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Patient Safety Competencies of Nursing Students at a Tertiary Care Hospital in Pakistan: A Cross-Sectional Study

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ABSTRACT

Background: Patient safety is defined as the reduction of the risk of unnecessary harm associated with healthcare in an acceptable way. It is a paramount global concern in healthcare, with large numbers of patients continuing to experience avoidable harm in healthcare settings. Objective: To assess the knowledge of students' nurses regarding patients' safety. Methods: A descriptive cross sectional study was conducted from May to July, 2025 at a public sector tertiary care institute in Karachi, Pakistan. Students enrolled in the Bachelor of Science in Nursing (GBSN) from the 2nd to the 8th semester were included while the students of 1st semester, GBSN and Post-RN, were excluded from the study. The data was gathered by using an open access, validated questionnaire, named "Health Professionals Education in Patient Safety Survey (H-PEPSS)". The sample size was 240, calculated by using Power Analysis and Sample Size (PASS) version 21.0.3. A convenient sampling technique was applied. Data was analyzed by using SPSS version 27.0 Ethical approval was obtained from the designated organization's Institutional Research committee. A written informed consent was taken from all participants. Results: 82.1% of students attended patient safety training. Statistically, significant differences ($p < 0.05$) were found between perceptions of classroom instruction and clinical experience. A significant majority of students (85%) strongly agreed regarding their boundaries and duties of the patient safety in the clinical setting. Conclusion: Students showed an understanding of patient safety concepts, their capacity to apply these procedures effectively may be impacted by the inconsistent clinical exposure.

INTRODUCTION

Patient safety itself is defined as the reduction of the risk of unnecessary harm associated with healthcare to an acceptable minimum. Patient safety is a paramount global concern in healthcare, with large numbers of patients continuing to experience avoidable harm in healthcare settings(1). This harm is estimated to be the 14th leading cause of disease burden worldwide, accounting for approximately 15% of total hospital expenditure and activities (2). Nurses play a critical role in ensuring patient safety due to their constant, 24-hour care of hospitalized patients therefore nurses must be better prepared to deliver safe care and prevent patient's harm (3, 4). As the vital role of nurse's role in patient's safety has been recognized. Furthermore, there has been a growing emphasis since the beginning of the new digital era on educating future health professionals, including nursing students, with the necessary knowledge, skills, and attitudes to improve their patient safety competencies(5, 6). Many nursing students report a lack of understanding of patient safety principles and feel incompetent, indicating a significant gap between what they learn in the classroom and its application in clinical practice (7, 8). Patient safety education is frequently implicit rather than explicit, potentially leading to confusion or a failure to meet safety competency standards. As the evidences urged, the need of assigning an important part of patient's safety in the curriculum and nursing degree curricula around the world often do not assign sufficient importance to patient safety competencies (9). Patient safety includes safety of cultural values, belief, and medication safety and infection control. In low- and middle-income countries (LMICs), unsafe patient care remains a leading cause of death and disability, with a higher incidence of adverse events. However, the high-income countries somehow overcome this issue. Patient safety is an emerging concern in healthcare education in these regions, and formal, in-person patient safety training in medical and nursing curricula is a relatively new development (10).

The factors involved in poor patients' safety are exacerbated by students' reluctance to report adverse events, often due to fear of consequences, blame, or their perceived lack of authority as students. The quality of the clinical learning environment, including the safety culture and the role of clinical tutors, also significantly influences students' attitudes and ability to internalize patient safety concepts, Furthermore, a lack of faculty and clinical preceptor expertise has been identified as a barrier to effective patient safety teaching(11). However, the differing power dynamics in LMIC healthcare settings, where physicians often hold leadership, can make other health professionals more vulnerable to blame, and nursing curricula historically emphasize skill development over a broader biomedical focus. Patient

safety is an emerging concern in healthcare education in these regions, and formal, in-person patient safety training in medical and nursing curricula is a relatively new development(12). Recent initiatives in Pakistan have seen the introduction of patient safety courses at large academic medical centers, demonstrating improvements in student knowledge and systems thinking skills (13). Furthermore, one of study assessed the high alert medication safety among nurses reported that most of the nurses have poor knowledge(14). Current statistics indicate the alarming situation and crucial need of actions to be taken in this regard. This study aimed to assess the knowledge of students' nurses regarding patients' safety.

METHODOLOGY

A descriptive cross sectional study design was used to conduct the study at a public sector tertiary care institute in Karachi, Pakistan. The study was completed within three months from May to June, 2025 after the approval from the designated institute. Students enrolled in the BS Nursing program from the 2nd to the 8th semester were included because all those students were performing clinical duties. Students from the 1st semester, GBSN and Post-RN programs were excluded because 1st semester students have no clinical placements while post-RN students already worked as registered staff nurses.

