

EXAMINING THE PATIENT SAFETY COMPETENCIES OF NURSING STUDENTS: A MULTI-REGIONAL STUDY

HEMŞİRELİK ÖĞRENCİLERİNİN HASTA GÜVENLİĞİ YETKİNLİKLERİNİN İNCELENMESİ: ÇOK BÖLGELİ BİR ARAŞTIRMA

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Abstract

Objective: This study aimed to examine the patient safety competencies of nursing students studying at different state universities in Türkiye.

Methods: This descriptive study was conducted in three public universities located in different geographical regions of Türkiye. The study sample consisted of 391 nursing students in year-3 and year-4. The study data were collected with the 'Socio-Demographic Characteristics Form' and the 'Patient Safety Competency Self-Evaluation Tool'. Mann-Whitney U and Kruskal Wallis analyses were used in the research data analysis.

Results: Nursing students' patient safety competency levels were determined to be above moderate levels. The mean attitude score of nursing students was found to be higher than the mean knowledge and skill scores. Students who were in year-4, those who were studying at universities B and C, those who were taking patient safety courses, and those who were taking a course on patient safety as a separate course were found to have higher scores.

Conclusion: It is recommended that patient safety training should be organized in a way to develop competencies and that teaching methods that would improve students' knowledge, attitudes, and skills should be integrated into the curricula and the results should be evaluated.

Keywords: Nursing Students, Patient Safety, Competency

Özet

Amaç: Bu çalışma, Türkiye'deki farklı devlet üniversitelerinde öğrenim gören hemşirelik öğrencilerinin hasta güvenliği yetkinliklerini incelemeyi amaçlamıştır.

Gereç ve Yöntem: Tanımlayıcı tipte olan bu çalışma, Türkiye'nin farklı coğrafi bölgelerinde yer alan üç devlet üniversitesinde gerçekleştirilmiştir. Araştırmanın örneklemini 3. ve 4. sınıftaki 391 hemşirelik öğrencisi oluşturmuştur. Çalışma verileri 'Sosyodemografik Özellikler Formu' ve 'Hasta Güvenliği Yetkinliği Öz Değerlendirme Aracı' ile toplanmıştır. Araştırma verilerinin analizinde Mann-Whitney U ve Kruskal Wallis analizleri kullanılmıştır.

Bulgular: Hemşirelik öğrencilerinin hasta güvenliği yetkinlik düzeylerinin orta düzeyin üzerinde olduğu belirlenmiştir. Hemşirelik öğrencilerinin tutum puan ortalamalarının bilgi ve beceri puan ortalamalarından yüksek olduğu saptanmıştır. 4. sınıf öğrencilerinin, B ve C üniversitelerinde okuyanların, hasta güvenliği dersi alanların ve hasta güvenliği dersini ayrı bir ders olarak alanların puanlarının daha yüksek olduğu görülmüştür.

Sonuç: Hasta güvenliği eğitimlerinin yetkinlikleri geliştirecek şekilde düzenlenmesi ve öğrencilerin bilgi, tutum ve becerilerini geliştirecek öğretim yöntemlerinin müfredatlara entegre edilmesi ve sonuçlarının değerlendirilmesi önerilmektedir.

Anahtar Kelimeler: Hemşirelik Öğrencileri, Hasta Güvenliği, Yetkinlik

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Bu makaleye atf yapmak için / Cite this article: Erkuş Küçükkelepçe, G., Basit, G., & Arslan Şeker, S. (2023). Examining The Patient Safety Competencies of Nursing Students: A Multi-Regional Study. *Gevher Nesibe Journal of Medical & Health Sciences*, 8 (4), 1163-1174. <http://doi.org/10.5281/zenodo.10049134>

INTRODUCTION

Patient safety has become a subject that is increasing in importance day by day and attracting global attention, with the increasing awareness of preventable errors in healthcare. The developments in healthcare services in the changing world conditions make it imperative that the healthcare services should be provided in a way that is attentive, effective and takes patient safety into account. Changes in patient safety reveal the need for transformation in the education and clinical practices of health professionals to improve health policies and education systems (Bianchi et al., 2016). Nurses have a critical role and importance in ensuring patient safety because they are the group spending the most time one-on-one with patients among healthcare professionals and they have a greater majority in numbers than other professional groups in healthcare. Therefore, it is very important for nursing students, who would be nurses of the future, to gain patient safety competence before graduating.

