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LEVEL OF PATIENT SAFETY COMPETENCY AND ASSOCIATED BARRIERS AMONG EMERGENCY NURSES IN SECONDARY CARE HOSPITALS OF MIRPUR AJK : A CROSS-SECTIONAL ANALYTICAL STUDY

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ABSTRACT

Background: Patient safety competency is essential for emergency nurses working in high-pressure clinical environments.

Objective: To assess patient safety competency and identify associated factors and barriers among emergency nurses in secondary care hospitals of Mirpur, Azad Jammu and Kashmir.

Methodology: A quantitative cross-sectional analytical study was conducted among 109 emergency nurses from six hospitals using convenience sampling. Data were collected using the 45-item Patient Safety Competency Self-Evaluation tool and a researcher-developed 20-item barriers questionnaire and analysed using descriptive statistics and chi-square tests.

Results: Overall, 75 nurses (68.8%) had high competency, 31 (28.4%) moderate competency, and 3 (2.8%) low competency. Competency was significantly associated with age (p=0.046), but not education (p=0.213). Commonly reported barriers included fatigue (103; 94.5%), high patient volume (102; 93.6%), time pressure (91; 83.5%), and fear of blame (92; 84.4%).

Conclusion: Emergency nurses demonstrated generally high competency, but workplace pressures and organizational barriers require targeted improvement.

KEYWORDS: Patient safety; competency; emergency nurses; barriers; secondary care hospitals; Mirpur.

INTRODUCTION

Patient safety is a key aspect of health care quality and it is especially significant in the Emergency Department where care is provided to patients with acute, critical and life threatening conditions [1]. The practice of emergency nursing is characterized by rapid clinical evaluation, prioritisation of treatment, medication administration, effective communication, timely clinical decision making and infection prevention [2]. Nurses are expected to display high levels of knowledge, technical skills, professional attitudes, and be able to identify and avert potential risks to patients in order to meet these responsibilities [3]. Patient safety competency is defined as the knowledge, skills, attitudes and professional behaviors required to reduce preventable harm and keep clinical work safe [4]. In the field of patient safety, nurses are closely involved in ongoing monitoring, accurate recording, effective collaboration with other professionals and reporting adverse events [2,3].

Patient safety incidents are especially prevalent in emergency departments due to the high number of patients, the high rate of turnover, the unpredictability of the workload, time constraints and the complexity of patients' conditions [5]. Then, there's a risk of medication mistakes, missed interventions, communication problems, lack of monitoring and other preventable adverse events [6]. Emergency nurses' previous research studies have shown that teamwork, psychological safety, situation monitoring, adverse event reporting, and experience with the work are significant elements linked with patient safety competency [7,8]. In addition, factors such as nurses' educational attainment, patient safety training, clinical experience, and organizational support can impact their capacity to identify hazards and take required steps to ensure patient safety [9]. Factors such as inadequate staffing, limited resources and time, heavy workloads, limited training and poor safety cultures may further limit nurses' ability to maintain safe clinical practices [10].

There is a high level of resource and workload constraints in EDs in secondary care hospitals. In such environments, nurses have to respond to a variety of clinical emergencies and still provide the necessary level of care to the patients [11]. So factors like age, education, experience, workplace environment – staffing, supervision, teamwork, communication, availability of necessary resources – may all have an impact on their ability to safeguard patient safety [8,12].

There are very few context-specific studies to provide any evidence of patient safety competency among emergency nurses working in secondary care hospitals of Mirpur, AJK.While there have been some international studies that have investigated patient safety competency among emergency nurses, little evidence exists to examine the competency level of emergency nurses and the related barriers in secondary care hospitals of Mirpur,

AJK. Especially, the associations of demographic characteristics of nurses, patient safety competency and work barriers need more study in this health care situation.

Research Objective

1. To determine the competency level of patient safety among emergency nurses of SCHs in, Mirpur AJK.
2. To examine the association between nurses' demographic variables, such as age, education, and years of experience with patient safety competency among emergency nurses.
3. To determine the major obstacles encountered by emergency nurses in the presence of patient safety in their clinical practice.

Research Questions

1. What is the level of competency of safety skills among emergency nurses in SCHs, AJK, Mirpur?
2. What is the relationship of the demographic factors (age, education, and years of experience) with patient safety competency among emergency nurses?
3. What are some challenges emergency nurses encounter with the safety of the patient in their clinical practice?

Research Hypothesis

1. Null Hypothesis (H_0): There is no significant association between patient safety competency and demographic variables (age, education and years of experience) among emergency nurses in secondary care hospitals (SCHs) in Mirpur AJK.
2. Alternative Hypothesis (H_1): There is significant association between demographic variables (age, education, years of experience) with patient safety competency among emergency nurses in SCHs in Mirpur, AJK.

METHODOLOGY

Study Design: The design of the study is quantitative, cross-sectional and analytical to evaluate patient's safety competency and related barriers among the emergency nurses working in secondary care hospitals of Mirpur (AJK).

Study Setting: This study was carried out in six emergency departments of the secondary care hospitals of Mirpur in AJK namely DHQ teaching hospital Mirpur, New City teaching hospital, Kotli institute of cardiology, DHQ Bhimber, DHQ Kotli, THQ Hospital Dadyal.

