



RESEARCH ARTICLE

Health professions students' knowledge, attitude, and practice towards patient safety: A cross-sectional study

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Keywords

Health profession student
KAP
Patient safety

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Abstract

Background: Patient safety is a cornerstone of effective healthcare systems, aimed at minimising errors and adverse outcomes. **Objectives:** To assess knowledge, attitudes, and practices of health profession students at Universiti Sultan Zainal Abidin (UniSZA) regarding patient safety. **Methods:** A cross-sectional study was conducted among 337 students from the Faculties of Medicine, Pharmacy, and Health Sciences. The sample size was calculated using RAOSOFT (95% confidence, 5% margin of error), with a minimum of 310 participants. A validated questionnaire assessed demographics, knowledge, attitudes, and practices. Undergraduate students from Years one to three were included. Scores above the domain means were categorised as “good knowledge”, “positive attitude”, or “good practices”. Data were analysed using SPSS v25 with *t*-tests, ANOVA, and Chi-square, alongside effect sizes. **Results:** A total of 337 of 370 invited students participated (response rate = 91.1%). Students showed good knowledge (mean 4.00 ± 0.73), positive attitudes (21.93 ± 2.26), and moderate practices (2.91 ± 0.84). Knowledge gaps included “near-miss” events (21.4%) and device reuse misconceptions (29.7%). Female and Health Sciences students demonstrated significantly better practices ($p < 0.001$). **Conclusion:** Students possessed adequate knowledge and positive attitudes, while practices were moderate. Targeted curriculum integration on near-miss recognition and safe device use is recommended.

Introduction

Patient safety remains a global priority in healthcare (Mistri *et al.*, 2023; Lawal *et al.*, 2024). The World Health Organisation (WHO, 2023) defines it as the prevention of errors and adverse effects during healthcare delivery, emphasising the principle of “do no harm.” Reports indicate that one in ten patients globally suffers harm during hospital care, with many of these incidents being preventable (Flott *et al.*, 2019; Singh & Mahomed, 2023). These figures highlight the urgent need for healthcare systems worldwide to prioritise patient safety by identifying root causes and implementing systematic changes.

In low- and middle-income countries, the risk is even higher, with death from unsafe care occurring in up to four out of every 100 people (WHO, 2019). Alarming, over 50% of this harm, equivalent to one in every 20 patients, is considered preventable, with nearly half attributed to medication errors (Panagiotti *et al.*, 2019; Hodkinson *et al.*, 2020). Estimates suggest that up to 40% of patients in primary and ambulatory care settings may experience harm, 80% of which is avoidable (WHO, 2022). This disproportionate burden on resource-constrained settings underlines the need for preventive strategies, especially in education and system design, to reduce harm.

Although reporting systems such as Malaysia's electronic Incident Reporting (e-IR) platform have improved the documentation of patient safety events, concerns remain about underreporting, lack of feedback, and whether lessons are effectively translated into policy or practice (Nadarajan *et al.*, 2020). For example, reported incidents rose from 2,769 in 2016 to 5,689 in 2017, and further to 9,431 in 2019, suggesting either improved reporting rates or worsening safety trends (Khalid *et al.*, 2022). These trends point to the importance of cultivating a safety culture in healthcare institutions, one that includes transparency, continuous learning, and the proactive engagement of future healthcare professionals.

Research has consistently shown that patient safety education enhances students' knowledge, attitudes, and competencies (Kirkman *et al.*, 2015; Walpolo *et al.*, 2017). A range of teaching strategies, including lectures, simulations, and root cause analysis workshops, has been employed across medical schools to foster such competencies (Kiersma *et al.*, 2011; Nie *et al.*, 2011). These educational innovations emphasise the potential for structured training to shape safety-conscious future practitioners.

