Original Article

Safe provision of nursing care as predicted by nursing students: A cross-sectional study

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ABSTRACT

Background & Aim: Assessment of safety culture and nursing students' competencies in patient safety is essential for readiness to provide quality and safe care. The objectives of the study are to examine how nursing students perceive patient safety culture and to evaluate factors that may influence their perceptions.

Methods & Materials: A descriptive cross-sectional study was conducted using the Slovak version of the Hospital Survey on Patient Safety Culture for Nursing Students and the Questionnaire for Measuring Demographic Variables and Information on the Education Process. The study involved 242 nursing students from two faculties in Slovakia. Data were analyzed using descriptive and inferential statistics.

Results: None of the dimensions of patient safety culture was rated by the nursing students above the necessary level of 75 %. Statistically significant correlations and differences were found between the nursing students' perceptions of patient safety culture and some selected sociodemographic variables. Multiple regression analysis revealed significant associations between the nursing students' perceptions of patient safety culture and overall patient safety grade, the number of reported events in the workplace, and the number of reported events by nursing students.

Conclusion: Recognising nursing students' perceptions of patient safety culture enables identification of weaknesses, and early implementation of targeted interventions and educational initiatives to increase overall patient safety in care provision. Future research should focus on recognizing relationships between perceived patient safety culture, teamwork, education, and indicators of safe and quality care during clinical training from nursing students' perspective.

Introduction

Patient safety, as defined by the World Health Organization, is the prevention of harm to patients during healthcare processes (1,2). It encompasses various organized activities targeting culture, processes, behaviors, and technologies to mitigate risk factors and adverse events, ultimately reducing preventable harm and errors (2). Fostering and evaluating patient safety culture is crucial for improving patient safety (1), with this culture being shaped by social learning and collective behaviors of healthcare professionals.

The inclusion of patient safety and its culture in the nursing curriculum was recommended by the IOM as early as 1999. Similar recommendations were also issued by the World Health Organization (2), emphasizing the need to enhance skills and competencies in patient safety during students' education. Several researchers also agree that improving the education and clinical training of healthcare professionals during their studies is crucial to achieving adequate safety in healthcare facilities (3,4). The issue of patient safety culture is essential for nursing students as they are directly involved in providing nursing care during clinical training. Students acquire the necessary competencies, professional values, and value-based behaviors based on the norms and safety culture of their environment. Nursing students constitute a distinct subgroup of healthcare providers in the complex healthcare system. Their attitudes toward patient safety culture can highlight areas of strengths and weaknesses in both educational and clinical settings (5).

The goal of educational institutions is to help nursing students reflect on their knowledge and competencies in patient safety and prepare them to provide quality and safe care in various clinical settings. The nursing students' competencies in patient safety include six main areas: contributing to patient safety culture, teamwork, effective communication, managing safety risks, optimizing human and environmental factors, and recognizing and responding to adverse events (6). Nursing education involves training in specific areas of patient safety and subsequent regular assessment of knowledge, skills, and specific competencies related to patient safety acquired by students (7). Nursing students' perceptions of patient safety culture should be regularly assessed to analyze the consistency between university education about patient safety and clinical practice.

In hospitals, patient safety training is often ad hoc, driven by organizational needs like new hires or audits. Integrating principles of fair safety culture into education fosters trust and fairness. Students should feel assured of fair treatment when reporting near errors or patient safety incidents (8). In the European Union countries, patient safety is not consistently taught in nursing education, and teaching methods vary between theoretical and practical training. Nursing curricula should incorporate specific sections on patient safety, with educational methods tailored to both academic and practical settings (9). Assessing nursing students' safety competencies, including their perceptions of patient safety culture during clinical training, is crucial for reinforcing patient safety culture and gauging the effectiveness of educational methods. Such assessment helps identify areas for improvement, raise awareness among professionals, track safety changes, and compare results nationally and internationally (5). Based on the above-mentioned evidence, the present study aimed to report on the nursing students' perceptions of patient safety culture and factors that may influence their perceptions.