Nurses play a vital role in increasing the safety and quality of care by managing and reporting negative situations and factors that may arise due to their better-extended interaction with patients compared to other health professionals (Levett-Jones et al., 2020; Taskiran, Eskin Bacaksiz, & Harmanci Seren, 2020). Since the development of patient safety practices is possible with a qualified education, to create a safety culture, healthcare professionals need to receive training on this issue (Taskiran et al., 2020). International patient safety guidelines emphasize the importance of training for healthcare professionals to have the basis of knowledge, skills, behaviours, and attitudes related to patient safety and to know the importance of practicing patient safety in all their actions (European Network for Patient Safety, 2010; World Health Organization, 2011; Tella et al., 2014).

Providing quality and safe healthcare services is possible with the training of future healthcare professionals that would improve their competence about patient safety. Patient safety competence includes the knowledge, skills and attitudes related to patient safety and these competencies can be gained through training (Eskici, Kanig, Ugur, & Seren, 2021). It has been emphasized in the literature that higher education institutions have the responsibility of designing a curriculum focused on the practical competence of nursing graduates (Levett-Jones et al., 2020; Usher et al., 2017). Some researchers stated that the scope and content of the patient safety education given in nursing programs and whether the students create the desired level of proficiency should be evaluated (Bressan et al., 2016; H. Jang & Lee, 2017; Kılıç & Cevheroğlu, 2023). This study was carried out to examine the knowledge, skills and attitudes of nursing students studying in different geographical regions of Türkiye regarding patient safety.

MATERIALS AND METHODS

Study design

This descriptive study was conducted to examine the patient safety competencies of nursing students studying in the nursing department of three different public universities in Türkiye.

Settings and Participants

The study population consisted of 599 nursing students in the year-3 and year-4 of the Faculty of Health Sciences and Nursing of three public universities located in different geographical regions of Türkiye in the 2021-2022 academic year. These faculties were from the Necmettin Erbakan University (301) located in the Central Anatolian region, the Adiyaman University (196) located in the South East Anatolian region and the Munzur University (102) located in the East Anatolian region. All students who met the inclusion criteria and volunteered to participate were included in the study. The sample of the study consisted of 391 students in total (participation rate 65.2%).

Inclusion criteria for the study;

- Having given verbal and written consent to participate in the study,
- Having clinical practice experience,
- To be in at least the sixth semester of undergraduate nursing education (at least year-3)

Data collection tools

The study data were collected with the 'Socio-Demographic Characteristics Form' and the 'Patient Safety Competency Self-Evaluation Tool'.

Socio-Demographic Characteristics Form: It consisted of five questions about the age of the students, which year they were in their education, the university they attended, the status of taking courses related

to patient safety, and the way how they take these courses (included within a different course/as a separate course).

Patient Safety Competency Self-Evaluation Tool (PSCSE): The Turkish adaptation of the scale which was developed by Lee et al. (2014) to evaluate the patient safety competencies of nursing students in South Korea was carried out by Eskici et al. (2021). The multidimensional scale consists of 3 dimensions, 12 factors and 41 items in total. The score that can be obtained from the scale and sub-dimensions is between 1 and 5. Items 38 and 39 are reverse scored. Since it is a multidimensional scale, total score, sub-dimension and factor mean scores are evaluated separately. An increase in the mean score indicates that students have better knowledge, skills and attitude competencies about patient safety (Eskici et al., 2021). It is also recommended that the tool be used with year-3 and year-4 nursing students. It has been noted that year-1 and year-2 students might not have enough capability to answer the statements in the scale in terms of knowledge about patient safety and clinical experience. The Cronbach alpha value of the scale was found as 0.941 in the study of Eskici et al. (Eskici et al., 2021), and it was found to be 0.922 in this study.