The data was gathered by using an open access, validated questionnaire, named Health Professionals Education in Patient Safety Survey (H-PEPSS). It was developed by Liane R. Ginsburg, Evan Castel, and Deborah Tregunno with reported reliability ranging from 0.63 to 0.91 (13). The tool consisted of 4 domains: 1) Learning about specific patient safety content areas, (with seven subdomains) 2) How broader patient safety issues are addressed in health professional education 3) Comfort speaking up about patient safety 4) Demographic information regarding the study subject. A 5-point Likert rating scale was used for responses where 1-Strongly Disagree, 2-Disagree, 3-Neutral, 4- Agree, 5-Strongly Agree. The sample size was calculated by using PASS version 21. 0.3. A sample size 240 determined, based on a one-sample t- test considering a previous study effect size 3.5±0.55 (5). A convenient sampling technique was applied to collect the data from the study subject. Ethical approval was obtained from the designated institute's Institutional Research committee Ref NO. JPMC/29/05/2025. A written informed consent was taken from all participants. The consent form included the study's objectives and participants were also informed regarding their right to withdraw at any point without any penalty. Participant's confidentiality was maintained; all written documents were securely stored by the primary author. Data were analyzed by using SPSS version 27. Descriptive statistics were used to summarize

the data. Wilcoxon Signed Rank Test was applied to assess the association between H-PEPSS scores across classroom and clinical Settings.

RESULTS

A total of 240 participants were included in the study. Most of the respondents (54.2%) were aged between 20 and 22 years, followed by 33.8% who were between 23 and 25 years. Participants under the age of 20 accounted for 8.8%, while only 3.3% were 26 years or older. Regarding academic progression, 38.3% were in their 7th semester, 32.1% were in the 3rd semester, and 29.6% were in the 5th semester. In terms of exposure to patient safety training, 82.1% of the participants reported having attended such training, while 17.9% had not. When asked about their clinical experiences, a substantial proportion (95.4%) indicated that they had observed medical or nursing errors during their clinical placements, whereas only 4.6% had not witnessed any such incidents. Among those who had observed errors, 68.8% reported that they had informed a clinical educator or instructor, while 31.3% admitted that they did not report the error. Additionally, 76.3% of respondents stated that they had reported an error to hospital staff at some point, while 23.8% had never done so. Reporting of peer-related errors was also noted; 71.7% of participants reported that they had previously reported an error committed by a fellow student, whereas 28.3% had not.

TABLE NO 1: DEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANTS (N=240)

Variable	F (%)
Age	
Under 20	21 (8.8)
20-22	130 (54.2)
23-25	81 (33.8)
26 and above	8 (3.3)
Current Semester	
3rd Semester	77 (32.1)
5th Semester	71 (29.6)
7th Semester	92 (38.3)
Have you attended any patient safety training?	
Yes	197 (82.1)

No	43 (17.9)
Have you observed any medical or nursing errors during your clinical placement?	
Yes	229 (95.4)
No	11 (4.6)
If yes to the above, did you report the error to a clinical educator or instructor?	
Yes	165 (68.8)
No	75 (31.3)
Have you ever reported a medical or nursing error to hospital staff?	
Yes	183 (76.3)
No	57 (23.8)
Have you ever reported an error committed by a peer student?	
Yes	172 (71.7)
No	68 (28.3)

Table 2 presents a comparison of median scores across seven patient safety domains between classroom-based and clinical learning environments, as rated by nursing students. The analysis used the Wilcoxon Signed-Rank Test to assess differences in paired ordinal data, given the non-parametric distribution of responses. Across most domains, median scores were significantly higher in the classroom setting compared to the clinical setting, suggesting a perceived drop in patient safety competence when students transition from theoretical learning to practice-based environments. Clinical Safety had the most notable difference, with a classroom median of 4.25 (IQR = 0.75) versus a clinical median of 4.00 (IQR = 1.00), and a highly significant difference ($p < 0.001$). Agreement rates also dropped from 86.87% to 77.5%. Culture of Safety showed a similar pattern, with a significant reduction in median score (4.00 to 3.75, $p < 0.001$) and a marked decline in agreement levels (from 84.06% to 64.06%), indicating students perceive weaker safety culture in clinical settings. For Working with Other Health Care Professionals (HCPs), classroom scores remained higher (4.00 vs. 3.83; $p < 0.001$), with a drop in strong agreement from 82.98% to 73.12%. Domains such as Communicating Effectively and Managing Safety Risk showed no statistically significant differences between settings ($p = 0.094$ and $p = 0.178$, respectively), suggesting relative consistency in students' confidence or experience across environments. Understanding Human and Environmental Factors yielded a significant difference ($p = 0.002$), with agreement dropping from 85.27% in the classroom to 75.55% in the clinical setting. Finally, the domain Recognizing and

Responding to Adverse Events and Close Calls also declined significantly (p = 0.007), from a median of 4.00 to 3.75, and agreement rates fell from 75.31% to 67.71%.