Methods

A descriptive cross-sectional study design was used to report on the nursing students' perceptions of patient safety culture and factors that may influence their perceptions. The present study was conducted in accordance with the STROBE checklist (10) and approved by the Ethics Committee of the Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava (EC no. 37/2023).

Sample

The sample consisted of 242 nursing students from two nursing faculties offering baccalaureate programs in nursing in the Slovak Republic. After being granted permission to conduct the study, undergraduate nursing students were approached using the purposive sampling method. Inclusion and exclusion criteria were formulated. Nursing students were included if they: a) completed at least one clinical placement in hospital setting; and b) provided informed consent. In contrast, nursing students were not included if they: a) were absent due to illness; or b) were on maternity leave.

Overall, 270 questionnaires were distributed while 242 were returned (return rate: 89.6 %). None of the questionnaires was excluded from the final analysis; therefore, the final number of questionnaires in the final analysis was 242.

Data collection

Data collection was carried out between September and December 2023 using the questionnaire set comprised of three instruments. Patient safety culture was assessed using the Slovak version of the Hospital Survey on Patient Safety Culture for Nursing Students (HSOPS-NS) (11). The instrument comprises 54 items divided into four sections (A-D). The main component consists of 49 items capturing nursing students' perspectives on specific aspects of their workplace environment, such as the assessment of patient safety culture in the hospital, workplace communication, and overall perceptions of patient safety. Additionally, there are five supplementary items covering general perceptions of patient safety, reported adverse events in the workplace, adverse events reported by students (or under supervision), awareness of reporting systems, and any additional comments regarding patient safety, errors, or reporting systems. Nursing students' perceptions are assessed using a 5-point Likert scale ranging from "strongly disagree" to

"strongly agree", while responses to additional items are recorded using a 10-point Likert scale or dichotomous options. The reliability of the HSOPS-NS in terms of its consistency was evaluated by the value of the Cronbach alpha coefficient (α). For the HSOPS-NS, α was 0.849.

Organization and student-level demographic variables were assessed for both sample description and regression analysis purposes. A questionnaire consisting of 21 items was utilized to measure demographic variables, educational program details, and current placement information. The characteristics encompassed individual student attributes such as age, gender, and marital status, educational program specifics like educational level, prior university and work experience, as well as year of study, along with placement details such as previous clinical rotations, unit and shift assignments, internship work hours, self-reported patient-to-nurse ratio, perceived staffing adequacy, clinical supervision, and work intensity metrics like patient and staff numbers per shift, as well as the number of newly admitted and discharged patients per shift, among others. In total, the questionnaire set comprised 75 items, combining 54 items from the HSOPS-NS, and 21 items related to organizational and student-level demographic variables.

Data analysis

Data were analyzed using descriptive and inferential statistics calculated using the IBM SPSS Statistics 25.0 statistical program. Missing data values ranged from 0.2 to 0.3 %, indicating the high acceptability of the questionnaire set. For the description of the sample and instruments' analysis, descriptive statistics (mean, SD, frequency) were used. Furthermore, associations between individual dimensions of patient safety culture and individual variables were tested using the Spearman correlation coefficient (r). Differences in rating patient safety culture based on selected categorical variables were analyzed using nonparametric tests, specifically the Mann-Whitney U test and the Kruskal-Wallis test. Nonparametric tests were used based on the results of the Kolmogorov-Smirnov normality test ($p < .001$) indicating that the data were not normally distributed.

To determine predictors of the outcome dimensions of the HSOPS-NS (overall perceptions of patient safety, number of events reported, number of events reported by nursing students), multiple regression analysis was performed. The dimensions were considered dependent variables and the dimensions of patient safety culture represented independent variables. The results were tested at the significance level of $p \leq 0.05$.

Results

The sample consisted of 242 nursing students from two nursing faculties in the Slovak Republic. The sample characteristics are reported in Table 1.

