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Assessment of medical errors awareness among nursing students during their clinical internship: Palestinian perspectives

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Abstract

Background Medical errors are a major concern for patient safety in healthcare institutions globally, making this a critical public health issue leading to significant problems, including increased hospital stays and higher mortality rates.

Objectives This study aims to assess nursing students' awareness of medical errors during their clinical internship.

Methods A cross-sectional study was conducted with 280 intern nursing students from the Arab American University in Palestine. A self-administered questionnaire, comprising 43 items across six subscales based on a medical error scale was used to collect data. The analysis was performed using SPSS version 29, with data collected during the Fall of semester 2024.

Results The overall mean awareness score was 161 (SD = 75.34) out of a possible 215, with a mean item-level score of 3.74 (on a 5-point scale). Among the subscales, the highest mean score was observed in Care Practices (M = 4.06), while the lowest was in Patient Falls (M = 3.38). Approximately 39.6% of students reported medical errors, with 12.5% involving blood transfusion, 11.4% medication errors, and 20.1% categorized as other errors (e.g., needlestick injuries). The majority (65.7%) reported not committing any errors during their clinical practice.

Conclusion The study suggests that intern nursing students have a low tendency to commit medical errors, which bodes well for the implementation of future patient safety protocols. These findings indicate that nursing students are becoming increasingly proficient in safe care practices, thereby reducing medical error rates, and enhancing patient safety in clinical settings.

Clinical trial number Not applicable

Keywords Awareness, Clinical internship, Medical errors, Nursing student

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Background

Medication errors are a significant global issue often resulting from various contributing factors [1], and posing serious risks to patient safety patient safety [2, 3]. Hospitalized patients are particularly vulnerable to these errors due to their illness, comorbidities, and the number of medications they require [4]. Medical errors are defined as errors in planning or execution that result in or have the potential to result in, unexpected adverse outcomes [5]. In simpler terms, they are considered preventable "adverse events" [6]. The World Health Organization (WHO) estimates medication errors cost the global healthcare system over $42 billion annually [7]. Medication errors arise from inadequate medication systems, human factors, and unconducive environments, including ineffective staffing during prescribing, transcribing, dispensing, administration, or monitoring [7–9]. Recognizing the urgency, WHO held a global summit, aiming to reduce medication-related adverse harm by 50% [7]. As one of the most frequent patient safety concerns worldwide, medication error has been linked to adverse events, increased mortality and morbidity rates, complications, and prolonged hospital stay hospital [8, 10, 11].

Medical and nursing students must be trained to identify risks, report errors, enhance systems with a deep awareness of human fallibility, and communicate errors to patients, fostering a patient safety-centered healthcare culture [12–14]. Prior research indicates a high prevalence of medication errors among undergraduate nursing students, accompanied by a failure to report these errors [3, 15]. Conversely, a recent study in Saudi Arabia found most nursing students exhibited a low tendency toward medication errors [14]. Creating a culture of safety is critical for improving patient quality care [16, 17]. Key elements include transparency, feedback on safety concerns, and open discussion without fear of blame. While nursing curricula cover theoretical knowledge required for clinical practice, they often lack emphasis on the practical application of safety principles [18].

Integrating patient safety education into courses utilizing diverse teaching strategies, such as simulation, online modules, and virtual reality, can improve students' competency in safe medication administration [14, 19, 20]. Students may fear making mistakes, especially those endangering patients. Implementing drug safety in clinical settings is essential for developing professional nursing competency. Nursing curricula should incorporate focused instruction on medical errors and patient safety, as these important topics continue to develop in both academic and clinical contexts [14]. Currently, Palestine lacks a regulatory framework for managing, reporting, monitoring, and educating healthcare professionals about medication errors [21]. Furthermore, most of the studies conducted in Palestine have addressed nurses' awareness of medication errors [21, 22], but no previous studies have specifically targeted undergraduate nursing students. Therefore, the aim of this study is to assess nursing students' awareness of medication errors during their clinical internships.

Materials and methods

Setting and participants

A cross-sectional study was conducted with 280 final-year nursing students enrolled in a clinical internship program, commonly referred to as intern nursing students, who had not yet graduated, from the Arab American University in Palestine. A self-administered questionnaire, comprising 43 items across six subscales based on a medical error scale was used to collect data. The data was collected during the Fall semester of 2024.

All nursing interns participated in the study. The Raosoft online sample calculator (http://www.raosoft.com/samplesize.html) was used to determine the required sample size. At a 95% confidence level, with a 5% margin of error, a population size of 400, and a predicted response rate of 50%, the minimum sample size required was 197. Ultimately, 280 nursing interns agreed to participate in the research.