Moreover, students in healthcare disciplines generally exhibit positive attitudes toward patient safety and a willingness to adopt safe practices (Scalese *et al.*, 2015; Tegegn *et al.*, 2017). Strengthening these attitudes through curricular exposure is vital in preparing them to reduce errors and improve healthcare outcomes (Leotsakos *et al.*, 2015; ElAraby *et al.*, 2018). This suggests that early and comprehensive education in patient safety can reinforce professional accountability and lead to safer clinical practices.

Despite the global emphasis on integrating patient safety into health professions education, prior studies have identified gaps in students' awareness of error reporting procedures and the absence of a structured patient safety curriculum in many programs (Nadarajan *et al.*, 2020). However, little is known about how well-prepared health professions students are in terms of patient safety knowledge, attitudes, and practices, particularly in the context of developing healthcare education systems. This study seeks to address that gap by evaluating students' readiness and identifying educational needs for enhancing safety training in pre-professional programs.

Specifically, this study focused on three interrelated aspects of patient safety: 1) students' knowledge of key safety concepts such as near-miss events, root cause analysis, and infection control; 2) attitudes towards error reporting, accountability, and safety training; and 3) practices related to incident reporting, device use, and documentation. In particular, the study examined

awareness of "near-miss" incidents as an essential but often overlooked dimension of patient-safety learning.

Methods

Study design and participants

A cross-sectional study was conducted among undergraduate students enrolled in health profession programs, including Medicine, Pharmacy, and Health Sciences. Participants were selected using stratified convenience sampling to ensure proportional representation across faculties and academic years (first to third year). Students were invited via email and in-class announcements to participate voluntarily by completing a structured, self-administered questionnaire. Of 370 students invited from the three faculties, 337 completed the questionnaire, yielding a 91.1% response rate.

Instrument development and content

The instrument was adapted from Mohammed *et al.* (2023), which demonstrated acceptable psychometric properties (Cronbach's $\alpha = 0.76$). Internal consistency in the current sample was satisfactory (Knowledge $\alpha = 0.71$; Attitude $\alpha = 0.83$; Practice $\alpha = 0.69$), confirming reliability for this dataset.

The instrument consisted of four parts:

1. Demographic data: Gender, age, faculty, and academic year.
2. Knowledge section (five items): Assessed basic awareness and understanding of patient safety concepts such as "near miss," root cause analysis, and hand hygiene.
3. Attitude section (five items): Used a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree) to gauge respondents' beliefs and perceptions toward patient safety.
4. Practice section (five items): Measured self-reported adherence to patient safety practices using binary responses (True/False).

Scoring and data handling

- Knowledge score: Each correct/positive response was scored as 1; incorrect or "No" responses as 0. Total scores ranged from zero to five.
- Attitude score: Likert-scale items were scored 1 (strongly disagree) to 5 (strongly agree), giving a total possible score of five to twenty-five. The mean attitude score was then calculated.

- Practice score: Positive practices were scored as 1 (True), and unsafe or incorrect practices as 0 (False). Total scores ranged from zero to five.

Domain scores were dichotomised using each domain's mean score as a pragmatic cut-off to differentiate higher and lower performance, consistent with prior KAP studies using adapted tools where established thresholds were unavailable (Mohammed *et al.*, 2023). Sensitivity analyses using median splits yielded similar patterns.

Data analysis

Data were analysed using IBM SPSS Version 25. Descriptive statistics (frequency, percentage, mean, standard deviation) were used to summarise demographic characteristics and KAP responses. Independent samples t-tests were used to compare practice scores by gender. One-way ANOVA with Tukey's post hoc tests assessed differences in scores across academic years and faculties.

Effect sizes were calculated to determine the practical significance of group differences: Cohen's *d* was reported for t-tests (small = 0.2, medium = 0.5, large = 0.8), and partial eta squared (η^2) for ANOVA (small = 0.01, medium = 0.06, large = 0.14). Statistical significance was set at $p < .05$.

Ethics approval

Ethical approval was obtained from the UniSZA Human Research Ethics Committee (UniSZA/UHREC/2024/655). All respondents provided informed consent before participation.

