursing students' perceptions of broader aspects of patient safety and comfortable speaking up about patient safety. The results showed that the means of the broader aspects of patient safety (3.58(0.71)) and comfortable speaking up about patient safety (3.31(0.59)) were significantly lower in group A compared with group B (3.79(0.71) and 3.55(0.72), respectively), ($p=0.008$, $p=0.001$, respectively).

Table 3. Comparison of nursing students' perceptions of broader aspects of patient safety and comfortable speaking up about patient safety (n=337)

Variables	Group A	Group B	t-test	p-value*
	Mean(SD)	Mean(SD)		
Broader aspects of patient safety	3.58(0.71)	3.79(0.71)	-2.67	0.008
Comfortable speaking up about patient safety	3.31(0.59)	3.55(0.72)	-3.43	0.001

Note. *p-values are significant at level of ≤ 0.05

3.4 Comparison of patient safety competency, broader aspects of patient safety and comfortable speaking up about patient safety with respect to demographic data

Table 4 shows the scores of H-PEPSS domains in different learning settings, perceptions of broader aspects of patient safety, and comfortable speaking up about patient safety with respect to nursing students' demographic information. The scores of patient safety competency of nursing students who attended patient safety training ($p=0.001$) and reported errors to educators ($p=0.001$) and peer students ($p=0.04$) were significantly higher in the classroom setting. In addition, it was revealed that the scores of patient safety competency of nursing students who observed medical and nursing errors ($p=0.005$) and reported errors to clinical educators ($p=0.007$) and peer students ($p=0.001$), were significantly higher in the clinical settings.

Moreover, the score of broader aspects of patient safety was significantly higher in female students ($p=0.03$) who did not observe medical and nursing errors ($p=0.006$). Moreover, the score of comfortable speaking up about patient safety was significantly higher in students who did not observe medical and nursing errors ($p=0.03$) and did not report errors to clinical educators ($p=0.004$) based on the results of this study.

Table 4. Comparison of patient safety competency, broader aspects of patient safety and comfortable speaking up about patient safety with respect to demographic information of nursing students (n=337)

Variables	Categories	Patient safety competency in classroom setting	Patient safety competency in clinical setting	Broader aspects of patient safety	Comfortable speaking up about patient safety
		Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)
Gender	Female	3.06(0.82)	2.98(0.98)	3.74(0.65)	3.43(0.63)
	Male	3.14(0.82)	2.90(0.97)	3.58(0.78)	3.39(0.70)
	t-test	0.52	-0.45	-0.69	0.69
Age groups	p-value	0.34	0.46	0.03*	0.53
	<25	3.10(0.82)	2.92(0.99)	3.66(0.71)	3.42(0.66)
	≥ 25	3.02(0.88)	3.00(0.96)	3.75(0.77)	3.34(0.72)
	t-test	0.95	0.73	-2.12	-0.62
Attendance at patient safety training	p-value	0.60	0.65	0.49	0.45
	Yes	3.22(0.81)	2.85(0.8)	3.65(0.66)	3.46(0.67)
	No	2.89(0.78)	2.99(1.06)	3.68(0.75)	3.38(0.65)
	t-test	-3.55	-1.30	-3.87	1.01
Observation of medical and nursing errors	p-value	0.001*	0.19	0.70	0.31
	Yes	3.11(0.77)	3.01(0.81)	3.61(0.73)	3.37(0.66)
	No	3.05(0.98)	2.65(1.42)	3.88(0.65)	3.57(0.66)
	t-test	0.55	2.83	-2.78	-2.24
Reporting errors to clinical educators	p-value	0.58	0.005*	0.006*	0.03*
	Yes	3.20(0.76)	2.72(1.06)	3.66(0.77)	3.35(0.64)
	No	2.84(0.90)	2.03(0.93)	3.69(0.59)	3.57(0.69)
	t-test	3.83	2.71	-0.27	-2.93
	p-value	0.001*	0.007*	0.78	0.004*

Table 4. Continued

Variables	Categories	Patient safety competency in classroom setting	Patient safety competency in clinical setting	Broader aspects of patient safety	Comfortable speaking up about patient safety
		Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)
Reporting errors to hospital staff	Yes	3.15(0.81)	2.93(1.09)	3.73(0.69)	3.35(0.63)
	No	3.05(0.83)	2.94(0.89)	3.63(0.73)	3.46(0.68)
	t-test	1.11	-0.05	1.21	-1.51
	p-value	0.27	0.96	0.23	0.13
Reporting errors to peer students	Yes	3.15(0.80)	3.08(0.80)	3.65(0.73)	3.39(0.63)
	No	2.95(0.85)	2.59(1.24)	3.72(0.69)	3.46(0.73)
	t-test	2.97	4.37	-0.82	-0.88
	p-value	0.04*	0.001*	0.41	0.38

Note. *p-values are significant at level of ≤ 0.05

4. Discussion

This study compared patient safety competency and patient safety-related aspects in professional education between Iranian undergraduate nursing students of two medical universities. The findings showed that the scores of patient safety competency (in the classroom and clinical settings) and its domains obtained by the nursing students of group A were significantly higher than those obtained by nursing students of Group B. Langari et al. (2017) also found that both Finnish and British nursing students had excellent overall patient safety competency scores; however, the overall patient safety competency score in British students was much higher than that of Finnish students. Similarly, two other studies reported considerable disparities in patient safety competencies among students from several Saudi universities (Alquwez et al., 2019; Colet et al., 2015). According to Shanty et al.'s (2018) study findings, patient safety competency scores significantly differed between the study groups. Patient safety competency was reported to be higher in postgraduate nursing and nuclear medicine students. Patient safety competency of nursing students was higher in the classroom than in the clinical setting according to findings of a study done by Amilia and Nurmalia (2020). In a nutshell, it seems that the level of patient safety competency is different among university students. This difference can be attributed to cultural and contextual varieties in patient safety education throughout the world (Langari et al., 2017). Günay and Kılınc (2018) reported that clinical learning is affected by different factors, including personal characteristics, clinical educators, academic educators, physical facilities, and environment.