Inclusion and exclusion criteria

Participants were selected based on the following inclusion criteria: (1) being a final-year nursing student enrolled in the clinical internship program at the Arab American University in Palestine during the Fall semester of 2024, (2) having completed at least one month of clinical training as part of the internship, and (3) providing informed consent to participate in the study.

Students were excluded if they: (1) had already graduated from the nursing program, (2) were not actively engaged in clinical internship training at the time of data collection, or (3) submitted incomplete survey responses. Additionally, responses from the 20 students who participated in the pilot testing were excluded from the final dataset to maintain data integrity.

An explanatory letter outlining the study's goals and aims was included with the online survey to guarantee data quality and accuracy throughout the data collection procedure. To improve participant understanding and involvement, the researcher included a mobile phone number in the letter to address any questions or concerns.

Study instruments

The survey used in the study included the following tools: demographic details of participants, (age, gender, and duration of internship), open-ended questions about reporting errors (e.g., "Did you make any medical

mistakes? Did you report any medical errors?, and What kind of mistake did you make?", and the Medical Error Scale for Nurses. Data from nursing students was collected using the original instrument, which was distributed in English.

The Medical Error Scale for Nurses [23] consists of 43 items distributed across six subscales: "medication practices, care practices, communication, falls, transfusions of blood and blood products, and other regulated practices". Factor 1(Falls) includes 12 items, Factor 2 (Blood and Blood Products Transfusion) contains 6 items, Factor 3 (Medication Practices) contains 6 items, Factor 4(Care Practices contains eight items), Factor 5(Communication) contains 5 items, and Factor 6(Other Controlled Practices) contains 6 items. A 5-point Likert scale was used to assess participants' responses. The response options were: "Always" (5), "Frequently" (4), "Sometimes" (3), "Rarely" (2), and "Never" (1). A score near 43 (minimum score 43×1) indicated that the nurse was not cautious about medical errors or was at risk of making them, and a score near 215 (maximum score 43×5) indicated that the nurse was disciplined or concerned about medical errors. Subscales and overall scale scores, ranging from 1 to 5, were calculated by dividing the mean scores for each subscale by the total number of items, facilitating easier comparisons.

Each participant's total questionnaire scores were translated to percentages by dividing the number of right answers by the total scores (215), then multiplying the results by 100. This meant that each participant's overall response might be anything between 0% and 100%. Then, according to Alkubati et al. [24] and Farzaei et al. [25], the knowledge scores were divided into three groups: low knowledge (0–33.3), moderate knowledge (33.4–66.6), and strong knowledge (66.7–100).

Validity and reliability of the medical error scale for nurses (MESN):

The MESN, developed by Öztürk and Kahriman [23], is a psychometrically validated instrument designed to assess nurses' behaviors and awareness related to medical errors across six subscales: Falls, Blood and Blood Products Transfusion, Medication Practices, Care Practices, Communication, and Other Controlled Practices. Content validity was established through evaluation by a panel of 15 nursing experts, resulting in a Content Validity Index (CVI) of 0.82, indicating acceptable content validity. Construct validity was confirmed via exploratory and confirmatory factor analyses conducted with a sample of 298 nurses. The confirmatory factor analysis demonstrated a good model fit with the following indices: $\chi^2/df = 2.52$, Root Mean Square Error of Approximation (RMSEA) = 0.072, Comparative Fit Index (CFI) = 0.90, and Incremental Fit Index (IFI) = 0.90.

Regarding reliability, the MESN exhibited high internal consistency, with a Cronbach's alpha coefficient of 0.89 for the overall scale. Subscale Cronbach's alpha values ranged from 0.71 to 0.91, indicating good to excellent reliability. Test–retest reliability was assessed with a separate group of 50 nurses over a two-week interval, yielding a correlation coefficient of $r = 0.562$ ($p < 0.0001$), confirming the scale's stability over time [23].

In our study, Cronbach's alpha coefficient of 0.99 for the overall scale. Additionally, three experts—two nursing PhD holders and one clinical instructor supervising intern students evaluated its content validity. They assessed its accuracy, provided recommendations to improve clarity, and determined whether the items adequately reflected the study's main objectives.

Ethical considerations

Ethical approval for this study was obtained from the Institutional Review Board (IRB) at the Arab American University (Approval Number: 2024/A/172/N). All procedures adhere to the principles of the Declaration of Helsinki. Participation was entirely voluntary, with assurances that withdrawal from the study would not affect participants' grades or academic performance. Strict measures were implemented to ensure confidentiality and privacy by refraining from collecting or disclosing any identifying information. Informed consent was obtained from all participants prior to their involvement.