Results

Demographics

A total of 337 of 370 invited respondents completed the survey, yielding a response rate of 91.1%. The majority were female (70.3%), and most were from the Faculty of Health Sciences (41.2%). Students spanned all academic years: first year (22.8%), second year (39.2%), and third year (38.0%), reflecting varied levels of curriculum exposure to patient safety. Detailed demographic data are presented in Table I.

Table I: Sociodemographic characteristics of respondents

Variable	Category	Frequency (%)
Gender	Male	100 (29.7)
	Female	237 (70.3)
Age	<21	20 (5.9)
	21-23	218 (64.7)
	>23	99 (29.4)
Faculty	Health Sciences	139 (41.2)
	Pharmacy	109 (32.3)
	Medicine	89 (26.4)

Knowledge

As shown in Table II, while 99.1% of students had heard of "patient safety," only 21.4% understood the term "near miss." About 91.7% were reported to have received formal patient safety education. Positive attitudes were relatively common, with 73.0% supporting mandatory safety training, and 67.1% showing confidence in incident reporting.

Table II: Knowledge of respondents towards patient safety

Question	Yes (%)	No (%)
Heard of "patient safety"?	334 (99.1)	3 (0.9)
Understand the term "near miss"?	72 (21.4)	265 (78.6)
Aware of the importance of hand hygiene?	337 (100.0)	0 (0.0)
Know about root cause analysis?	172 (51.0)	165 (49.0)
Received formal education on patient safety?	309 (91.7)	28 (8.3)

Attitudes

Students demonstrated strong positive attitudes, with 73.0% supporting mandatory patient safety training. Confidence in reporting safety incidents was high (67.1%). The detailed attitude responses are shown in Table III.

Table III: Attitude of respondents towards patient safety

Statement	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
Patient safety is a top priority.	113 (33.5)	220 (65.3)	0 (0.0)	0 (0.0)	4 (1.2)
Confident in identifying/reporting incidents	226 (67.1)	71 (21.1)	33 (9.8)	5 (1.5)	2 (0.6)
Healthcare providers should be accountable	69 (20.5)	205 (60.8)	60 (17.8)	2 (0.6)	1 (0.3)
Mandatory training for professionals	246 (73.0)	85 (25.2)	4 (1.2)	0 (0.0)	2 (0.6)
Willingness to speak up	0 (0.0)	164 (48.7)	8 (2.4)	0 (0.0)	2 (0.6)

Practices

However, practice was inconsistent. In Table IV, while 99.7% supported verifying patient identity, 70.3% believed reusing single-use devices after sterilisation is acceptable. Practices differed significantly by gender, faculty, and year of study ($p < 0.001$). Female students and those from the Faculty of Health Sciences scored higher in practice domains. Effect sizes: Cohen's d (gender) = 0.31; eta squared (faculty) = 0.07.

Table IV: Practices towards patient safety

Statement	True (%)	False (%)
Use of abbreviations is appropriate if commonly understood	301 (89.3)	36 (10.7)
Reusing single-use devices after sterilisation is acceptable	237 (70.3)	100 (29.7)
Verifying patient ID before procedures.	336 (99.7)	1 (0.3)
Administering medication without checking details.	112 (33.2)	225 (66.8)
Ignoring patient complaints is acceptable	112 (33.2)	225 (66.8)

Significant differences were observed in practice levels based on gender ($p = 0.003$), year of study ($p < 0.001$), and faculty ($p < 0.001$). Female students exhibited higher adherence to patient safety practices compared to males. Additionally, senior students displayed better practices. Faculty-wise, students from the Faculty of Health Sciences demonstrated superior practices compared to Pharmacy and Medicine.