Study process

The study data were collected through a face-to-face interview by the researchers between April 15 and May 15, 2022, after obtaining the permission of the ethics committee and the necessary permissions from the nursing departments of the relevant universities. Before the data collection process, the nursing students were informed about the purpose and content of the study, and the volunteers were asked to complete the data collection forms. It took about 15 minutes for the participants to complete the data collection forms.

Ethical considerations

Ethics committee approval was obtained from Adiyaman University Social and Human Sciences Ethics Committee (16.02.2022/214) while necessary written permissions were obtained from the Nursing Departments of the Necmettin Erbakan University (28.02.2022/ E-18689117-100-160259), the Adiyaman University (01.03.2022/ E-35820350-730.08.03-51471) and the Munzur University (24.02.2022/ E-98750247-605.99- 45038). Verbal and written consent was obtained from the participants who agreed to participate in the study. The necessary permission to use was obtained from the author who carried out the Turkish validity and reliability of the measurement tool used in this study.

Data analysis

The SPSS (Statistical Package for Social Sciences) 28.0 package program was used. The Kolmogorov-Smirnov normality test was used to examine the normality assumption of quantitative variables, and non-parametric statistical methods were used in the study. Mann-Whitney U Analysis and Kruskal Wallis Analysis were used to evaluate the differences between independent groups. Bonferroni Correction was used to determine the group from which the difference originated. In all analyses, $p < 0.05$ was accepted as the statistical significance value.

RESULTS

While the mean age of the participants was 21.81 ± 1.38 years, 55% of the students were 22 years old or above. More than half (54.7%) of them were year-3 students, and 41.4% of them were studying at University C. The majority (71.1%) of the students were found to take a course on patient safety, and 62.6% of those who took the course ($n=278$) stated that the patient safety course was included in another course (Table 1).

Table 1. Sociodemographic Characteristics of Nursing Students

(n=391)	n	%
Age (Mean±SD=21.81±1.38)		
20-21 years	176	45.0
≥ 22 years	215	55.0
Gender		
Female	302	77.2
Male	89	22.8
Class		

Third year	214	54.7
Fourth year	177	45.3
University		
A University	137	35.0
B University	92	23.5
C University	162	41.5
Academic mean (Mean±SD =2.98±0.32)		
≤ 2.50	38	9.7
2.51-3.00	179	45.8
≥ 3.01	174	44.5
Status of Taking Courses on Patient Safety		
Yes	278	71.1
No	113	28.9
According to the Way of Taking Courses on Patient Safety (n=278)		
Inside a Lesson	174	62.6
As a Separate Course	104	37.4

Participants had a mean score of 4.00±0.39 from the Patient Safety Competency Self-Evaluation (PSCSE) Tool and 3.72±0.54, 4.04±0.43 and 4.23±0.52, from the sub-dimensions of knowledge, skill and attitude, respectively (Table 2).

Table 2. Patient Safety Competency Self-Evaluation (PSCSE) Tool and Sub-Dimensions Mean Scores

	Number of Items	Mean	SD	Min	Max
Knowledge	6	3.72	0.54	1.33	5.00
Concept of the components of patient safety culture	4	3.78	0.56	1.00	5.00
Concept of error and cause analysis	2	3.60	0.73	1.00	5.00
Skills	21	4.04	0.43	2.19	5.00
Error reporting and response to an error	4	3.67	0.63	1.00	5.00
Communication related to error	3	3.99	0.57	1.33	5.00
Resource utilization/evidence-based practice	3	3.76	0.60	1.67	5.00
Safe nursing practice	5	4.14	0.56	2.20	5.00
Infection prevention	4	4.47	0.54	1.50	5.00
Precise communications during hand offs	2	4.22	0.61	1.50	5.00
Attitudes	14	4.23	0.52	2.36	5.00
Patient safety promotion/prevention strategy	4	4.36	0.61	1.75	5.00
Responsibility of health care professionals for patient safety culture	4	4.30	0.62	1.50	5.00
Error reporting and disclosing	4	3.96	0.76	1.75	5.00
The components of patient safety culture	2	4.35	0.68	2.00	5.00
Patient Safety Competency Self-Evaluation Tool Total Score	41	4.00	0.39	2.32	4.98

