

Exploring Knowledge, Attitude, and Learning Experiences of Nursing Students towards Sustainable Patient Safety Following Online Nursing Education: A Mixed Method of Study

Jharna Ghosh^{1,2*}, Santhna Letchmi Panduragan^{2,3}, Faridah Mohd. Binti Said², Atikah Nabilah Binti Mohd Salleh², Amiya Bhaumik²

¹Sister Florence College of Nursing, Barisha, Kolkata - 700008, India

²Lincoln University College, Wisma Lincoln, 12-18, Jalan SS 6/12, 47301 Petaling Jaya, Selangor, Malaysia

³Cyberjaya University, 63000 Cyberjaya, Selangor, Malaysia

*Corresponding Author's Email: jharnaa.ghosh@gmail.com

ABSTRACT

Background: Nursing students find it challenging to manage patient safety when attending online classes, both theoretical and practical, for extended periods. **Objectives:** To assess and explore nursing students' knowledge, attitude, and learning experiences toward sustainable patient safety following online education. **Methods:** A mixed-method study among 3rd and 4th year level nursing students following online education. In the first phase of the quantitative study, 383 students participated using a self-reported questionnaire, while in the second phase, 20 focused groups of students participated using the purposive sampling technique. **Results:** In the first phase, most of the participants, 151 (39.43%), were in their 3rd year of B.Sc. nursing. Of these, 250 (65.27%) attended more than 6 months of online classes using smartphones, 374 (97.65%). The participants encountered issues with educational storage in 229 cases (59.79%) and internet connectivity in 183 cases (47.78%). According to their learning experiences, most of them—196 (51.17%) and 187 (48.83%)—had attended scenario-based and simulation-based practical classes, among which 238 (62.14%) students shared theoretical confidence but 294 (76.76%) lacked clinical confidence. In terms of knowledge and attitude, 228 (59.53%) students demonstrated strong knowledge, with a mean, median, and SD of 27.09, 17.51, 06.64, while 173 (45.17%) students demonstrated a positive attitude, with a mean, median, and SD of 131.97, 117.19, and 13.37, respectively. In the second phase, a maximum of 16 (80%) students expressed a lack of confidence in the management of patient safety. **Conclusion:** The study showed that it is important to maintain patient safety is a healthcare discipline. In this study, nursing students demonstrated strong theoretical knowledge and a positive attitude, but they lacked clinical confidence.

Keywords: Attitude; Knowledge; Learning Experience; Online Nursing Education; Patient Safety

INTRODUCTION

Patient Safety education in the healthcare system is the core objective of the global patient safety 2021-2023 WHO action plan (Sheehan *et al.*, 2022). It includes preventing errors and adverse effects on healthcare patients (WHO, 2021; Mandal, Basu & De, 2020). Educating students on patient safety can potentially reduce healthcare-associated harm and error (Ayub *et al.*, 2024). The fundamental dimensions of quality nursing are dependent on the nurses' adequate knowledge and attitude (Dionisi *et al.*, 2021; Mansor *et al.*, 2018). Medical students should need appropriate training to manage life-and-death situations in public (Shin & Baek, 2023). Nursing is known as a disciplined stream in comparison to other streams (Glerean *et al.*, 2023). They are working in a pivotal role (Zhao *et al.*, 2023). The COVID-19 pandemic-induced online distance education has

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distorted real clinical learning. The COVID-19 pandemic forced academic institutions to offer online education, which significantly impacted their ability to maintain quality teaching (WHO, 2021). This study aims to assess and explore the nursing student's knowledge, attitude, and learning experiences toward sustainable patient safety following online education. Following online education, a cross-sectional study revealed low learning competencies among nursing students, potentially impacting their future professional careers (Martzoukou *et al.*, 2024). A qualitative study was conducted on the live experiences of final-year students following online education. They shared that they had missed learning opportunities, future concerns, and communication difficulties related to patient care. (Üzar-Özçetin & Öcalan, 2024). Many other research studies revealed that nursing students had 57.1% unsatisfactory results toward patient safety (Pereira *et al.*, 2023). Nursing students had an above-moderate level of knowledge toward patient safety (Yılmaz & Erdem, 2024). Nursing students had only 43.2% knowledge and 45.4% positive attitudes towards patient safety (Mohammed *et al.*, 2023). Most of the nursing students had different levels of knowledge under the sub-theme of lack of motivation and interaction during online classes (Siah *et al.*, 2022).