Based on the findings, the scores of broader aspects of patient safety and perceptions of comfortable speaking up about patient safety in nursing students of group A were significantly lower than that of students in group B. No studies have been conducted in this regard yet. Therefore, a gap exists among the studies on how to address patient safety issues and perception of comfortable speaking up about patient safety. Since attitudes can influence behavior, assessing nursing students' attitudes towards patient safety is important (Robson et al., 2011). In this regard, researchers found that speaking of mistakes and filling out reporting forms were more effective in improving patient safety (Asem et al., 2019; Berman et al., 2018). Researchers also explained that the reasons that nurses and students speak less about patient safety issues may be fear of punishment, incorrect recognition of medical errors, lack of knowledge in the field, blame, and pressure from other colleagues (Asem et al., 2019; Robson et al., 2011; Safarpour et al., 2017). Usher et al. (2017) believed that nursing students must have the confidence to communicate with others to improve patient safety, especially to challenge unsafe practice, recognize, disclose, and respond to adverse events, including errors and malpractices, to reach significant improvements in patient safety and create a harmless environment for patients.

In total, our results showed that the scores of patient safety competency were statistically significantly higher in nursing students, who attended patient safety training, observed medical and nursing errors, and reported errors to clinical educators and peer students. Similarly, Torkaman et al. (2022) showed that educational intervention was somewhat effective in

improving the patient safety competency in the long run. Gaupp et al. (2016) in line with the present study, indicated that e-learning improved students' attitudes toward patient safety competency. Two other studies also emphasized the role of education in understanding students' patient safety competency and their inclusion in the students' curriculum (Nie et al., 2011; Tom, 2016). Based on these findings, it can be concluded that students, who participate in workshops and training classes, gain more experience in patient safety. Observing and reporting medical and nursing errors allow students to become familiar with harmful cases to the patient. Consequently, reporting these errors and sharing them with other students and instructors, in addition to sharing self-experiences and observations, increase patient safety and may reduce errors in the clinical setting.

According to our results, score of broader aspects of patient safety was significantly higher in female students who did not observe medical and nursing errors. Moreover, mean of comfortable speaking up about patient safety was significantly higher in students who did not observe medical and nursing errors and did not report errors to clinical educators. One of the reasons why females were more concerned about patient safety issues than males may be the way they communicate with patients. Usually, women are more involved in conversations with the patient and their colleagues (Colet et al., 2015), which makes them more aware of patient safety concerns and issues, including medical errors. In addition, the more the students talk to their professors and instructors about patient safety in clinical setting, the less their fear of reporting errors and mistakes.

5. Implications and limitations

The results of the study implicate the importance of the attention to patient safety education among nursing students, suggesting a fundamental reform in the way novice nurses are prepared both in the classroom and in the clinical setting. Nursing professors are recommended to put more emphasis on the patient safety competency and its related aspects in educational curriculum. Results of the present study can guide nursing professors and managers to develop appropriate strategies in promoting nursing students' patient safety competency. These strategies may include reviewing the educational needs as well as modifying and developing the educational curricula.

This study had some limitations. The first limitation was related to its cross-sectional nature and gathering data at a single time period. The second limitation was the use of questionnaire to assess the safety competency and its related aspects in professional education, which may have resulted in exaggerative scores and personal bias. Future longitudinal studies are suggested to be done to collect detailed information on changes of patient safety competency over the time, from the students' entrance to the universities until they begin their clinical work. Moreover, future studies can be performed using different methods of competency evaluation, such as 360-degree evaluation method or other new and scientific methods, to help determine the actual competency.

6. Conclusion

According to the findings of the present study, nursing students from two different nursing schools had varied levels of patient safety competency in the classroom and clinical setting. In addition, it was found that the participants had different perspectives on larger aspects of patient safety and perceptions of speaking up about patient safety. The current findings can help policymakers align patient safety instruction with international standards in all nursing schools. Nursing professors are suggested to adopt new methodologies, such as realistic scenarios and role-playing. Researchers are recommended to undertake interventional and longitudinal studies to find out the efficacy of these strategies at improving students' patient safety competency.

Acknowledgment

The authors appreciate the nursing students who generously participated in this study.

Author contribution

JF, AM, and FRS conceptualized, designed and wrote the research proposal. IN, SKH, and ZTM collected, analyzed, and interpreted the data. JF provided supervisions, essential suggestions, and recommendations throughout the research process. JF, AM, IN, SKH, ZTM and

FRS contributed equally to writing and revising the manuscript and approved the final manuscript.

Conflict of interest

The authors declare no conflict of interest.

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