When the differences in the PSCSE scale and its sub-dimensions were evaluated in the study according to sociodemographic characteristics, a statistically significant difference was found between the year of the student in their education and the PSCSE scale total and "Attitude" sub-dimension scores ($p<0.05$). Accordingly, the PSCSE scale total and the "Attitude" sub-dimension mean scores of the year-4 students were determined to be statistically significantly higher than the year-3 students. There was a statistically significant difference between the universities and the PSCSE scale total and the "Skill" sub-dimension mean scores ($p<0.05$). The PSCSE scale total and the "Skill" sub-dimension mean scores of students studying at University A were found to be statistically significantly lower than students studying at Universities B and C. A statistically significant difference was found between the PSCSE scale total, "Knowledge" and "Skill" sub-dimension mean scores of the students who took courses related to patient safety and those who did not ($p<0.05$). The PSCSE scale total, "Knowledge" and "Skill" sub-dimension mean scores of the students who took courses related to patient safety were found to be statistically significantly higher compared to those who did not. There was a statistically significant difference between the PSCSE scale total, "Knowledge" and "Skill" sub-dimension mean scores of the students who took courses related to patient safety as a separate course and those who had courses related to patient safety included within a different course ($p<0.05$). The PSCSE scale total, "Knowledge" and

“Skill” sub-dimension mean scores of the students who took courses related to patient safety as a separate course were found to be statistically significantly higher than those who had it included within a different course (Table 3).

Table 3. Comparison of PSCSE Tool and Sub-Dimensions According to Sociodemographic Characteristics (n=391)

	Patient Safety Competency Self-Evaluation Tool			
	Knowledge Mean±SD	Skills Mean±SD	Attitudes Mean±SD	PSCSE Total score Mean±SD
Age				
20-21 years	3.68±0.54	4.02±0.39	4.23±0.52	3.98±0.37
≥ 22 years	3.76±0.53	4.06±0.46	4.23±0.52	4.02±0.41
Z/p	-1.659/0.097	-1.423/0.155	-0.183/0.855	-1.320/0.187
Class				
Third year	3.67±0.54	4.00±0.41	4.15±0.54	3.94±0.39
Fourth year	3.78±0.52	4.09±0.45	4.33±0.48	4.07±0.38
Z/p	-1.469/0.142	-1.900/0.057	-3.518/ 0.000*	-3.152/ 0.002*
University				
A University ¹	3.66±0.46	3.91±0.44	4.15±0.60	3.90±0.40
B University ²	3.82±0.42	4.11±0.38	4.25±0.50	4.06±0.33
C University ³	3.72±0.64	4.12±0.42	4.28±0.46	4.04±0.40
KW/p	5.874/0.053	23.204/ 0.000*	3.571/0.168	11.887/ 0.003*
		1<2,3		1<2,3
Status of Taking Courses on Patient Safety				
Yes	3.82±0.52	4.09±0.42	4.26±0.53	4.06±0.39
No	3.48±0.49	3.93±0.43	4.15±0.50	3.86±0.37
Z/p	-6.423/ 0.000*	-3.410/ 0.001*	-1.952/0.051	-5.148/ 0.000*
According to the Way of Taking Courses on Patient Safety				
Inside a Lesson	3.75±0.50	4.03±0.42	4.23±0.55	4.00±0.38
As a Separate Course	3.93±0.54	4.19±0.40	4.30±0.49	4.14±0.39
Z/p	-3.026/ 0.002*	-3.149/ 0.002*	-1.005/0.315	-2.835/ 0.005*