Nurses are the frontline healthcare workers; their fundamental responsibility is to ensure patient safety. Safe and error-free, sustainable patient safety assurance following prolonged online education is challenging (Jamshidi, Hemmati & Parizad, 2021).

METHODOLOGY

This study used a mixed-method approach, exploring and evaluating experiences both quantitatively and qualitatively using social and behavioral science (Timans, Wouters & Heilbron, 2019). This study employed a mixed-method approach to investigate the experiences of nursing students who had received their education online.

Research Design

A sequential explanatory mixed-method research design.

Method of Data Collection

The first phase: Began with the collection of data on January 6, 2023. The total number of participants is 383 from 3rd and 4th year levels of General Nursing and Midwifery (GNM) and Bachelor of Nursing (B.Sc. Nursing) students who have attended online nursing classes in nursing academic institutions in India. Data collected using a convenient sampling technique by sending an online Google form consisting of demographic and knowledge questionnaires on patient safety after getting informed consent.

2nd phase

Qualitative data was collected from 20 willing participants who participated with the consent that their experiences would be recorded and to be used for research purposes using a semi-structured interview schedule from 4th to 5th October 2023.

Data Analysis

Quantitative Data was analysed from 383 students using descriptive and inferential statistics. Mean, median, Standard deviation, and regression analysis, which described continuous data and frequency-percentages as categorical data.

Qualitative data was analysed from 20 focused group students by inductive content analysis with the aim of theme and sub-theme categorization.

Ethical Consideration

The present study received ethical permission from the Ethical Committee of Sister Florence College of Nursing, India, with reference number 005/IEC/SFCON on 24th January 2022.

RESULTS

Quantitative Data

Frequency and Percentage Distribution of Demographic Data of Participants

The majority of the participants nursing students were 3rd year Bachelor of Nursing students 151(39.43%) with age group between 18-21 years, most of the students 353(92.17%) had a previous perception of online classes and they were from rural residency 237 (61.88%) Table 1.

Table 1: Frequency and Percentage Distribution of the Demographic Data of the Participants (N=383)

Criteria	Range	Frequency	Percentage
Age in years	18-21	223	58.22%
	22-25	159	41.51%
	25 +	1	0.26%
Year of Students	3 rd year GNM	94	24.54%
	4 th year B.Sc. Nursing	138	36.03%
	3 rd year B.Sc. Nursing	151	39.43%
Previous perception about online class	Yes	353	92.17%
	No	30	7.83%
Type of residence	Rural	237	61.88%
	Urban	146	38.12%

Regarding online data, the majority 250 (65.27%) of students attended more than six months of classes using a smartphone 374, (97.65%), facing problems in storage 229, (59.79%), and internet connectivity 183, (47.78%). The majority of students 294, (76.76%) were of the opinion that they need more practice for developing confidence (Table 2).

Table 2: Frequency and Percentage Distribution of the Online Data of the Participants(N=383)

Criteria	Range	Frequency	Percentage
Duration of online classes attended	6+ months	250	65.27%
	6- months	133	34.73%
Type of Online Teaching Learning Tool Used	Smartphone	374	97.65%
	Desktop/Laptop	9	2.35%
Online data storage on your mobile	Problematic	229	59.79%
	Not Problematic	154	40.21%
Type of practical online class attended	Scenario-based	196	51.17%
	Simulation-based	187	48.83%
Internet connectivity during online classes	Problematic	183	47.78%
	Supportive	200	52.22%
Self-confidence about theory classes	Not so confident	145	37.86%
	Confident	238	62.14%
Opinions about practical confidence	Need practice	294	76.76%
	Confident	89	23.24%

Figure 1 shows six dimension-wise knowledge and attitude scores from online classes. The figure showed the highest knowledge scores towards patient safety in environment and medication safety but the lowest scores in infection control, blood, and blood product transfusion. The data also revealed that the highest attitude scores were toward infection control and medication safety, but the lowest in environmental safety and fall prevention.