Table 1. Sample characteristics (N= 242)

Variables		N	%
Unit type	Surgical	62	27.7
	Anaesthesiology/Intensive Care Unit	74	33.0
	Medical	33	14.7
	Other	55	24.6
Year of study	Second	100	41.5
	Third	141	58.5
Form of study	Full-time	194	81.2
	Part-time	45	18.8
Previous work experience in healthcare	Yes	114	47.1
	No	128	52.9
Perceived staff adequacy	0 % of the time (inadequate)	12	5.1
	25 % of the time	26	11.0
	50 % of the time	68	28.7
	75 % of the time	84	35.4
	100 % of the time (adequate)	47	19.8
Responsibility for student	Nurse/clinical nurse	51	21.6
	Head nurse/coordinator nurse	51	21.6
	Nurse teacher/clinical tutor	79	33.5
	Nurse educator/lecturer (employee of the university)	27	11.4
	Nursing staff/nursing team	28	11.9

Variables		N	%
Outcome expectations	Not at all (unmet expectations)	26	11.1
	Enough	93	39.6
	Greatly	89	37.9
	Very greatly (met expectations)	27	11.5
Variables		**M**	**SD**	**Range**

Variables	M	SD	Range
Age	24.09	7.28	20-54
Number of hours of clinical training/week	22.76	13.55	4.5-64
Number of patients/last shift	13.36	6.20	1-35
Number of newly admitted patients/shift	2.23	1.99	0-9
Number of discharged patients/shift	1.84	1.82	0-9
Number of nurses/last shift	3.10	1.31	1-9
Number of nursing assistants/last shift	1.39	1.02	0-6
Number of physicians/last shift	2.78	1.60	0-8
Number of students/last shifts	2.28	2.28	0-10

M: mean, SD: standard deviation

Nursing students' rating of patient safety culture

The overall patient safety grade was rated relatively positively (6.97±1.76) by the nursing students. The nursing students indicated the low number of events reported during clinical placement (0.94±1.65), up to 10 events; and, similarly, they stated the low number of events reported by students themselves (0.19 ±0.71), up to five. The nursing students perceived "Nonpunitive responses to errors" (2.88±0.78; 28.9%) as the least positive, while they achieved the highest scores in the subscale "Communication openness" (3.46±0.72; 55.2%). Nevertheless, none of the dimensions of patient safety culture was rated by the nursing students above the necessary level of 75 % as recommended by the AHRQ (12). The description of all the dimensions of patient safety culture is reported in Table 2.

Table 2. Dimensions of patient safety culture

Safety culture dimensions	M ± SD	Positive responses %
Teamwork within units	3.42 ± 0.75	50.1
Supervisor/manager expectations & actions promoting patient safety	3.46 ± 0.74	51.1
Organizational learning/continuous improvement	3.33 ± 0.70	44.9
Management support for patient safety	3.25 ± 0.69	42.5
Overall perceptions of patient safety	3.45 ± 0.60	47.8
Feedback & communication about error	3.34 ± 0.76	46.9
Communication openness	3.46 ± 0.72	55.2
Frequency of events reported	3.02 ± 0.97	33.3
Teamwork across units	3.16 ± 0.62	37.8
Staffing	2.94 ± 0.64	31.6
Handoffs & transitions	2.96 ± 0.41	33.2
Nonpunitive responses to errors	2.88 ± 0.78	28.9
Indicator of good praxis	3.33 ± 0.66	38.9

Correlations between patient safety culture and individual variables

Weak but statistically significant correlations were found between the ratings of patient safety culture and selected sociodemographic variables (age, number of patients/shift, number of newly admitted patients, number of nurses/shift, number of nursing assistants/shift). With the increasing age of nursing students, as well as the increasing number of nurses and nursing assistants during the most recent shift, evaluation of patient safety culture also increases. In contrast, patient safety culture increases with the decrease in the number of patients in the shift, as well as in the number of newly admitted patients (Table 3).