Z:Mann Whitney U, KW:Kruskal Wallis, Difference:Bonferroni *p<0.05

When the differences in the PSCSE Knowledge, Skill and Attitude sub-dimension factors according to sociodemographic characteristics were evaluated, a statistically significant difference was found in the scores of Factor 1 and 12 between the age group of 20-21 and 22 or above students ($p < 0.05$). Accordingly, these factors' scores of students who were aged 22 or above were statistically significantly higher than the students in the 20-21 age group (Table 4). There was a statistically significant difference between the year-3 and year-4 students in terms of the Factor 1, 3, 4, 5, 9, 10, 11 and 12 scores ($p < 0.05$). Year-4 students had statistically significantly higher scores on these factors compared to year-3 students (Table 4). There was a statistically significant difference among the universities studied in terms of the Factor 1, 4, 8, 9, 10, 11 and 12 scores ($p < 0.05$). The "Factor 1" scores of students studying at University A were determined to be statistically significantly lower than students studying at University B. The "Factor 4" scores of students studying at University A were determined to be statistically significantly lower than students studying at University C. The "Factor 9, 11 and 12" scores of students studying at University A were determined to be statistically significantly lower than students studying at Universities B and C. The "Factor 8" scores of students studying at University A were determined to be statistically significantly lower than students studying at University B. The "Factor 10" scores of students studying at University C were determined to be statistically significantly higher than students studying at Universities A and B (Table 4). There was a statistically significant difference between those who took courses on patient safety and those who did not in terms of the Factor 1, 2, 3, 4, 6, 7, 9, 10 and 12 scores ($p < 0.05$). Therefore, the scores of the students who took courses on patient safety were significantly higher than the students who did not (Table 4). There was a statistically significant difference between the students who took courses related to patient safety as a separate course and those who had courses related to patient safety included within a different course in terms of the Factor 1, 2, 7, 9, 11 and 12 scores ($p < 0.05$). Accordingly, the scores of the students who took courses related to patient safety as a separate course were significantly higher than those who had courses related to patient safety inside of another course (Table 4).

Table 4. Comparison of PSCSE Knowledge, Attitudes and Skills Sub-Dimension Factors According to Sociodemographic Characteristics (n=391)

	Patient Safety Competency Self-Evaluation Tool					
	Knowledge			Attitudes		
	Factor 1: Concept of the components of patient safety culture Mean±SD	Factor 2: Concept of error and cause analysis Mean±SD	Factor 3: Patient safety promotion/prevention strategy Mean±SD	Factor 4: Responsibility of health care professionals for patient safety culture Mean±SD	Factor 5: Error reporting and disclosing Mean±SD	Factor 6: The components of patient safety culture Mean±SD
Age						
20-21 years	3.76±0.55	3.51±0.76	4.36±0.62	4.30±0.63	3.94±0.78	4.38±0.67
≥ 22 years	3.79±0.56	3.68±0.70	4.36±0.60	4.31±0.61	3.98±0.74	4.32±0.68
Z/p	-0.813/0.416	-2.172/ 0.030*	-0.019/0.985	-0.035/0.972	-0.518/0.605	-0.826/0.409
Class						
Third year	3.71±0.55	3.60±0.74	4.27±0.63	4.23±0.63	3.86±0.78	4.31±0.68
Fourth year	3.87±0.54	3.60±0.72	4.48±0.56	4.40±0.59	4.08±0.71	4.39±0.67
Z/p	-2.611/ 0.009*	-0.443/0.658	-3.521/ 0.000*	-2.625/ 0.009*	-2.743/ 0.006*	-1.246/0.213
University						
A University ¹	3.69±0.46	3.59±0.69	4.24±0.72	4.17±0.65	3.97±0.77	4.28±0.72
B University ²	3.88±0.45	3.70±0.59	4.38±0.51	4.36±0.56	3.99±0.83	4.33±0.65
C University ³	3.80±0.66	3.56±0.84	4.46±0.53	4.39±0.61	3.93±0.71	4.41±0.65
KW/p	8.479/ 0.014*	1.683/0.431	5.119/0.077	11.025/ 0.004*	0.611/0.737	3.029/0.220
	1<2			1<3		
Status of Taking Courses on Patient Safety						
Yes	3.87±0.55	3.71±0.70	4.40±0.60	4.35±0.62	3.96±0.77	4.39±0.67
No	3.56±0.51	3.33±0.73	4.26±0.61	4.20±0.60	3.96±0.73	4.24±0.67
Z/p	-6.127/ 0.000*	-4.799/ 0.000*	-2.389/ 0.017*	-2.552/ 0.011*	-0.070/0.944	-2.248/ 0.025*
According to the Way of Taking Courses on Patient Safety						
Inside a Lesson	3.81±0.52	3.64±0.71	4.36±0.60	4.30±0.64	3.97±0.78	4.36±0.73
As a Separate Course	3.98±0.58	3.83±0.67	4.47±0.61	4.43±0.59	3.95±0.77	4.43±0.57
Z/p	-2.779/ 0.005*	-2.401/ 0.016*	-1.714/0.087	-1.679/0.093	-0.225/0.822	-0.184/0.854

