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ASSESSMENT OF KNOWLEDGE, ATTITUDE, AND PRACTICES REGARDING PATIENT SAFETY AMONG UNDERGRADUATE NURSING STUDENTS IN PRIVATE AND PUBLIC COLLEGES OF KARACHI, PAKISTAN.

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Abstract

Background: *Patient safety is a critical aspect of healthcare, aiming to minimize preventable harm. Nurses play a vital role in ensuring patient safety, yet limited research explores how nursing education prepares nursing students to maintain patient safety and prevent from any sentinel events in the hospital.*

Objectives*: To assess nursing students' knowledge, attitudes, and their practices related to patient safety in their clinical settings.*

Methodology: A analytical cross-sectional study was conducted among 323 undergraduate nursing students from public and private colleges in Karachi. Data was collected using a structured questionnaire and analyzed statistically to compare KAP scores across gender, marital status, year of study, and clinical exposure.

Results: *Female and married students had significantly higher knowledge scores ($p = 0.013$, $p = 0.044$). Students in public hospitals demonstrated better knowledge and practices than those in private settings ($p = 0.018$, $p = 0.049$). Knowledge increased with academic progression ($p = 0.009$), but attitudes and practices showed no significant variation. Besides, an anova also revealed a statistically significant difference in knowledge scores across the years of study it meant that patient safety progresses as nursing students progress in to their nursing education.*

Conclusion: *Structured training is essential to improving students'*

attitudes and practices. Integrating patient safety education into the nursing curriculum can enhance competencies and promote a patient safety.

INTRODUCTION

Patient safety is described as "the lack of preventable harm to a patient and the minimization of unnecessary risks associated with healthcare to an acceptable level" (WHO, 2023). Nurses are essential in protecting patient outcomes by recognizing, addressing, and reporting problems that could affect the quality of care (Levett-Jones et al., 2020). In their role as frontline providers, they are distinctly situated to enhance a culture of safety within healthcare environments. Nonetheless, despite the growing focus on patient safety within global health priorities, substantial gaps persist in understanding how nursing education prepares students with the essential skills to effectively enhance safety (Simamora et al., 2020; Alirezaei et al., 2024; Biresaw et al., 2020). Undergraduate nursing education is crucial in equipping students for safe clinical practice. Students start engaging with patients early in their education via clinical placements, directly impacting patient results from the very beginning of their careers (Kim, 2021). Consequently, the degree to which nursing programs cultivate knowledge, skills, and attitudes pertaining to patient safety is vital.(Tocco Tussardi et al., 2021). Organized education in this field has demonstrated an improvement in students' skills to identify and handle safety hazards; however, there is still a lack of consistent and substantial evidence regarding what makes training effective. (Ngoc et al., 2024; Kakemam et al., 2024). Numerous studies emphasize the advantages of focused patient safety training. A quasi-experimental study conducted in South Korea with 107 nursing students revealed that participants in an educational intervention experienced greater satisfaction, enhanced knowledge, and a heightened motivation to implement safety principles in clinical environments. A notable disparity was noted between the intervention and control groups ($p = 0.001$), as 97% of students indicated they had gained new knowledge and skills (Lee & Dahinten, 2023). Likewise, cross-sectional research conducted in Iran involving 215 students showed high self-reported proficiency in patient safety, especially within clinical and classroom contexts, revealing statistically significant variations between the two environments (Farokhzadian et al., 2024)

Nevertheless, the literature also uncovers areas of worry. In Egypt, merely 40.2% of students expressed confidence in reporting errors, although more than half acknowledged the significance of patient safety and medical mistakes (Khider et al., 2024). Similarly, a study conducted in China revealed that 28.9% of students encountered nursing mistakes during their internships; however, significant differences in attitudes toward patient safety were observed solely between those who had received training and those who had not, rather than among demographic factors like age or gender (Ranran&AbLatif,2024). The divide between theoretical understanding and practical implementation continues to be a persistent issue. In Turkey, discovered that students reported strong perceptions of patient safety culture, especially regarding care environments and staff conduct, but showed less assurance in error reporting and handling unforeseen occurrences (Catal et al., 2024). A comparable mixed-methods research in China showed that students believed they learned more from clinical settings than from classrooms; however, many were unaware of how to identify near misses and handle adverse events (Zhang et al., 2024).

Cultural factors and gender differences also affect how students perceive things. In Lebanon, male students expressed more favorable opinions on error causes and responsibilities for disclosure, whereas female students were more aware of elements like working hours as a risk factor (Koleilat et al., 2024). Additional research, like a study carried out in North Carolina, revealed that

there were no notable differences in patient safety knowledge, abilities, or attitudes among various institutions or depending on previous clinical positions (Lee et al., 2020).