Differences in rating patient safety culture based on selected variables

Differences in rating patient safety culture based on selected variables (unit type, year of study, form of study, previous experience

in health care, perceived staff adequacy, responsibility for student, and outcome expectations) were analyzed in the present study. Statistically significant differences were found out between patient safety culture and year of study, with better scores for Teamwork within units (M_{rank}= 136.63; p= 0.002), and Organizational learning/continuous improvement (M_{rank}= 132.99; p = 0.014) by the students in their second year of study. The part-time students also rated the following patient safety culture dimensions better: Overall perceptions of patient safety (M_{rank}= 137.08; p= 0.047), Feedback & communication about error (M_{rank}= 143.13; p= 0.012), Communication openness (M_{rank}= 139.04; p= 0.038), Frequency of events reported (M_{rank} = 149.77; p = 0.001), and Indicator of good praxis (M_{rank} = 144.36; p = 0.009). The students with previous experience in health care achieved better scores in Staffing (M_{rank} = 135.43; p= 0.001). Additionally, the students who had their past clinical placement in intensive care units rated Overall perceptions of patient safety (M_{rank} = 124.89; p= 0.028) better.

The students who perceived that staffing was fully adequate also rated Teamwork within units (M_{rank} = 147.28; p = 0.003) and Indicator of good praxis (M_{rank}= 144.18; p= 0.011) better. Moreover, the students who were supervised by the nurse manager during their clinical placements also achieved better scores in the patient safety culture dimension of Teamwork within units (M_{rank} = 142.88; p= 0.016). Finally, the students whose expectations of clinical placement were greatly met rated the following patient safety culture dimensions better: Teamwork within units (M_{rank}= 150.04; p= 0.001), Supervisor/manager expectations & actions promoting patient safety (M_{rank}= 154.96; p < 0.001), Organizational learning/continuous improvement (M_{rank} = 142.94; p= 0.002), Overall perceptions of patient safety (M_{rank} = 152.15; p< 0.001), Communication openness (M_{rank}= 131.85; p= 0.004), Teamwork across units (M_{rank}= 132.15; p= 0.034), Nonpunitive responses to errors (M_{rank} = 156.71; p= 0.015), and Indicator of good praxis (M_{rank}= 133.98; p= 0.005).

Table 3. Correlations between the Patient safety culture dimensions and selected sociodemographic variables (N=242)

Dimensions of the PSC	Age	Number of hours of clinical practice/week	Number of patients/shift	Number of newly admitted patients	Number of discharged patients	Number of nurses/shift	Number of nursing assistants/shift	Number of physicians/shift	Number of students/shift
PSC1	-0.017	-0.115	-0.049	0.055	0.105	0.040	0.078	-0.001	-0.034
PSC2	0.004	-0.081	-0.171*	0.014	0.062	0.147*	0.195**	0.045	-0.012
PSC3	-0.029	-0.113	-0.085	0.024	0.003	0.059	0.131*	-0.012	-0.029
PSC4	-0.092	-0.069	-0.012	0.022	0.002	-0.010	0.125	0.015	0.042
PSC5	0.043	-0.053	-0.275**	0.006	-0.009	0.074	0.043	-0.069	-0.112
PSC6	0.061	-0.128	-0.167*	0.067	-0.014	0.046	0.046	0.006	-0.116
PSC7	0.026	-0.053	-0.063	-0.020	0.044	0.047	0.045	0.085	0.006
PSC8	0.142*	0.013	0.007	-0.009	-0.017	-0.093	-0.022	-0.027	-0.091
PSC9	-0.042	-0.109	-0.008	-0.149*	-0.105	0.105	0.107	0.042	-0.039
PSC10	0.098	-0.001	-0.126	-0.092	-0.001	-0.026	-0.035	-0.058	-0.066
PSC11	-0.115	0.037	0.066	-0.076	0.033	0.049	0.112	0.008	0.006
PSC12	0.111	0.107	-0.109	0.051	0.117	-0.027	-0.019	-0.046	-0.082
PSC13	0.094	-0.031	-0.054	0.021	0.101	-0.085	-0.085	-0.055	-0.097

PSC1 - Teamwork within units; PSC2 - Supervisor/manager expectations & actions promoting patient safety; PSC3 - Organizational learning/continuous improvement; PSC4 - Management support for patient safety; PSC5 - Overall perceptions of patient safety; PSC6 - Feedback & communication about error; PSC7 - Communication openness; PSC8 - Frequency of events reported; PSC9 - Teamwork across units; PSC10 – Staffing; PSC11 - Handoffs & transitions; PSC12 - Nonpunitive responses to errors; PSC13 - Indicator of good praxis
* p<0.05; ** p<0.01