Z:Mann Whitney U, KW:Kruskal Wallis, Difference:Bonferroni *: $p<0.05$

Table 4. Continued..

Patient Safety Competency Self-Evaluation Tool						
	Skills					
	Factor 7: Error reporting and response to an error Mean±SD	Factor 8: Communication related to error Mean±SD	Factor 9: Resource utilization/evidence based practiced Mean±SD	Factor 10: Safe nursing practice Mean±SD	Factor 11: Infection prevention Mean±SD	Factor 12: Precise communications during hand offs Mean±SD
Age						
20-21 years	3.66±0.61	4.00±0.54	3.74±0.57	4.12±0.56	4.43±0.55	4.14±0.59
≥ 22 years	3.69±0.65	3.97±0.59	3.77±0.63	4.15±0.57	4.50±0.54	4.29±0.62
Z/p	-0.985/0.324	-0.937/0.349	-0.887/0.375	-0.541/0.589	-1.658/0.097	-2.495/ 0.013*
Class						
Third year	3.69±0.57	3.98±0.57	3.69±0.57	4.07±0.56	4.41±0.53	4.16±0.61
Fourth year	3.66±0.69	4.00±0.57	3.84±0.62	4.22±0.55	4.53±0.54	4.30±0.61
Z/p	-0.123/0.902	-0.068/0.946	-2.413/ 0.016*	-2.722/ 0.006*	-2.856/ 0.004*	-2.131/ 0.033*
University						
A University ¹	3.64±0.64	3.89±0.56	3.61±0.61	3.96±0.53	4.27±0.55	4.05±0.61
B University ²	3.77±0.58	4.11±0.46	3.83±0.63	4.10±0.54	4.54±0.46	4.37±0.55
C University ³	3.65±0.65	4.00±0.62	3.85±0.55	4.30±0.55	4.59±0.53	4.28±0.62
KW/p	5.008/0.082	8.941/ 0.011*	13.787/ 0.001*	26.851/ 0.000*	32.750/ 0.000*	17.557/ 0.000*
		1<2	1<2,3	1,2<3	1<2,3	1<2,3
Status of Taking Courses on Patient Safety						
Yes	3.74±0.63	4.02±0.59	3.82±0.59	4.17±0.54	4.49±0.52	4.29±0.56
No	3.51±0.60	3.92±0.50	3.61±0.60	4.04±0.60	4.41±0.59	4.05±0.69
Z/p	-4.173/ 0.000*	-1.903/0.057	-3.345/ 0.001*	-2.122/ 0.034*	-1.125/0.260	-3.097/ 0.002*
According to the Way of Taking Courses on Patient Safety						
Inside a Lesson	3.65±0.64	3.97±0.57	3.75±0.56	4.13±0.53	4.43±0.56	4.23±0.57
As a Separate Course	3.89±0.59	4.09±0.62	3.94±0.63	4.25±0.55	4.60±0.43	4.40±0.53
Z/p	-3.410/ 0.001*	-1.875/0.061	-2.817/ 0.005*	-1.760/0.078	-2.352/ 0.019*	-3.097/ 0.002*