Data collection method

All intern nursing students were provided access to online surveys distributed via social media groups created by the researcher and the coordinator for the internship practice. Before distribution, the survey link was evaluated for usability and functionality on a pilot sample of 20 intern nursing students who met the inclusion criteria; however, their responses were excluded from the final analysis. To ensure completeness, all survey components were marked as mandatory, and only one submission per participant was allowed, with additional attempts automatically rejected. Data collection took place during the fall semester of 2024.

Data analysis

Statistical analysis was performed using version 29.0 of the Statistical Package for Social Sciences (SPSS). The data was summarized using descriptive statistics, such as standard deviations, percentages, and frequencies. Mean scores for each subscale category were analyzed using descriptive statistics. Independent t-tests were conducted to examine the associations between demographic variables (such as age, gender, and clinical placement) and medical error awareness scores.

Table 1 Relationship between demographic characteristics and medical error scores ($N = 280$)

Characteristic	Categories	*n*	%	Mean ± SD	t(*p*-value)
Age, in years 22.30 ± 1.80					
	≤ 22	193	68.9	165.13 ± 58.24	0.145 (0.884)
	> 22	87	31.1	164.03 ± 60.19	
Gender					
	Male	90	32.1	137.52 ± 61.08	-5.633 (< 0.001)
	Female	190	67.9	177.71 ± 53.07	
Clinical Placement during internship					
	Medical/Surgical	129	46.1%	157.76 ± 64.40	-1.858 (0.064)
	ICUs/Emergency	151	53.9%	170.80 ± 52.92	

*t = independent t-test

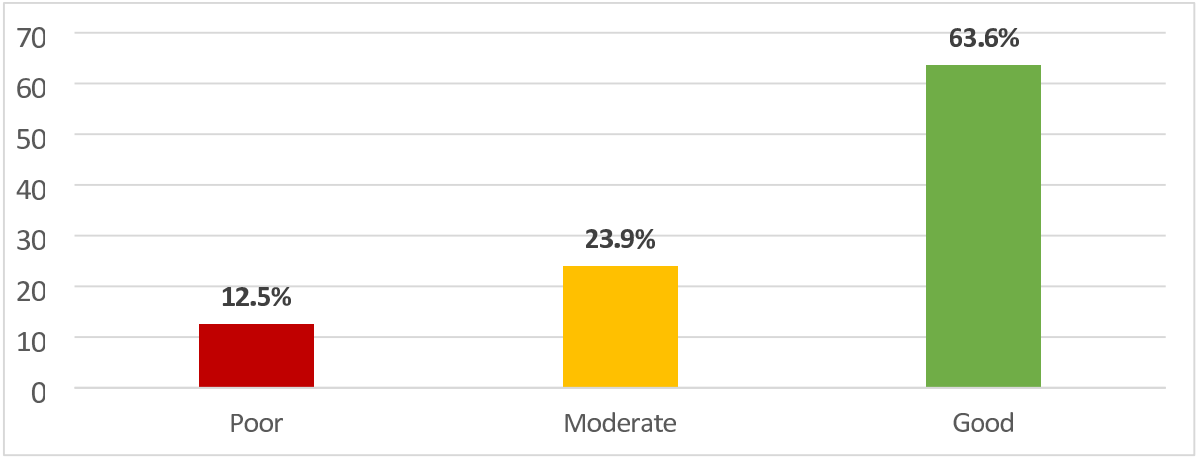

Fig. 1 Levels of students' medical error scores

Table 2 Reporting medical errors (MEs)

Questions related to MEs	Frequency (Yes)	%
Did you report any MEs?	111	39.6
Blood transfusion	35	12.5
Drug error	32	11.4
Others (needle stick, wrong insertion of cannula)	56	20.1
Non	184	65.7

Percentage (%)

Results

As shown in Table 1, the characteristics of interns include a mean age of 22.3 years. The majority were male nursing students (67.9%), and 53.9% completed their clinical placement during the internship in ICUs or Emergency departments. There was a significant relationship between gender and medical error scores, where female students rated higher scores than male students ($p < 0.001$).

As described in Fig. 1, About two thirds (63.6%) of students had good scores for medical errors followed by moderate level (23.9%) where the lowest had a poor level (12.5%).