Table V: Comparison of practice scores across demographic variables

Variable	Category	Mean practice score (SD)	p -value
Gender	Male	2.75 (± 0.85)	0.003
	Female	3.01 (± 0.82)	
Year of study	1st Year	2.61 (± 0.89)	<0.001
	2nd Year	2.88 (± 0.81)	
	3rd Year	3.10 (± 0.78)	
Faculty	Health sciences	3.09 (± 0.74)	<0.001
	Pharmacy	2.85 (± 0.81)	
	Medicine	2.65 (± 0.88)	

Discussion

The findings reveal that UniSZA health professions students possess substantial knowledge and generally positive attitudes towards patient safety, which is consistent with previous studies conducted globally (Alwhaibi *et al.*, 2020; Naser *et al.*, 2020). However, despite 99.1% of participants acknowledging awareness of the concept of "patient safety," only 21.4% demonstrated familiarity with the definition of a "near miss" in healthcare. This highlights a critical knowledge gap in understanding fundamental patient safety concepts among students across health-related fields, not just medicine.

The under-recognition of near misses is concerning because such events, defined as errors that could have caused harm but did not, either by chance or timely intervention, are valuable learning opportunities (Ahmed *et al.*, 2023). Although Ginsburg *et al.* (2012) primarily focused on staff behaviour in clinical settings, their findings are relevant here: cultivating a culture of safety must begin early, with student education emphasising the importance of recognising and reporting near misses. If students do not understand or recognise near misses, they are less likely to report or learn from them, which could negatively impact future

patient outcomes. Hence, embedding near-miss training into the pre-registration curriculum across all health faculties is vital.

Overall, respondents showed a positive attitude towards patient safety. Although most respondents (67.1%) expressed confidence in identifying and reporting incidents, this does not necessarily translate into actual reporting behaviour. Prior studies in Malaysia noted under-reporting due to fear of blame or lack of feedback (Nadarajan *et al.*, 2020; Ismail & Khalid, 2022). Strengthening a non-punitive reporting culture and embedding structured reporting simulations in training can bridge this gap. Encouraging open communication and ensuring feedback loops from reported incidents would further enhance students' practical engagement with patient-safety systems

Specifically, 67.1% expressed confidence in their ability to identify and report safety incidents. While this indicates promising self-efficacy, the survey-based design did not involve interviews or discussions with participants; therefore, statements such as "*students are willing to talk about patient safety*" were rephrased. Furthermore, only 25.2% of students strongly agreed that patient safety training should be mandatory. This does not equate to complete endorsement and highlights an important issue: students may not fully grasp the importance of patient safety education within their training. While the timing of formal safety instruction varies across faculties and years of study (see Methods), the inconsistency may account for varied perceptions. As Frenk *et al.* (2010) advocate, integrating patient safety as a core curriculum component ensures consistency and fosters a stronger culture of safety among future healthcare professionals.

This study also reveals inconsistencies in the application of safety practices. For instance, while nearly all students (99.7%) correctly agreed on the importance of confirming a patient's identity before drug administration, a core patient safety guideline, only 70.3% correctly rejected the reuse of single-use medical equipment. Alarming, 29.7% believed that single-use devices could be safely reused after sterilisation. This contradicts WHO (2023) guidelines, which emphasise that reusing single-use devices, even after sterilisation, poses a high risk of cross-contamination and infection. This highlights the need for clearer education on infection control and the rationales behind specific safety policies, especially regarding equipment use.

Another issue lies in documentation practices. While 89.3% believed it was acceptable to use commonly known acronyms in patient records, reliance on

abbreviations can cause miscommunication and lead to patient harm if misunderstood by other healthcare workers or stakeholders (Jayatilake *et al.*, 2023). Students must be taught not only about the dangers of ambiguous documentation but also how to balance clarity with efficiency in clinical records. Holper and colleagues (2020) emphasised that clarity in communication is an essential aspect of patient safety training.