Fortunately, several institutions have shown favorable results from patient safety programs. At Aga Khan University, students reported considerable enhancements in their self-evaluated safety skills after finishing the course, backed by reflective accounts (Ahmed et al., 2023). Similarly, a study in Bengaluru identified a notable link between students' understanding of patient safety and their self-assessed competence, with greater confidence observed in theoretical scenarios than in clinical ones (Biswas & Thomas, 2023). Although the overall results indicate that education can enhance nursing students' safety skills, they also highlight ongoing deficiencies—particularly in aspects such as error reporting, practical implementation, and alignment between academic and clinical experiences. These gaps highlight the necessity for a more cohesive and hands-on strategy for patient safety training in nursing education. Creating a safety-oriented culture among students through impactful training and guidance is crucial for equipping the future generation of nurses to provide safe, high-quality care.

RESEARCH METHODOLOGY:

An Analytical Cross-sectional study was conducted.

STUDY SETTING:

The study was performed in both Public and Private Colleges of Nursing, Karachi, Pakistan.

STUDY DURATION:

This study was conducted from a period of July 2024, to January 2025.

SAMPLING TECHNIQUE:

Purposive sampling techniques, "also known as judgmental or expert sampling, involves intentional selection of participants based on the researcher's expertise" approached for this study as it is a non-probability sampling method where the sample being drawn from that part of the population that is close to hand (Bisht, 2024).

SAMPLE SIZE:

The sample size was calculated based on the knowledge, Attitude, and Practices among undergraduate nursing students with an assumed medication administration error (30.77%) (Zhang et al., 2024) at 5% Level of significance and 80% power. The minimum sample size was 323. Openepi.com was used to calculate the sample size.

INCLUSION CRITERIA:

Undergraduate BS Nursing students who agreed to participate were included in this study.

EXCLUSION CRITERIA:

Nursing students who were RN, RM, CMW, CHN, and LHV, and those who were not willing to give informed consent were excluded from this study setting.

ETHICAL CONSIDERATION:

Ethical approval was obtained from the Ethical Review Committee of both Public and Private Colleges of Nursing.

Participants were informed about the purpose of the study, and written informed consent was taken.

They informed that each participant has the right to withdraw from the study at any time without consequences.

Anonymity and confidentiality were absolutely assured throughout the study.

DATA COLLECTION TOOL AND MEASURMENT

Data was collected through Self-Structure Questionnaire by visiting the selected hospitals, and formal permissions were granted through official correspondence.

VALIDITY AND RELIABILITY:

Validity and reliability of the tools were checked through the IRB of the Ethical Review Committee of the College of Nursing Civil Hospital, Karachi, and the panel of three experts in nursing specialty analyzed the content validity of the tools before using them to ensure that all questions were consistently

convey and carry the anticipated meaning that they prepared.

DATA ANALYSIS:

The collected data were coded, tabulated, and analyzed using the Statistical Package of Social Science (SPSS). The data was analyzed on SPSS licensed V-16 software with Cronbach alpha 0.89,0.88, and 0.87, respectively.

RESULTS:

Table 1. Socio-Demographic Data:

Variable	Frequency	Percent
Gender		
Male	218	67.49%
Female	105	32.51%
Age Group		
18-20	59	18.27%
21-23	207	64.08%
24-26	57	17.65%
Year of Study		
First	65	20.12%
Second	67	20.74%
Third	116	35.91%
Fourth	75	23.22%
Marital Status		
Single	299	92.57%
Married	24	7.43%
Type of clinical environment		
Public	220	68.11%
Private	103	31.89%

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The results of Table # 1 explained that, A total of 323 undergraduate nursing students participated in the study. The majority of the respondents were male (218, 67.49%), while female participants constituted 105 (32.51%) of the sample. The largest proportion of students fell within the 21–23 age group (207, 64.09%), followed by those aged 18–20 years (59, 18.27%), and 24–26 years (57, 17.65%). The distribution across the years of study revealed that the highest number of participants were in their third year (116, 35.91%), followed by the fourth year (75, 23.22%), second year (67, 20.74%), and first year (65, 20.12%). The majority of the respondents were single, 299(92.57%). Most of the students reported being exposed to public clinical environments (220, 68.11%), while a smaller proportion had experience in private clinical environments (103, 31.89%).