According to Tables 2, 39.6% of interns reported MEs. The majority of intern nursing students (65.7%) reported not making any errors during their internship clinical practice. Among those who reported errors, 12.5% were related to blood transfusion11.4%, to drug errors, and 20.1% to other errors, such as "needle stick, wrong insertion of canula".

Table 3 presents the distribution of interns' responses regarding medical errors (MEs) in clinical practice. Overall, the most frequently selected response across all items was "Always, "accounting for 48.2% of all responses, indicating a generally high level of adherence to safe clinical practices among participants.

Across the six factors (F1–F6), specific items stood out with the highest frequency of "Always" responses within each subscale:

- Factor 1 – Falls: The highest adherence was reported for Q9 ("I visit a patient at risk of falling frequently"), reflecting strong attention to fall prevention practices.
- Factor 2 – Blood and Blood Products Transfusion: The most consistently followed practices were reported in Q16 ("Before I apply blood and blood products, I identify the patient") and Q17 ("I

Table 3 Errors in clinical application

		Questions	Never N(%)	Rarely N(%)	Sometimes N(%)	Often N(%)	Always N(%)
Factor 1- Falls	Q1.	I put the patient bell in a place where the patient can easily reach	53(18.9)	28(10.0)	50(17.9)	28(10.0)	121(43.2)
	Q2.	I always inform the patient to call the nurse when she wants to stand up.	41(14.6)	19(6.8)	59(21.1)	38(13.6)	123(43.9)
	Q3.	I put pillows on the bed edges of agitated patients	39(13.9)	23(8.2)	46(16.4)	33(11.8)	139(49.6)
	Q4.	I take unused materials from the patient's room.	56(20.0)	25(8.9)	56(20.0)	39(13.9)	104(37.1)
	Q5.	I always lock beds or wheelchairs when not using	44(15.7)	22(7.9)	50(17.9)	40(14.3)	124(44.3)
	Q6.	I constantly monitor patients during transport and transfer	40(14.3)	21(7.5)	48(17.1)	41(14.6)	130(46.4)
	Q7.	Patient companions tell the nurse when they leave	31(11.1)	37(13.2)	63(22.5)	51(18.2)	98(35.0)
	Q8.	If the patient gets up for the first time, I will surely accompany him	37(13.2)	30(10.7)	38(13.6)	45(16.1)	130(46.4)
	Q9.	I visit a patient at risk of falling frequently	38(25)	25(8.9)	42(15.0)	32(11.4)	143(51.1)
	Q10.	I monitor the place if the floor is wet in patient rooms/corridors	39(13.9)	26 (9.3)	43(15.4)	45(16.1)	127(45.4)
	Q11.	I monitor the patient after anti-hypertensive and sedative medications	39(13.9)	19(6.8)	41(14.6)	49(17.5)	132(47.1)
	Q12.	I inform patients and their companions about the causes and precautions of falls	38(13.6)	26(9.3)	45(16.1)	43(15.4)	128(45.7)
	Total- F1		**41.3(14.7)**	**25.1(8.9)**	**48.4(17.3)**	**40.3(14.4)**	**124(44.2)**
Factor 2- Blood and Blood Products Transfusion	Q13.	I apply blood and its products according to the suitable technique	39(13.9)	22(7.9)	42(15.0)	39(13.9)	138(49.3)
	Q14.	I verify the patient's blood type information before applying blood and blood products	40(14.3)	18(6.4)	47(16.8)	35(12.5)	140(50.0)
	Q15.	I check the label information before applying blood and blood products	41(14.6)	24(8.6)	37(13.2)	35(12.5)	143(51.1)
	Q16.	Before I apply blood and blood products I identify the patient	42(15.0)	20(7.1)	37(13.2)	35(12.5)	146(52.1)
	Q17.	I prepare blood and blood products according to the procedure	43(15.4)	25(8.9)	36(12.9)	28(10.0)	148(52.9)
	Q18.	After applying blood and blood products, I monitor the patient for complications	39(13.9)	23(8.2)	36(12.9)	39(13.9)	143(51.1)
	Total-F2		**40.7(14.5)**	**22(7.8)**	**43.2(12.2)**	**35.2(12.5)**	**143(51.1)**
Factor 3-Medication Practices	Q19.	I administer the drug after I have verified the patient's ID	44(15.7)	18(6.4)	40(14.3)	31(11.1)	147(52.5)
	Q20.	I know the injection sites and make the drug to the right area	44(15.7)	17(6.1)	47(16.8)	33(11.8)	139(49.6)
	Q21.	I do not prepare drugs without checking the physician's order	45(16.1)	21(7.5)	42(15.0)	28(10.0)	144(51.4)
	Q22.	I record my drug applications	38(13.6)	27(9.6)	37(13.2)	37(13.2)	141(50.4)
	Q23.	I prepare drugs according to the aseptic technique in oral drug application	42(15.0)	18(6.4)	38(13.6)	38(13.6)	144(51.4)
	Q24.	I prepare sterile drugs for parenteral drug administration	38(13.6)	21(7.5)	43(15.4)	37(13.2)	141(50.4)
	Total-F3		**41.8(14.9)**	**20.3(7.3)**	**41.2(14.7)**	**34(12.1)**	**142.7(50.9)**