TABLE 2: H-PEPSS DOMAIN SCORES REFLECTING NURSING STUDENTS' CONFIDENCE IN PATIENT SAFETY ACROSS CLASSROOM AND CLINICAL SETTINGS

Patient Safety Domain	Setting	Median (IQR)	p-value~	Agree/ Strongly Agree
Clinical Safety	Classroom	4.25 (0.75)	**<0.001**	86.87%
	Clinical	4.00 (1.00)		77.5%
Culture of Safety	Classroom	4.00 (0.75)	**<0.001**	84.06%
	Clinical	3.75 (1.00)		64.06%
Working with other HCP	Classroom	4.00 (0.63)	**<0.001**	82.98%
	Clinical	3.83 (0.67)		73.12%
Communicating effectively	Classroom	4.33 (0.67)	0.094	88.33%
	Clinical	4.33 (0.67)		85.5%
Managing Safety Risk	Classroom	4.00 (0.67)	0.178	87.5%
	Clinical	4.00 (1.00)		83.19%
Understanding human and environmental factors	Classroom	4.00 (0.67)	**0.002**	85.27%
	Clinical	4.00 (1.00)		75.55%
Recognize, respond to adverse events and close calls	Classroom	4.00 (0.75)	**0.007**	75.31%
	Clinical	3.75 (0.50)		67.71%

~ Wilcoxon Signed Rank Test

Table 3 presents student responses on how broader patient safety issues are addressed in their health professional education. A significant majority of students (85%) agreed or strongly agreed that they clearly understood the boundaries of what was safe for them to do in the clinical setting. Similarly, 80.4% reported consistency in how different preceptors addressed patient safety issues, though 13.8% were neutral on this point. When asked about opportunities to engage with interdisciplinary teams, 69.2% agreed or strongly agreed that they had sufficient exposure, although nearly one in five students (18.3%)

remained unsure. In terms of understanding the importance of reporting adverse events and near misses, 78.7% felt they had gained a solid grasp of how such reporting can help prevent future errors. Patient safety appeared to be well integrated into the overall curriculum according to 86.7% of students, with only a small fraction expressing disagreement or uncertainty. Regarding the clinical aspects of patient safety—such as hand hygiene, patient transfers, and medication safety, 88.3% of students felt these topics were adequately covered. Likewise, 87.5% agreed or strongly agreed that the program also addressed broader "system-level" safety issues, including organizational policies, management, resources, and communication processes.

TABLE NO 3: BROADER PATIENT SAFETY ISSUES ARE ADDRESSED IN HEALTH PROFESSIONAL EDUCATION

Patient Safety	Strongly Disagree	Disagree	Neutral/ Unsure	Agree	Strongly Agree
Clarity on Safe Scope of Practice	2(0.8)	13 (5.4)	21 (8.8)	131 (54.6)	73 (30.4)
Consistency Among Preceptors on Safety Issues	1 (0.4)	13 (5.4)	33 (13.8)	154 (64.2)	39 (16.2)
Opportunities for Interdisciplinary Learning	11 (4.6)	19 (7.9)	44 (18.3)	114 (47.5)	52 (21.7)
Understanding the Value of Reporting Events	9 (3.8)	13 (5.4)	29 (12.1)	140 (58.3)	49 (20.4)
Integration of Patient Safety in Curriculum	1 (0.4)	5 (2.1)	26 (10.8)	118 (49.2)	90 (37.5)
Coverage of Clinical Safety Practices	3 (1.2)	7 (2.9)	`18 (7.5)	113 (47.1)	99 (41.2)
Coverage of System-Level Safety Factors	2 (0.8)	2 (.8)	26 (10.8)	116 (48.3)	94 (39.2)

Table 4 focuses on students' comfort and speaking up about patient safety concerns. The majority (82.1%) agreed that when adverse events are discussed in clinical settings, the focus is more on system-related issues rather than blaming individuals. However, despite this systems-based approach, 74.6% of students believed that reporting a safety issue could still lead to negative repercussions for the person

who reports it. When it came to directly addressing unsafe practices observed in the clinical environment, 85.9% of students said they felt safe and comfortable doing so, though a small minority remained hesitant.