Table 2. Comparison of Knowledge, Attitude, and Practice Scores by Marital Status

Mean Score	Single	Married	p-value	CI
Knowledge	4.206±0.457	4.4±0.358	0.044	-0.381, -0.005

Attitude	4.221±0.482	4.241±0.456	0.842	-0.220-0.180
Practice	4.263±0.446	4.241±0.464	0.818	-0.165,0.208

Table # 2 showed that Married students demonstrated a significantly higher mean knowledge score (4.40 ± 0.358) compared to single students (4.21 ± 0.457), with a p-value of 0.044. The 95% confidence interval for the mean difference ranged from -0.381 to -0.005, indicating a statistically significant difference in knowledge as compared to attitude and practice results showed that there was no significant difference seemed as p value > 0.05.

Table 3. Comparison of Knowledge, Attitude, and Practice Scores by Gender

Mean Score	Male	Female	p-value	CI
Knowledge	4.177±0.429	4.310±0.487	0.013	-0.237, -0.027
Attitude	4.181±0.456	4.310±0.515	0.024	-0.240, -0.017
Practice	4.251±0.415	4.283±0.507	0.542	-0.137,0.072

Table # 3 elaborated that female students demonstrated significantly higher knowledge scores (4.31 ± 0.487) compared to male students (4.18 ± 0.429), with a p-value of 0.013. Likewise, related to the attitude, females scored higher as the p-value is 0.024, though there is no significant difference observed in the practice between two genders as p-value> 0.05.

Table 4. Comparison of Knowledge, Attitude, and Practice Scores by Clinical Environment

Mean Score	Public	Private	p-value	CI
Knowledge	4.261±0.438	4.134±0.472	0.018	0.022,0.233
Attitude	4.251±0.475	4.163±0.484	0.122	-0.023,0.201
Practice	4.295±0.436	4.190±0.463	0.049	-0.0006,0.209

In Table # 4, the Students in public clinical environments demonstrated significantly higher knowledge scores (4.26 ± 0.438) compared to those in private clinical environments (4.13 ± 0.472), with a p-value of 0.018 Likewise, Students who were working in public clinical environments had significantly higher practice scores (4.30 ± 0.436) compared to those in private clinical environments (4.19 ± 0.463), with a p-value of 0.049 but no statistically significant difference was observed in attitude scores between public (4.25 ± 0.475) and private clinical environments (4.16 ± 0.484), with a p-value of 0.122.

Table 5. Comparison of Knowledge, Attitude, and Practice Scores by Year of Study

Mean Score	First	Second	Third	Fourth	p-value
Knowledge	4.052±0.453	4.247±0.451	4.265±0.416	4.274±0.482	0.009
Attitude	4.160±0.424	4.262±0.439	4.229±0.419	4.234±0.628	0.652

Practice	4.175±0.452	4.289±0.415	4.3241±0.422	4.216±0.496	0.125

Knowledge:

A statistically significant difference in knowledge scores was observed across the four years of study (p = 0.009). The mean knowledge scores increased progressively from the first year (4.05 ± 0.453) to the fourth year (4.27 ± 0.482), indicating that students' knowledge improved as they advanced in their academic journey, likewise the practice scores also showed an increasing trend from the first year (4.18 ± 0.452) to the third year (4.32 ± 0.422), followed by a slight decline in the fourth year (4.22 ± 0.496), the difference was not statistically significant (p = 0.125). This indicates that students' practical application of patient safety principles was consistent across years of study, however no statistically significant difference in attitude scores was observed across the years of study (p = 0.652).

Table 6. Multiple Comparisons of Knowledge Scores Between Years of Study

Comparison	Mean Difference	p-value
First vs Second	-0.195	0.012
First vs Third	-0.213	0.002
First vs Fourth	-0.221	0.004
Second vs Third	-0.017	0.796
Second vs Fourth	-0.026	0.727
Third vs Fourth	-0.008	0.898

Table # 6 presents pairwise comparisons of knowledge scores among nursing students across the four years of study (First, Second, Third, and Fourth years). Since the analysis of variance (ANOVA) revealed a statistically significant difference in knowledge scores across the years of study, post-hoc pairwise comparisons were conducted to identify where the differences lie.

First-year students had significantly lower knowledge scores than second-year students, with a mean difference of -0.195 (p = 0.012). First-year students also scored significantly lower than third-year students, with a mean difference of -0.213 (p = 0.002). Similarly, first-year students scored significantly lower than fourth-year students, with a mean difference of -0.221 (p = 0.004). No significant difference in knowledge scores was found between second-year and third-year students, with a mean difference of -0.017 (p = 0.796). The difference in knowledge scores between second-year and fourth-year students was also not significant, with a mean difference of -0.026 (p = 0.727). Similarly, no significant difference was observed between third-year and fourth-year students, with a mean difference of -0.008 (p = 0.898).