Table 3 (continued)

		Questions	Never N(%)	Rarely N(%)	Sometimes N(%)	Often N(%)	Always N(%)
Factor 4-Care Practices	Q25.	I monitor the local impact of my care practices	43(12.1)	23(8.2)	47(16.8)	40(14.3)	136(48.6)
	Q26.	I monitor the systemic effects of my care practices	35(12.5)	28(10.0)	39(13.9)	39(13.9)	139(49.6)
	Q27.	I check and verify the patient's identity information in my applications.	38(13.6)	21(7.5)	36(12.9)	43(15.4)	142(50.7)
	Q28.	Immediately notify the physician of any abnormal conditions that I have observed	38(13.6)	20(7.1)	36(12.9)	39(13.9)	47(52.5)
	Q29.	Before application, I will check if the tool/equipment I will use is working correctly	39(13.9)	25(8.9)	39(13.9)	38(13.6)	139(49.6)
	Q30.	Knows the effect of care practices on the patient	34(12.1)	26(9.3)	39(13.9)	42(15.0)	139(49.6)
	Q31.	I follow the patient regularly	35(12.5)	23(8.2)	42(15.0)	44(15.7)	136(48.6)
	Q32.	I perform patient monitoring "follow-up" as needed	35(12.5)	26(9.3)	40(14.3)	43(12.1)	136(48.6)
	Total-F4		**37.1(13.3)**	**21.8(7.8)**	**39.8(14.2)**	**41(14.6)**	**126.8(45.3)**
Factor 5-Communication	Q33.	I share information about patient care and results during shift changes	37(13.2)	28(10.0)	35(12.5)	45(16.1)	135(48.2)
	Q34.	I verify non-explicit requests/orders that may cause problems	38(13.6)	22(7.9)	41(14.6)	44(15.7)	135(48.2)
	Q35.	I record all information about the patient's treatment for nurse observation	36(12.9)	31(11.1)	39(13.9)	41(14.6)	133(47.5)
	Q36.	Communicate patient's complaints/problems to healthcare team members immediately	36(12.9)	23(8.2)	39(13.9)	53(18.9)	129(46.1)
	Q37.	I dispose of the materials according to the color of the medical waste bins	39(13.9)	21(7.5)	38(13.6)	40(14.3)	142(50.7)
	Total F-5		**37.2(13.3)**	**25(8.9)**	**38.4(13.7)**	**44.6(15.9)**	**134.8(48.1)**
Factor 6 Other Controlled Practices	Q38.	I do not leave the medication with the patient to drink/apply the medication.	41(14.6)	13(4.6)	44(15.7)	48(17.1)	134(47.9)
	Q39.	I don't apply the medication prepared by someone else to the patient.	41(14.6)	19(6.8)	41(14.6)	35(12.5)	144(51.4)
	Q40.	In the case of oral medication, I stay with him until he drinks it.	39(13.9)	21(7.5)	45(16.1)	36(12.9)	139(49.6)
	Q41.	I replace cannula/catheters for a vessel that fills 72 h	38(13.6)	19(6.8)	47(16.8)	40(14.3)	136(48.6)
	Q42.	I do not give under / high-dose medication "abnormal dose"	41(14.6)	15(5.4)	51(18.2)	38(13.6)	135(48.2)
	Q43.	I do not use the device/tools that I do not know	39(13.9)	18(6.4)	47(16.8)	32(11.4)	144(51.4)
	Total F-6		**39.8(14.2)**	**17.5(6.3)**	**45.8(16.4)**	**38.2(13.6)**	**138.7(49.5)**
	TTotal Score		**39.7(14.2)**	**22(7.8.3)**	**42.8(15.3)**	**38.9(13.9)**	**135(48.2)**

prepare blood and blood products according to the procedure").