Z:Mann Whitney U, KW:Kruskal Wallis, Difference:Bonferroni *: $p<0.05$

DISCUSSION

One of the aims of nursing education is to provide students with an optimum level of patient safety competence before their graduation to provide qualified nursing care. Patient safety competence refers to the knowledge, skills, and attitudes that would reduce unnecessary medical risks, damages and errors (H. Jang & Lee, 2017; Kakemam, Ghafari, Rouzbahani, Zahedi, & Roh, 2022; Tella et al., 2014). In this study, which was conducted to evaluate the competencies of nursing students regarding patient safety, the knowledge, skills, and attitude scores of the students about patient safety were determined to be above moderate levels, and they had higher scores on attitudes about patient safety competence compared to their knowledge and skills scores. The results of some other studies in which the competencies of nursing students related to patient safety were evaluated show that, similar to our study, the students had higher attitude scores than their knowledge and skill scores (Kim, Yoon, Hong, & Min, 2019; S. E. Lee, Lee, Peters, & Gwon, 2020). Park (2019) and Huang et al. (2020) found that students' patient safety competencies (knowledge, skills and attitude) were at moderate levels. Moreover, in the study, the fact that whether the students took courses related to patient safety as a separate course or had courses related to patient safety included within a different course was seen to have a significant effect on patient safety competence. According to this result, it can be said that the fact that the students take courses on patient safety makes contributions to students to be familiar with patient safety, especially in the development of their attitudes that lead them to display more careful behaviours in practice. On the other hand, although the mean scores in the knowledge and skill dimensions were high, the fact that these scores were lower than the attitude mean score might be related to teaching methods. Therefore, teaching methods in which students can actively participate in classroom settings should be used more frequently for them to gain patient safety competence.

Another important finding of our study was that the students obtained lower scores on the "concept of error, reporting of errors and communication related to errors" than other factors. According to the results of the study conducted by Safarpour et al. (2017) to evaluate the patient safety attitudes, skills, knowledge, and barriers of nursing students regarding reporting medical errors, participants were found to have a positive attitude about reporting medical errors, however, they had low knowledge about medical errors and how to report them. In our study, the fact that the knowledge, skill, and attitude scores related to the concept of error and error reporting systems were lower than other factors might be due to the inability of students to observe the functioning of this situation and related systems in the clinical environment.

When the patient safety competence scores of the nursing students were evaluated according to the universities they studied, the total scale and the skill sub-dimension scores of the students studying at University A were determined to be statistically significantly lower. This might be due to the lack of a separate course on patient safety at University A. In other words, the fact that the presence of a separate course on patient safety in the curriculum of the students studying at universities B and C might have influenced the high scores of the students at these universities. The pre-post-test design study by Kim et al. (2019) showed a significant increase in students' patient safety competencies, including attitudes, skills, and knowledge. In their study conducted in three different nursing schools, Lee et al. (2020) determined that the scores of the students did not change according to the school they were studying (S. E. Lee et al., 2020). However, the studies emphasized that a systematic education program about patient safety should be included in the nursing curriculum (K. S. Jang, 2018) and this should start from the undergraduate level and continue after graduation (Murray, Sundin, & Cope, 2018).

In this study, the students who took the patient safety course were determined to have higher knowledge, skills and total scale scores, and the mean scores of the students who took courses related to patient safety as a separate course were higher than those who had the courses included within a different course. This finding supports the results of the studies showing the positive effect of patient safety training on patient safety competence (Jin & Yi, 2019; VanDenKerkhof, Sears, Edge, Tregunno, & Ginsburg, 2017; Yan, Yao, Li, & Chen, 2021). Furthermore, in this study, students who took a patient safety course had higher scores on the *Patient safety promotion/prevention strategy*, *Responsibility of health care professionals for patient safety culture* and *Concept of the components of patient safety culture* factors than those who did not. Undergraduate education is important in providing the next generation of nurses with patient safety skills suitable for the 21st century. Therefore, it is noted that the subject should be addressed from an early stage (Mansour, Al Shadafan, Abu-Sneineh, & AlAmer, 2018) and patient safety courses should be included in the undergraduate curriculum to create and maintain a