In terms of demographic influences, patient safety practices were higher among female students, those from the Faculty of Health Sciences, and students aged 21–23. These findings mirror previous research, where demographic variables like gender, field of study, and educational level influence patient safety behaviour (Ismail & Khalid, 2022; Ayyad *et al.*, 2024). The association between higher years of study and better safety practices suggests that as students gain more clinical experience and academic exposure, their competence in patient safety improves.

Limitations

This study has several limitations. First, the cross-sectional design limits the ability to assess longitudinal changes in knowledge, attitudes, or behaviour over time. Future cohort studies are needed to track student progress as they advance through their programs. Second, self-reported data may be subject to response and social desirability biases, potentially leading participants to overestimate their knowledge or adherence to safety practices. This impacts the generalizability and accuracy of the findings. Additionally, two negatively worded items in Table IV ("*It is acceptable to reuse single-use devices*" and "*Abbreviations in records are always safe if commonly known*") may have been misunderstood by students. Such confusion could explain the unexpectedly high number of "*false*" responses. Future questionnaires should consider reverse scoring and clarity testing during pilot phases to mitigate misinterpretation (Lilienfeld & Waldman, 2015). Categorising outcomes based on sample means may introduce arbitrariness; however, similar results were obtained using median cut-offs, supporting the robustness of findings.

The study's strengths include a high response rate and the inclusion of students from diverse faculties and academic years, providing a broad perspective on the current state of patient safety awareness at UniSZA. Reliability analysis indicated acceptable internal consistency, supporting the credibility of the findings. Future research should consider incorporating qualitative interviews to explore the motivations

behind responses and the real-life barriers students face in implementing safety practices.

Recommendations

Several important patient safety gaps were identified that warrant targeted educational and curricular interventions. First, the low level of familiarity with the concept of “near misses” suggests that students may not fully appreciate the importance of identifying and learning from incidents that do not result in patient harm. This highlights the need to introduce near-miss education early in the curriculum and to reinforce these concepts through simulation-based activities, allowing students to recognise, report, and reflect on such events in a safe learning environment.

In addition, inconsistent practices regarding the reuse of single-use medical items point to gaps in understanding infection prevention and control principles. Reinforcing existing infection control guidelines during practical and skills-based training, together with clear explanations of the scientific and safety rationale behind these guidelines, may help promote more consistent and safe practices.

The uncritical use of acronyms in clinical documentation also emerged as a concern, as it increases the risk of miscommunication and medication errors. This underscores the importance of explicitly teaching safe documentation practices, supported by real-world examples that illustrate how ambiguous or inappropriate acronym usage can lead to serious clinical consequences.

Finally, the limited endorsement of mandatory patient safety training indicates a need for stronger institutional commitment. Integrating patient safety as a compulsory module across all health-related faculties would help ensure a standardised foundation of safety knowledge, attitudes, and practices among future healthcare professionals, ultimately contributing to safer patient care.

By integrating these elements into existing coursework and clinical simulations, students can develop stronger patient safety behaviours before entering the workforce. Simulation-based learning, as suggested by Aggarwal and colleagues (2010), offers a valuable platform to practice real-world patient safety scenarios in a low-risk environment. Such practical exposure, combined with curriculum modifications, could significantly enhance safety outcomes.

Conclusion

This study highlights that while UniSZA health professions students demonstrate high awareness of the general concept of patient safety and confidence in incident reporting, critical gaps remain in understanding specific safety practices such as near-miss recognition, single-use device protocols, and safe documentation. Tailored curriculum interventions, including simulation training, mandatory safety modules, and early integration of patient safety education, are essential to bridge these gaps. Furthermore, faculty-specific efforts should ensure consistent exposure across different programs. By reinforcing foundational safety principles early in training and continuously throughout academic progression, we can better prepare future healthcare professionals to uphold patient safety standards and foster a stronger culture of safety in clinical practice.

Conflict of interest

The authors declare no conflict of interest.

Source of funding

The authors did not receive any funding.

Acknowledgement

The authors hereby express their gratitude to the respondents of this study.

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