- Factor 3 – Medication Practices: The highest-scoring items were Q19 ("I administer the drug after I have verified the patient's ID") and Q21 ("I do not prepare drugs without checking the physician's order"), demonstrating diligence in medication safety protocols.
- Factor 4 – Care Practices: The item with the highest adherence was Q28 ("Immediately notify the physician of any abnormal conditions that I have observed"), highlighting proactive communication and monitoring.
- Factor 5 – Communication: The most frequently practiced behavior was reported in Q37 ("I dispose of the materials according to the color of the medical waste bins"), indicating proper waste management practices.
- Factor 6 – Other Controlled Practices: The highest "Always" responses were for Q39 ("I don't apply the medication prepared by someone else to the patient") and Q43 ("I do not use the device/tools that I do not

Table 4 Descriptive statistics for total scores by subscale

Statistic	F1 Falls	F2 Blood Transfusion	F3 Medication	F4 Care	F5 Communication	F6 Other Practices	Total Score
N	280	280	280	280	280	280	280
Mean	43.8	22.7	22.6	30.4	18.8	22.7	161
Median	48	27	27	36	21	25	180
Mode	60	30	30	40	25	30	215
Standard deviation	15.3	8.61	8.59	11.2	6.99	4.25	75.34
Range	48	24	24	32	20	24	172
Minimum	12	6	6	8	5	6	43
Maximum	60	30	30	40	25	30	215

F1(Falls), F2(Blood and Blood Products Transfusion), Fr 3(Medication Practices), F 4(Care Practices), F 5(Communication), F 6(Other Controlled Practices)

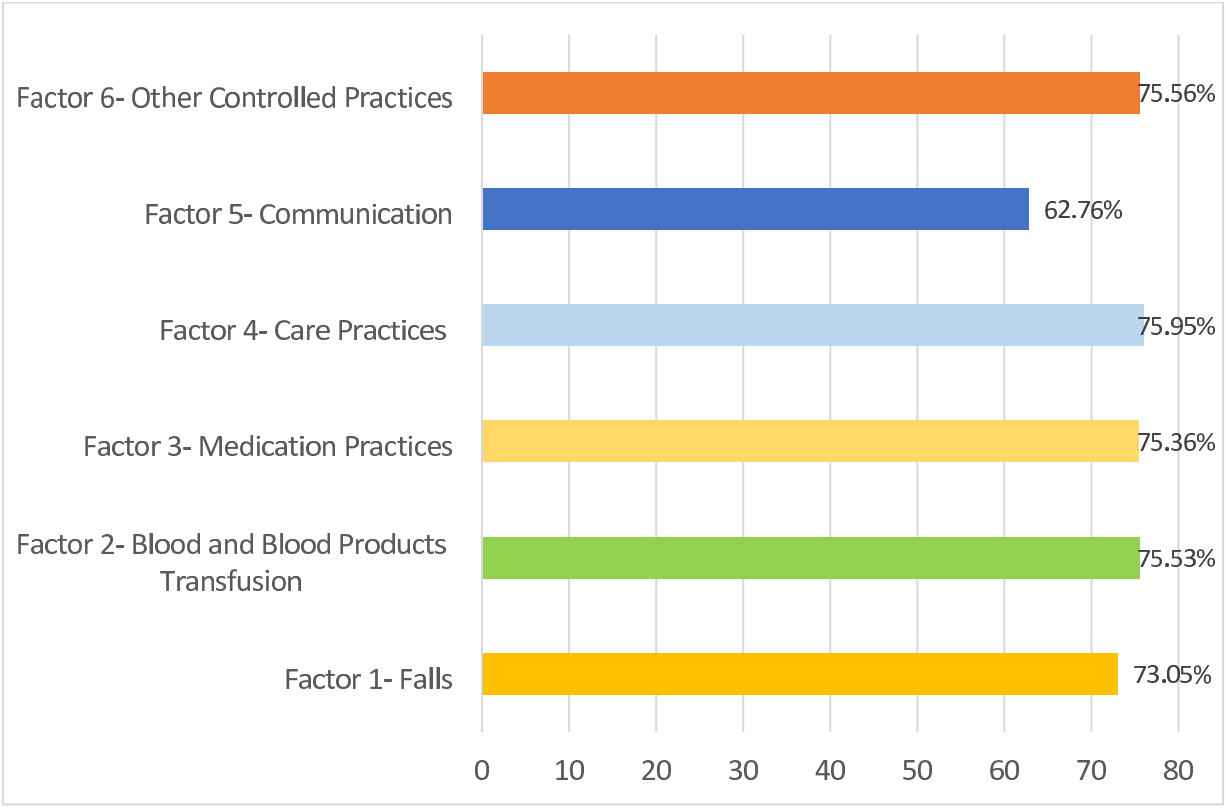

Fig. 2 Descriptive statistics for percentages of the subscale categories

know"), reflecting strict compliance with medication and equipment safety standards.