Predictors of patient safety culture

Multiple regression analysis was used to examine the association between patient safety culture dimensions and overall patient safety grade, the number of reported events in the workplace, the number of events reported by nursing students, the level of teamwork, and the perception of unfinished nursing care (Table 4). Model 1 (R^2= 0.383; Adj R^2= 0.347; F= 10.780; p< 0.001) revealed that three dimensions of patient safety culture (Teamwork

within units; Organizational learning/continuous improvement; Indicators of good praxis) explained 34.7 % of the variability in the overall degree of patient safety. Model 2 ($R^2= 0.102$; Adj $R^2= 0.047$; F= 1.849; p= 0.038) revealed a significant association between one dimension of the patient safety culture (Overall perceptions of patient safety) and the number of events reported during the clinical placement of nursing students. This dimension of patient safety culture explained 4.7 % of the variability in the number of events reported

during the clinical placement of nursing students. Model 3 ($R^2= 0.114$; Adj $R^2= 0.059$; F= 2.076; p= 0.017) revealed a significant association between one dimension of patient safety culture (Management support for patient safety) and the number of events reported by nursing students themselves during the clinical placement. This dimension of patient safety culture explained 5.9 % of the variability in the number of events reported by nursing students themselves during the clinical placement.

Table 4. Predictors of the perception of individual PSC dimensions (N=242)

PSC dimensions	Overall patient safety grade		Number of events reported		Number of events reported by NS	
Model	($R^2 = 0.383$; Adj $R^2= 0.347$; F= 10.780; p <0.000)		($R^2 = 0.102$; Adj $R^2= 0.047$; F= 1.849; p = 0.038)		($R^2 = 0.114$; Adj $R^2= 0.059$; F= 2.076; p = 0.017)	
	β	p	β	p	β	p
(Constant)	-	<0.000**	-	0.003	-	0.045
PSC1	0.208	0.004*	-0.145	0.101	-0.107	0.222
PSC2	0.056	0.415	0.110	0.198	0.149	0.080
PSC3	0.217	0.003**	0.003	0.970	-0.163	0.066
PSC4	-0.020	0.714	0.055	0.428	0.180	0.009*
PSC5	-0.020	0.910	-0.230	0.005*	-0.145	0.076
PSC6	-0.007	0.400	0.083	0.360	0.091	0.319
PSC7	-0.060	0.233	-0.038	0.677	-0.006	0.950
PSC8	0.086	0.933	0.138	0.076	0.042	0.583
PSC9	-0.005	0.700	0.137	0.072	0.001	0.985
PSC10	0.023	0.308	0.011	0.884	-0.101	0.178
PSC11	0.061	0.532	-0.058	0.408	0.030	0.671
PSC12	0.062	0.295	-0.051	0.498	0.052	0.483
PSC13	0.259	p <0.000**	-0.028	0.755	0.076	0.396

Legend: β (Standardized Beta coefficient); Sig. (significance)
PSC1 - Teamwork within units; PSC2 - Supervisor/manager expectations & actions promoting patient safety; PSC3 - Organizational learning/continuous improvement; PSC4 - Management support for patient safety; PSC5 - Overall perceptions of patient safety; PSC6 - Feedback & communication about error; PSC7 - Communication openness; PSC8 - Frequency of events reported; PSC9 - Teamwork across units; PSC10 – Staffing; PSC11 - Handoffs & transitions; PSC12 - Nonpunitive responses to errors; PSC13 - Indicator of good praxis
* $p \leq 0.05$ **$p < 0.001$

Discussion

The present study aimed to report on the nursing students' perceptions of patient safety culture and factors that may influence their perceptions. Recognizing nursing students' perspectives allows educators and healthcare institutions to identify areas of weakness in patient safety culture.