patient safety culture (Çiftcioğlu, Apaydın Cırık, & Efe, 2022). Taking a course on patient safety might be considered to have an effect on creating a patient safety culture in students. Furthermore, the students who took courses related to patient safety were found to have statistically significantly higher scores on the *Error reporting and response to an error*, *Resource utilization/evidence-based practice*, *Safe nursing practice*, and *Precise communications during handoffs* factors than those who did not. In parallel with this, the students who took courses related to patient safety as a separate course were found to have statistically significantly higher scores on the *Error reporting and response to an error*, *Resource utilization/evidence-based practice*, *Infection prevention*, and *Precise communications during handoffs* factors than those who had courses related to patient safety included within a different course. In the literature, error reporting and disclosing have been emphasized to be effective in increasing patient safety (Asem, Sabry, & Elfar, 2019), and in order to increase patient safety, students should have the confidence to recognize, disclose and respond to errors and wrong practices, and to communicate with others when necessary (Usher et al., 2017). The lack of effective communication between the patient, healthcare professionals and the family was reported as an important factor preventing patient safety in a qualitative study on what patient safety means for nursing students (Oliveira & Silva, 2022). Therefore, non-technical skills such as communication and teamwork (Wu & Busch, 2019) have also been emphasized as important skills in patient safety. Moreover, studies noted that combining theoretical learning with field-based (practical) learning is effective in improving the patient safety competence of the students (Ji et al., 2021; Marcomini, Destrebecq, Rosa, & Terzoni, 2022). The importance of the pedagogical atmosphere of the clinical setting has been highlighted (Bianchi et al., 2016) and it was noted that patient safety should be presented in the integrated nursing curriculum and through multiple learning methods, including simulations, assignments, readings and clinical experiences (S. E. Lee et al., 2020). It has also been pointed out that patient safety cannot be achieved with a one-sided action, due to the fact that it, directly and indirectly, includes many elements of management, education and care (Murray et al., 2018). Therefore, combined use of the indicated methods would be beneficial to improve patient safety competence.

In this study, year-4 students were found to have higher total scores on the whole scale and on the attitude sub-dimension compared to year-3 students. The scores of the year-2 and year-3 students were determined to be higher in the study of Kim et al. (2019), and an increase was found in their scores after the educational intervention (Kim et al., 2019). Toygar, Hançerlioğlu, and Gacaner (2020) mentioned in their study that the higher the education year of students goes, the higher their knowledge and patient safety competence become (Toygar, Hançerlioğlu, & Gacaner, 2020). Contrary to this finding, another study reported that year-3 students had higher scores than year-4 students (Amilia & Nurmalia, 2020). The higher scores obtained by the year-4 students in this study might be due to the fact that they have attended more courses, seminars or clinical practice related to the subject as a natural outcome of the educational process. Besides, year-4 students in one of the universities included in this study (C) continue their internships. Therefore, the fact that they were more likely to encounter patient safety practices in line with the time they spent in the clinical settings might have affected their scores. Similarly, having the opportunity to closely monitor the responsibilities of healthcare professionals regarding patient safety and their practices (reporting, etc.) during clinical practice might have affected the scores of the students.

Limitations

The following limitations should be considered in the interpretation of the research results. The first is that the study sample is selected from three different geographical regions, so it does not cover all (seven) geographical regions in Türkiye. Secondly, the participation rate in the research is not much higher than the average. For these reasons, the generalizability of the research results is limited. Third is that the scale used in the study is based on self-report. Another limitation is related to the sample selection of the study. The convenience sampling method and the participation of only volunteer students may have affected the results.

CONCLUSION

The patient safety competence of nursing students studying at three different universities in Türkiye was examined in this study and their patient safety competency levels were determined to be above moderate levels. The mean attitude score of nursing students was found to be higher than the mean knowledge

and skill scores. Students who were in year-4, those who were studying at universities B and C, those who were taking patient safety courses and those who were taking a course on patient safety as a separate course were found to have higher scores. In line with these results, it is recommended that patient safety training should be organized in a way to develop competencies and that teaching methods that would improve students' knowledge, attitudes and skills should be integrated into the curricula and the results should be evaluated.

Acknowledgement

The authors would like to thank all students who made this study possible.

Author Contributions

Plan, design: GEK, GB, SAŞ; **Material, methods and data collection:** GEK, GB, SAŞ; **Data analysis and comments:** GEK, SAŞ, GB; **Writing and corrections:** GEK, GB, SAŞ.

Conflict of interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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