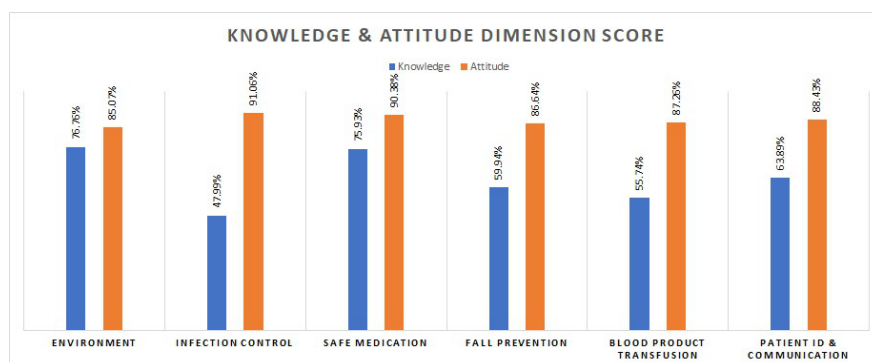


Figure 1: Dimension-Wise Knowledge and Attitude Score on Patient Safety (N=383)

Table 3 reported that the obtained 'r' value from regression analysis between knowledge and attitude was 0.36 which indicates a significant positive relationship with a very close mean, and median of knowledge and attitude scores.

Table 3: Mean, Median, and Co-Relation between Knowledge and Attitude (N=383)

Variable	Mean	Median	S.D.	r
Attitude Score	131.97	117.19	13.37	0.36
Knowledge Score	27.09	17.51	06.64	

P<0.05 level of significance

Qualitative Data Analysis from Focused Group (N=20)

The methodological credibility, thematic categorization, and analysis of qualitative data were ensured by the two researchers' findings under transcript derivation from semi-structured interviews from the focused groups. For exploring and interpreting the objectives, the main theme and sub-theme categorization were described by coding. Lastly, the researchers independently analysed each transcript to ensure the data's trustworthiness, until they reached a point of data saturation where no new findings emerged. Table 4 shared nursing students' live experiences under thematic coding.

Table 4: Themes, Sub-themes, Codes of Learning Experiences (N=20)

Theme	Sub-Theme	Code	Frequency	Percentage
Perception and experience toward learning experiences after following online education	Lack of clear perception and experience toward learning	Lack of theoretical Learning Lack of Practical Learning	18	90
Impact of Online Nursing Education	Barriers to learning due to internet connectivity and lack of space of Storage of educational data	Gaps in Procedural Steps Learning Gaps in situational handling and safe practices toward patient safety	16	80
Opinions about Online Education	Theoretically manageable Practically not manageable	Lack of confidence in patient safety management	20	100
Impact on dimension-wise Knowledge and attitude towards patient safety following online education	Gaps in patient management in a real situation	Safe Environment Safe Medication Infection Control Fall prevention and safe practices Safe Blood and blood product transfusion Safe communication and Patient identification	20	100

Theme-1: Perception and Experience Following Online Nursing Education

Sub-theme: Lack of clear perception and experience toward learning

“I am not sure about new patient management if not feeling good in the hospital due to an unfamiliar environment.”

“If any patient needs pain medication, I can give him to get relief from his current problem; I may forget to cross-check for rights of drug administration.”

Theme 2: Impact of Online Nursing Education

Sub-theme: Barriers to learning due to internet connectivity and lack of Storage space

"Due to interrupted and problematic online classes, theoretically we know how to manage patients, but practically we are unable to do so; inefficiency will be there."

“If the patient is unconscious and bedridden, we may forget to give a rail cot bed for fall prevention because of barriers in learning or practice.”

Theme 3: Opinions towards Impact of Online Nursing Education on Nursing Students Knowledge attitude and practice towards Patient Safety

Sub-theme: Theoretically manageable but practically not manageable, inadequate knowledge

“We are an outgoing batch, 4th-year students, having inadequate knowledge towards practical handling of the Patient Safety.”

“I know hand hygiene is very important for infection control but practically not practiced for a long time, which may affect patient safety outcomes.”

Theme: 4 Impact on Nursing Students' Knowledge and Attitude towards Patient Safety

Sub-theme: Ineffective Patient Handling and Patient Management toward Patient Safety

“Due to prolonged online practical and theoretical classes, we may forget how to communicate with patients or family members, or how to identify the right patients for patient care.”

“Patient safety-related all dimensions are very essential, but unexposed practical learning may affect.”