Patient safety culture among nursing students

Safety culture is a fundamental prerequisite for improving the quality of nursing care. In the present study, the nursing students rated the overall level of patient safety in their

clinical placements as acceptable, which is consistent with several other studies (13). Additionally, adverse events were minimally reported during the clinical placements of the students. Even fewer adverse events were reported by the students themselves. The students also stated that errors not leading to patient harm were not documented. In the study by Li et al. (14), up to 87.1 % of nursing students stated that adverse events such as medication errors, patient identification errors, dosing errors, and infusion rate errors were rare and did not result in negative patient outcomes. When asked to report the number of adverse events during their practice at the end of the academic year, one-third of the students reported no incidents, and only a few

reported more than one. This indicates that students are afraid to report adverse events and fear the consequences and guilt after reporting them (8).

The research results of the present study indicate that the nursing students' perceptions of patient safety culture dimensions align with those reported by Slovak nurses (15,16). Achieving a score of 75 % or more positive responses indicates an optimal level of safety culture. In the present study, the percentage of positive responses was lower than the recommended 75 % AHRQ threshold in all the dimensions (12). It is reported that if students acquire such information in advance, it positively influences their perceptions of patient safety (5).

In terms of the patient safety culture dimensions, the students in the present study positively evaluated "Communication openness" and "Supervisor/manager expectations & actions promoting patient safety". Internationally, it has been confirmed that students consider open communication and adequate practice management and supervision in clinical training as the most significant.

Globally, various instruments for measuring patient safety culture during clinical placements of nursing students being used, the dimensions related to clinical safety aspects and effective communication achieved the highest scores (8,17,18). However, the dimensions related to clinical safety primarily include topics focused on infection prevention and safe medication administration procedures, thus not falling directly into the sociocultural aspects of patient safety (17). For example, infection prevention was best rated in terms of skills, while the attitudes dimension was best rated in terms of the patient safety culture concept in Cyprus (19). Infection prevention as a significant component of nursing students' skills was also confirmed in Turkey (20). Clinical safety aspects were also best rated in China, where students also rated the risk management dimension the highest (6). Among sociocultural aspects of safety, effective communication was, similar to the results of the present study, the best-rated dimension in Turkey (21), Italy (4), and in the previous Slovak study using the same tool – the HSOPS-NS (22). In Italy and Saudi Arabia, the nursing students rated

the dimensions related to understanding human and environmental factors higher (3,4). Among other positively rated dimensions, there were stress recognition, perception of management, and job satisfaction in China (5), teamwork within units in Spain (11), and environmental care and employee behavior in Turkey (23).

Furthermore, the dimensions negatively rated in the present study were "Staffing" and "Nonpunitive responses to errors". It has been shown that inadequate staffing negatively impacts patient safety. However, the shortage of nurses remains a global issue, often leading to underreporting of adverse events (22). The students also negatively rated the items related to the use of punitive measures for errors and, conversely, highlighted the use of nonpunitive measures for reporting adverse events in clinical practice. The hospital environment is perceived as repressive, placing an emphasis on individual accountability for adverse events without considering the entire system and organizational failures (16).

The students also expressed high agreement with the items indicating ineffective information exchange, especially during patient handovers, which can be influenced by lack of experience, inefficient communication, and lack of communication skills. A good work environment for nurses is characterized by a favorable nurse-patient ratio, good communication and teamwork with physicians, competent managers, and hospital management support, enabling nurses to provide effective patient care (24). In the national and international studies, the dimensions related to adverse events and their management were evaluated as the least positive, for example in Cyprus (19) Turkey (20), Slovakia (22), and Spain (11). Nursing students in Egypt achieved the lowest scores in the areas related to supervision/management, communication, and frequency of reported adverse events (25). Other dimensions with low scores across countries were teamwork (5), and employee training (23).

Factors influencing patient safety culture evaluation among nursing students

One of the main factors influencing the perception of patient safety culture related to nursing students was age, with most studies

showing that older students generally rate patient safety, including the selected dimensions, better (19,26). Overall, the progress in nursing students' knowledge tends to increase over the years (3), which is in line with the results of the present study. However, in some studies, patient safety culture was rated better by younger students (22). Differential perceptions of patient safety culture may be due to lower-year students having less insight into their skills and abilities, while older, more experienced students better understand the concept of patient safety and what is important in providing safe nursing care (27). Additionally, according to the year of study, the authors' findings differ, with several studies suggesting that students' self-assessment decreases as they progress through their studies (3). In the present study, the second-year students rated patient safety culture better compared to the third-year students. However, other studies refute this claim, stating that senior students tend to rate their knowledge, skills, or attitudes towards patient safety (4,27) or certain dimensions (8) more positively. Stevanin et al. (4) also point out the most hazardous clinical training environment among second-year students.