These results collectively suggest that intern nursing students demonstrated strong awareness and practice of patient safety behaviors, particularly in high-risk areas such as blood transfusion, medication administration, and fall prevention.

The total scores for each subscale, comprising 43 items categorized into six subscales, are presented in Table 4. The overall findings revealed a mean total score of 161, with **a** median of 180, a mode of 215, and a standard deviation of 75.34. The scores ranged from a minimum of 43 to a maximum of 215, resulting in a range of 172.

As illustrated in Fig. 2, the highest percentage score was observed in Factor 4- Care Practices (75,95%), reflecting the importance of the caring concept, which is a fundamental component of nursing and is emphasized from the outset of nursing education. Conversely, the lowest score was recorded for Factor 5- Communication (62.76%), highlighting a critical area for improvement. This finding emphasizes the need to strengthen communication skills during internship training to ensure comprehensive, safe, and effective nursing care.

Discussion

Medical errors are a significant public health issue that impacts patient safety in healthcare facilities worldwide. They can lead to various adverse outcomes, including increased mortality, morbidity, and length of hospitalization [8, 10, 11]. Additionally, MEs negatively affect patient safety and confidence in healthcare systems [26]. The knowledge and experience gained during nursing play a crucial role in enhancing students' ability to ensure and improve patient safety in clinical practices [27]. While the primary objective of this study was to assess final-year nursing students' awareness of medical errors during their clinical internships, it's important to note that the Medical Error Scale for Nurses (MESN) employed in this research evaluates not only awareness but also attitudes and practices related to medical errors across six subscales: falls, blood and blood products transfusion, medication practices, care practices, communication, and other controlled practices. Therefore, the study inherently provides insights into the students' attitudes and practices concerning medical errors.

The findings of this study revealed that the majority of nursing students (65.7%) reported not committing any errors during their internship clinical practice. These results are promising, as they reflect the strong foundation of nursing students in enhancing patient safety. This can be attributed to the integration of various strategic teaching methods, including simulation labs, which prioritize patient safety as a core objective [19, 28]. Simulation-based education has also been shown to enhance nursing students' awareness of medical errors by providing opportunities to practice skills and make decisions within a safe, controlled environment [29, 30].

However, the high prevalence of interns reporting MEs contradicts findings from a review study, which reported approximately 48.60% of nursing students failed to report medication errors, emphasizing the impact of underreporting on patient safety [31]. This discrepancy highlights the need to foster a culture of transparency, accountability, and caring during clinical training. Interventions such as targeted education, enhanced supervision by clinical instructors, and systematic efforts to identify and mitigate the root cause of MEs are critical for improving reporting practices and overall patient safety outcomes [14].

The issue of underreporting is further compounded by various contextual and cultural factors. Fear of blame, hierarchical structures, and lack of supportive environments are significant barriers that deter nursing students from reporting errors. In Middle Eastern healthcare contexts, such as Palestine, these factors may be more pronounced due to cultural norms and institutional practices [32]. For instance, a study by Alrasheeday et al. [15] highlighted discrepancies in patient safety culture perceptions among nursing students between academic and clinical settings, emphasizing the need for interventions that address these cultural and systemic barriers. Future research employing qualitative or mixed-method designs could provide deeper insights into these issues, informing the development of culturally appropriate interventions to promote transparency and patient safety [15].

Conversely, a small percentage of students reported specific errors related to blood transfusion, drug errors, and other incidents, such as "needle stick, wrong insertion of cannula". These findings underscore the importance of revising nursing curricula to place greater emphasis on these critical areas [33]. Such errors not only jeopardize patient safety but also expose students to occupational hazards. A review study further reported these findings by reporting a high prevalence of medication errors among nursing students [31]. These highlight the need to enhance the pharmacological aspects of nursing education and address various aspects of MEs.

Regarding interns' responses related to MEs in clinical practice, 48.2% of responses fell under the 'always' category. These findings are consistent with a previous study conducted in Saudi Arabia, where the majority of students also reported 'always' when addressing errors related to "falls, blood and blood products transfusion, medication practices, care practices, communication, and other controlled practices". However, the mean score in that study (4.36) was higher than in our study (3.74) (15). This difference could be attributed to the fact that data collection in our study occurred during the 7th war October, a highly stressful situation that may have impacted students' awareness of medical errors. Hence, during their internship, nursing students are at significant risk of stress in their practice, which could jeopardize patient safety, clinical performance, and the quality of care provided to patients [34, 35].