Discussion

Patient safety involves reducing the risk of avoidable harm associated with healthcare to the lowest possible level. It is recognized as a global priority due to the significant knowledge gaps that persist in this area. The knowledge, attitude, and practices of healthcare providers regarding patient safety play a crucial role in ensuring the delivery of safe and effective care. A well-informed and positive approach to patient safety among healthcare professionals directly impacts their ability to prevent errors, mitigate risks, and uphold the highest standards of patient care. Addressing these gaps is essential for advancing global healthcare systems and fostering a culture of safety. Fewer than half of the students demonstrated strong knowledge and a positive attitude toward patient safety in this survey. Additionally, only a small number of married and experienced students exhibited good patient safety practices. The practice of patient safety among students was significantly influenced by their

experience, the duration of their practical training, and their understanding of patient safety principles.

The present study provides a comprehensive understanding of the factors influencing knowledge, attitude, and practice (KAP) regarding patient safety among nursing students, considering variables such as marital status, gender, clinical environments, and year of study which was similar to the research study performed by (Aniwada & Onwasigwe, 2016). Marital status showed a significant impact on knowledge scores, with married students scoring higher than single students (Lee at al., 2022). The small but statistically significant mean difference suggests that married students have greater life experience or responsibilities contributing to their understanding of patient safety. However, a similar finding was under score by a study that attitude and practice is not differ significantly between the married and single students, indicating that marital status does not influence KAP aspects of patient safety (Alandajani et al., 2022).

In addition, gender significantly influenced both knowledge and attitude scores. Female students scored higher in knowledge and attitude, highlighting their stronger focus on and understanding of patient safety. Similar to this observation a study underscores that gender differences could stem from variations in learning styles, communication skills, or empathy levels between genders (Alitabar, & Parsakia, 2025). However, the present study shows that practice scores were comparable between male and female students, indicating similar application of patient safety principles regardless of their gender, this is similar to the conclusion drawn by a study performed on nursing in Gaza strip that patient safety is not influenced by gender differences (Qaraman et al., 2022). Furthermore, the study shows that the type of clinical environment (public vs. private) had a significant impact on both knowledge and practice scores. This was ideally similar to the findings of a research study that demonstrate students in public clinical environments demonstrated higher knowledge and practice scores compared to those in private environments (Atwa et al,.2024). The finding suggests the reason of this difference that, it could be attributed to the greater diversity and complexity of cases in public settings, providing more learning opportunities. However, attitude scores did not differ significantly suggesting that exposure to different environments does not strongly influence perceptions of patient safety, this fact was explained by a study involving nursing student (Ayyad et al., 2024).

With regards to the present study, knowledge scores significantly increased with the year of study, as revealed by ANOVA and post-hoc comparisons. First-year students scored significantly lower than second-year, third-year, and fourth-year. This study findings corroborate with previous study that there is a cumulative impact of education and clinical exposure on knowledge acquisition (Ahmed et al.,2023). A possible explanation would be that the lack of significant differences among upper-year students suggests a plateau effect, where additional years of study add marginal knowledge gains. According to the current study, the students with greater knowledge of patient safety were more likely to demonstrate good patient safety practices compared to those with limited knowledge. This aligns with findings from a systematic review on nurses' adherence to patient safety principles, which revealed a positive correlation between knowledge and patient safety practices among nurses in the USA. The review also highlighted the role of healthcare professionals' knowledge and adherence to evidence-based medicine guidelines in promoting patient safety (Elsous et al., 2016). Overall, the study underscores the multidimensional factors influencing nursing students' KAP regarding patient safety. By addressing these factors through customized training and education strategies, institutions can enhance the overall preparedness of nursing students, ensuring better patient care outcomes.

Conclusion

This study shows that patient safety is very important in nursing, but there are many students who lack proper training in handling patient safety issues and feel uncomfortable reporting errors.

To improve patient safety, nursing education should include more hands-on training and create a learning environment where students feel safe to report mistakes.

Encouraging teamwork, improving communication, and integrating patient safety into nursing courses will help future nurses provide safer care to patients.

Limitations:
This study provides a snapshot rather than long-term insights.
Responses depend on participants' honesty and memory, which may lead to bias.

Recommendation:
Integrate Patient Safety into the Curriculum
Foster a Culture of Error Reporting
Enhance Practical Training
Strengthen Communication and Teamwork
Promote Continuous Learning and Research

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Authorship Contribution:
Conceptualization of project: k.k, s.h, s.g, s.p, n.n, data collection: n.n,a.t, a.m, s.s, data analysis: n.n,a.t, a.m, s.s, literature review: n.n,a.t, a.m, s.s, s.h, s.g, s.p, s.k, drafting, revision, writing of manuscript: s.h, s.g, s.p, s.k, k.k, n.n, a.t, a.m, s.s, budgeting: s.h, s.g, s.p, s.k, k.k, n.n,a.t, a.m, s.s,

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