TABLE 4: COMFORT SPEAKING UP ABOUT PATIENT SAFETY

Comfort Speaking	Strongly Disagree	Disagree	Neutral/Unsure	Agree	Strongly Agree
Focus on System Issues Over Individual Blame	1 (0.4)	10 (4.2)	32 (13.3)	142 (59.2)	55 (22.9)
Fear of Repercussions for Reporting	6 (2.5)	24 (10.0)	31 (12.9)	82 (34.2)	97 (40.4)
Comfort Addressing Unsafe Practices	9 (3.8)	9 (3.8)	16 (6.7)	94 (39.2)	112 (46.7)

DISCUSSION

The participants' demographic profile reveals a population that is primarily young and highly educated. Most participants were in the middle to late stages of their undergraduate studies, as indicated by the fact that the majority of students (54.2%) were between the ages of 20 and 22 and another 33.8% were between the ages of 23 and 25. The distribution of current semester levels further supports this, with 38.3% of students in the seventh semester demonstrating significant clinical exposure and familiarity with healthcare settings. Dissimilarly, the findings of another study conducted in 2025 where 50% of participants aged above 30 years(15). Interestingly 82.1% of students attended patient safety training**,** reflecting a commendable emphasis on safety education within the nursing curriculum. However, despite this high training exposure. Divergently another study conducted in 2025 reported that 90.9% of participants have no prior training(16). Findings of the current study showed a statistically significant differences ($p < 0.05$), when they asked about several patient safety competencies, both the students' perceptions of classroom instruction and clinical experience. Clinical safety rated significantly higher in the classroom (Mean = 4.25, SD = 0.75) than in the clinical environment (Mean = 4.00, SD = 1.00; $p < 0.001$), findings suggest that specific learning environments may better convey foundational safety principles. This aligns with previous research emphasizing the role of simulation and theoretical instruction in improving students' perceived competence in safety practices, reported 49 % of learner marked standardized simulation for better learning(17). In the equivalent way strong safety of culture

was perceived through classroom learning with a significant *p*-value (<0.001). This may reflect inconsistencies in the clinical supervision variability in staff attitude and the institutional constraints that limit the theory translation into practice. Real-world constraints often hinder the reinforcement of a safety-first mindset among students during clinical placements (18). Working with other healthcare professionals," also showed significant preference for classroom settings, with $p < 0.001$). Structured role-play, case studies, and interprofessional education modules which are frequently utilized in classroom settings but less frequently encountered during clinical rotations may be to blame for this. Similarly, the Pearson study findings aligned with the current study results reported significant preferences to collaboration with $p < 0.001$) (19). A statistically significant advantage ($p = 0.002$) was shown in the classroom setting, even though the mean rating for understanding human and environmental elements was the same (Median = 4.00). Another study conducted by Adem Sümen in 2020 where students reported statistically significant level ($p = 0.005$) understanding human and environmental elements during class room assessment of patient safety(20). This was probably because of the less variable and more consistent content delivery. While clinical learning may be very dependent on the particular unit, mentors, or institutional culture, classroom instruction may provide thorough insights into systems-based safety concepts.

In the current study, over 86% of participants felt that patient safety was well integrated into their formal education. Results of emphasizing the strong aspect of the academic curriculum, arranging theoretically knowledge, aware future nurses in terms of patient's care and organizational level communicators. Another study results congruent to this study findings, a survey of 296 senior nursing students, 90.9% of them thought patient safety education was essential, and 94.6% had already received it (21). However, a concerning finding was that 74.6% of students expressed fear of repercussions when reporting safety incidents**,** with 40.4% strongly agreeing with this statement. Another study conducted in 2022 revealed that the students reported, fear of negative reactions (64%), unpredictable reactions (62%), (42%), belief that reporting would be ineffective (22). Another study conducted in Saudi Arabia, percentages are comparable or even some higher , 87.5% feared disciplinary action, 87.2% feared being blamed, 85.6% feared losing colleagues' respect(23). Dissimilarly, a study conducted on medical students in South Kora reported that 18% felt positive about their organization's error disclosure culture, 41.2% intended to report an observed error by a peer, reflecting low confidence even safety issues were recognized(24). These findings highlight the urgent need to reform clinical environments, promote

psychological safety, and foster non-punitive error-reporting systems.

CONCLUSION

According to the study's findings, the student's perceptions of patient safety competence between classroom teaching and clinical experience are significantly different, this draws attention to a discrepancy between theoretical understanding and its actual use in practical contexts. Although the fact that students typically showed an understanding of patient safety concepts, their capacity to apply these procedures effectively may be impacted by the inconsistent clinical exposure. To close this theory, practice gap requires development of a safety culture in healthcare.

RECOMMENDATION

1. Patient safety training should be integrated into all semesters to emphasize the significance of patient safety education.

2. Clinical instructions should have been aligned with classroom material to ensure that students can successfully use patient safety competencies in practice, for this academic and clinical faculty must be trained.

3. To improve practical comprehension of patient safety procedures in a safe setting, scenario-based training and simulation should be used.

4. During clinical rotations, open communication, non-punitive reporting, and teamwork among students should have been promoted to build a healthy safety culture.

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