According to the study findings, the mean scores across subscale categories revealed that the highest mean score was related to Care Practices, reflecting the importance of the caring concept, which is a fundamental component of nursing and is emphasized from the first year of nursing education. In contrast, the lowest score was recorded for Communication, highlighting a critical area for improvement. This finding emphasizes the need to strengthen communication skills during internship training to ensure comprehensive, safe, and effective nursing care. This contrasts with a previous study, which found that awareness of medication errors was the highest [14]. ICUs frequently experience medical errors and adverse these issues, robust reporting systems are needed, typically utilizing various techniques [36]. Similarly, Bam [37], identified medication errors as the most common prevalent type of ME. Additionally, nursing students' practical understanding of pharmaceutical

therapy remains inconsistent and unregulated, even after completing pharmacology courses as part of their undergraduate studies [38], partly due to inadequate clinical supervision [39].

In conclusion, while the study's primary objective was to assess awareness, the comprehensive nature of the MESN allowed for a broader evaluation of nursing students' attitudes and practices related to medical errors. The insights gained from this multifaceted assessment can inform curriculum development and training programs aimed at enhancing all aspects of medical error prevention and patient safety.

Limitations

The study has several limitations. Self-administered surveys are often considered a limitation due to the potential biases in question interpretations. Furthermore, restricting data collection to a single university may have affected the generalizability of the findings. However, examining intern nursing students' experiences across different contexts could help identify effective strategies and preventative measures in this setting. Furthermore, the study did not explore barriers to reporting medical errors, which warrants further investigation.

Moreover, although the Medical Error Scale for Nurses (MESN) used in this study has demonstrated strong psychometric properties in its original validation with professional nurses, no formal validation (e.g., exploratory, or confirmatory factor analysis) was conducted within the current nursing student population. This may affect the applicability of the scale's factor structure to this specific group.

Implication for practice

The findings of this study can inform the development and implementation of targeted educational programs designed specifically for nursing interns to enhance their understanding of MEs and their prevention. These programs focus on strengthening interns' knowledge of the types, risks, and consequences of MEs while equipping them with evidence-based strategies to mitigate such errors in clinical practice. Moreover, the study highlights the critical need to design and evaluate interventions aimed at improving interns' competency in patient safety protocols. Additionally, incorporating specific methodological and instructional enhancements could further contribute to evidence-based clinical patient safety practices and inform policy decisions. In turn, these improvements would support the culture of accountability within healthcare institutions fostering adherence to patient safety standards.

Conclusion

The findings of this study suggest that nursing interns exhibited a low tendency to commit medical errors, which is a promising indicator for the implementation of future patient safety protocols. These results indicate that intern nursing students are progressively developing proficiency in safe care practices, contributing to a reduction in medical error rates and overall enhancement of patient safety in clinical settings. However, the study identified that awareness of fall prevention had the lowest mean score, highlighting the need to emphasize this critical aspect in nursing education and reinforce it during internship training. The findings also underscore the importance of providing adequate education to nursing students as future healthcare professionals to maximize patient safety and reduce preventable harm in clinical settings.

Abbreviations

MEs Medical errors
WHO World health organization

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Author contributions

Basma Salameh: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Validation, Visualization, writing – original draft, Writing – review & editing. Sameer A. Alkubati; Data curation, Formal analysis, Writing– review & editing. Mayas Kassabre; Writing– original draft, writing– review & editing. Faeda Qtait; Writing – original draft, writing– review & editing. Bahaaeddin M. Hammad; Conceptualization, Data curation, Writing – review & editing. Abeer Hussein; Conceptualization, Data curation, Writing – review & editing. Rasmieh Anabtawy; Conceptualization, Data curation, Writing – review & editing. Jamal Qaddumi; Conceptualization, Data curation, Writing – review & editing. Mohammed ALBashtawy; Writing – original draft, Writing – review & editing. Ola Mousa; Conceptualization, Data curation, Methodology.

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Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

for this study was obtained from the Institutional Review Board (IRB) at the Arab American University (Approval Number: 2024/A/172/N). All procedures adhere to the principles of the Declaration of Helsinki. Participation was entirely voluntary, with assurances that withdrawal from the study would not affect participants' grades or academic performance. Strict measures were implemented to ensure confidentiality and privacy by refraining from collecting or disclosing any identifying information. Informed consent was obtained from all participants prior to their involvement.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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