Various factors related to clinical training significantly disrupt nursing students' assessment of their knowledge, skills, or attitudes toward patient safety. According to our findings, dimensions "Teamwork within units", "Organizational learning/continuous improvement" and "Indicators of good praxis" predict students' rating of overall patient safety. Responsibility for students (22,26), team culture and communication within departments (26), as well as previous experience in providing nursing care (5) also significantly influenced assessments in the present study. For example, the studies indicate that mentors in clinical practice are role models and teachers for students in providing quality and individualized nursing care with an emphasis on patient safety. Effective communication, feedback, and ongoing interaction between mentors and students during clinical placements are considered integral parts of the educational process in clinical practice (28). In this context, we can state that the COVID-19 pandemic also affected nursing students. During that period, students required more psychosocial support and regular contact with their supervisors. Changes in placement in clinical wards and overwhelmed mentors dealing with COVID-19 issues contributed to this frustration (29). Students felt the need to discuss their concerns weekly but found limited opportunities for communication in the clinical setting.

Additionally, the recent Slovak study also revealed a factor related to the current clinical placements, with students in intensive care units rating selected dimensions of patient safety culture better (22), which is in line with the results of the present study. Educational institutions should strive for effective placement of students among clinical wards. The study by Aiken et al. (24) states that working conditions or the work environment are related to patient safety and quality of nursing care. The essence of workplace safety climate lies in the organization's commitment to safety. When students feel confident in their workplace, they engage proactively in learning, utilize resources effectively, and strive to achieve their educational goals (5).

The factors influencing nursing students' perspectives of patient safety culture related to the workload as represented by perceived staff adequacy and the number of patients and staff during clinical placements. Nursing students may perceive that adequate staffing levels contribute to the delivery of high-quality patient care. Similarly, students may feel more confident in their ability to provide comprehensive and timely care to patients, which can enhance their perception of patient safety culture (30). Additionally, adequate staffing levels can enhance the learning experience for nursing students during their clinical placements, so they have more opportunities for mentorship and engagement in patient care activities (28). In contrast, inadequate staffing levels can lead to increased workload, fatigue, and stress among nursing staff as perceived by nursing students, which may compromise patient safety (29).

Study limitations

While the structure of the cross-sectional study provides valuable preliminary insights into nursing students' perspectives on patient safety culture and factors that influence them, it is imperative to interpret these results carefully considering inherent constraints. These limitations encompass potential biases like selection bias and social desirability bias. Despite offering valuable

insights, the study's small sample size restricts the applicability and strength of the findings. Future studies employing larger and more diverse samples would mitigate these limitations and offer a more thorough comprehension of the association between patient safety culture and selected variables including teamwork and unfinished nursing care during clinical placements of nursing students.

Conclusion

The study aimed to report on the nursing students' perceptions of patient safety culture and factors that may influence their perceptions. Accurate perceptions of safety culture are a fundamental prerequisite for improving the quality of nursing care. As perceived by nursing students during their clinical training, an overall level of patient safety is acceptable and the occurrence of adverse events is minimal; however, adverse events go often undocumented and unreported. Nursing students must be educated about patient safety in advance, both in academic settings and during their clinical placements. From the students' perspective, communication, adequate practice management, and supervision are the most significant in education on safe care. On the other hand, nursing students perceive staffing and using punitive responses to errors negatively. The findings suggest the need to increase students' competence in perceptions of patient safety culture, management, and reporting adverse events, as well as professional communication and teamwork. Furthermore, it is important to consider the factors that influence students' perceptions of patient safety culture, including clinical settings and adequate staffing levels for better training, coordination, teamwork, and more effective communication. Recognizing nursing students' perspectives enables the identification of weaknesses in patient safety culture and allows early implementation of targeted interventions that require a multifaceted approach.

Acknowledgment

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