DISCUSSION

Quantitative Findings (1st Phase)

1st Phase: Demographic and Online Educational Data of Participants

The study findings show that the majority of participants were from students of 3rd year Bachelor of Nursing 151 (39.43%), attended more than 6 months of classes 250 (65.27%), used smartphones 374 (97.65%), faced problems in storing 229 (59.79%), and internet connectivity problems 200 (52.22%). and attended scenario-based or simulation-based practical classes 196 (51.17%) and 187 (48.83%). One descriptive study, conducted among 543 undergraduate students, supports the above study. The study found that 61.3% of the students were between the ages of 18 and 22, 97% used smartphones for online education, 38% experienced internet connectivity issues, and the students (39.43%) were in their third year of Bachelor degree in nursing (Dhawan *et al.*, 2022). Another study revealed that nursing students attended online education, where only 36.5% were satisfied following classes (Li *et al.*, 2021).

The present study investigated that out of 383 students, 238 (62.14%) students had theoretical confidence, but 294 (76.76%) had a lack of clinical confidence. This finding is supported by a study conducted among 360 undergraduate nursing students, where 71.7% students faced moderate levels of barriers during online education and faced lack of confidence too (Bassiouni, Fadl & Hussien, 2023).

Knowledge and Attitude toward Patient Safety

The present study findings regarding knowledge and attitude revealed that the maximum students (228,

59.53%) had good knowledge, and 173 (45.17%) students had a good attitude towards patient safety with a significant positive co-relationship ($r = 0.36$). These above findings are supported by one cross-sectional study conducted in Malaysia at one private University College among 92 nursing students using a purposive sampling technique. Data was collected by a self-reported questionnaire. The data highlighted that the majority (98.9%) of students had good knowledge on patient safety (Zulkifli *et al.*, 2021). Another cross-sectional study was conducted among 172 working nurses, and the data highlighted that the level of knowledge was 58.7% and the attitude was 52.9% toward patient safety (Wake *et al.*, 2021). Another descriptive study was conducted among 370 nursing students using the WHO patient safety questionnaire. Study results revealed that final-year students had significantly higher knowledge levels (Svitlica *et al.*, 2021). Other research studies reported that patient safety and its correlation depend on nurses' strong adherence and key principles of patient safety (Vaismoradi *et al.* 2020). Another supportive study was conducted among 370 medical and nursing students, and the results reported that knowledge and attitudes toward patient safety need implementation and development of patient safety courses for the enhancement of knowledge and practice (Svitlica *et al.*, 2021). Patient safety needs nurses' adequate knowledge and attitude, whether the classes are online or offline (Staines *et al.*, 2021).

Qualitative Findings (2nd Phase Findings)

The present study findings show that most of the focused group of students' opinions following online education are that they are theoretically confident toward patient safety but not enough competent toward practical handling. The maximum (80%) students faced problems toward practical situational handling and had a dimension-wise gap in knowledge and attitude toward sustainable patient safety.

The Covid-19 pandemic created an abrupt nursing education (Suliman *et al.*, 2021). A qualitative study in Turkey revealed that nursing students encountered numerous challenges, such as inadequate field experiences and inadequate storage of educational data, leading to obstacles in online education (Cengiz, Gurdap & Işık, 2022). Another qualitative study supported that there was a gap in learning toward emergency-based practical management (Michel *et al.*, 2021).

Limitations

This study was limited to 3rd and 4th year nursing students. This is the key limitation. Including a broader range of students, from diploma to degree programs, as well as postgraduate students, could enhance the generalizability of the findings.

CONCLUSION

Patient safety is a critical aspect of healthcare that relies heavily on nurses' knowledge and attitudes. This study findings indicated that while the majority of nursing students possessed strong knowledge and positive attitudes toward sustainable patient safety, there was a noticeable gap in clinical confidence, particularly in areas such as infection control management, patient communication, and accurate patient identification. To address these deficiencies, an interventional workshop on sustainable patient safety is recommended to bridge this learning gap. Additionally, incorporating simulations and practical situations into the curriculum could further enhance students' practical skills and confidence in patient safety practices. Future research should explore the long-term effects of such interventions on clinical performance, aiming to ensure that nursing students are fully prepared to uphold the highest standards of patient safety in their professional practice.

Conflict of Interest

The authors declare that they have no competing interests

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