Study Population: This study involved 150 registered nurses from emergency departments of selected hospitals involved in direct patient care.

Study Duration: The study was carried out after the ethical clearance and administrative approval from December 2024 to 2025.

Sample Size: The sample size was determined using the Raosoft Sample Size Calculator. With a population of 150 emergency nurses, a 95% confidence level, and a 5% margin of error, the required sample size was determined to be 109 emergency nurses.

Sampling Technique: The non-probability sampling method used was the convenience sampling technique that selected qualified and willing emergency nurses who were available during the data collection period.

Inclusion and Exclusion Criteria: Excluded were nurses who were not currently working in the ED and who did not have at least six months of ED experience. Nurses who were on vacation during data collection time, and nurse managers or administrative staff who did not have direct care duties were not included.

Study Variables: Age, gender, educational qualification and years of professional experience were taken as independent variables. Knowledge, skills, and attitudes were measured dependent variables were patient safety competency. Workplace barriers were also evaluated such as staffing and workload, communication and teamwork, training and protocols, equipment and environment, and organizational and reporting culture.

Data Collection Instruments: The data were collected by using the structured questionnaire comprising of three sections. Demographic and professional data were collected in the first section. The second section was the Patient Safety Competency Self-Evaluation, (PSCSE) tool developed by Lee et al. (2017), utilized to gather information about patient safety knowledge, skills and attitudes of nurses. These items were rated on a five point Likert scale (1 = strongly disagree, 5 = strongly agree). The third section was a researcher-developed Emergency Nursing Barriers to Patient Safety Questionnaire (ENBPSQ) made up of 20 items that measured staffing and workload, communication and teamwork, training and protocols, equipment and environment, and organizational and reporting culture. The responses were made on a five-point Likert scale, with higher scores representing higher barriers perceived.

Validity and Reliability: The Content Validity Index (CVI) was used for the content validity of the questionnaires, which was evaluated by a panel of five experts. Overall scale-level CVI was 0.96 which considered excellent level of content validity. A pilot study of 11(10%) of the total number of participants was conducted in order to determine the clarity and feasibility of the questionnaires. The 65 items were found to have excellent internal consistency of 0.931 using the reliability analysis. The pilot participants were not included in the main study.

Data Collection Procedure: Ethical approval and administrative permission were obtained from selected hospitals and nurses were approached and informed about the study and included in the sample if they fulfilled the inclusion criteria. Data were collected with written informed consent. Participants were given structured

questionnaires and completed anonymously to maintain confidentiality. About 30 minutes were given to complete the questionnaire.

Data Analysis: The data were entered and analyzed by the software of Statistical Package for Social Sciences (SPSS) version 26. Demographic characteristics, patient safety competency scores and perceived barriers were summarized using descriptive statistics, including frequencies, percentages, means, and standard deviations. Demographic data were compared to categorized levels of patient safety competency using the Chi-square test. The level of statistical significance was p-value < 0.05.

Ethical Considerations: All ethical and administrative clearance was obtained through the appropriate Institutional Review Board and administrative clearance was obtained in the selected hospitals. Informed consent was obtained in writing from all subjects. The participants were given the option to withdraw from the study at any point without penalty, and participation was voluntary. All collected data were anonymous and confidential, and only used for research purposes.

RESULTS

Among 109 participants, 56 (51.4%) were aged 40–49 years, 101 (92.7%) were female, and 68 (62.4%) held a Diploma in Nursing (table 1). Most had 6–10 years of nursing experience (41.3%), were staff nurses (81.7%), and worked day shifts (50.5%). All participants (100%) worked in emergency departments and reported previous patient safety training.

Table 1. Demographic and professional characteristics of participants (N = 109)

Variable	Category	Frequency (n)	Percentage (%)
Age	20–29 years	4	3.7
	30–39 years	45	41.3
	40–49 years	56	51.4
	50+ years	4	3.7
Gender	Male	8	7.3
	Female	101	92.7
Education level	Diploma in Nursing	68	62.4
	Bachelor's degree in Nursing (BSN)	34	31.2
	Master's degree in Nursing (MSN)	7	6.4
Years of nursing experience	Less than 1 year	12	11.0
	1–5 years	21	19.3
	6–10 years	45	41.3
	11–15 years	29	26.6
	More than 15 years	2	1.8
Current work position	Staff nurse	89	81.7
	Charge nurse	20	18.3
Workplace	DHQ Mirpur	36	33.0
	KIC	16	14.7
	THQ Hospital Dadyal	22	20.2
	NC Hospital Mirpur	8	7.3
	DHQ Kotli	8	7.3
	DHQ Bhimber	19	17.4
Specialty area	Emergency Department	109	100.0
Shift schedule	Day shift	55	50.5
	Night shift	29	26.6
	Rotating shifts	25	22.9
Previous patient safety training	Yes	109	100.0
Years in current workplace	1–5 years	15	13.8
	6–10 years	20	18.3
	11–15 years	23	21.1
	16–20 years	0	0.0
	>20 years	24	22.2

Note: The reported categories for years in the current workplace total 82 participants (75.4%), not 109; 27 participants are unaccounted for in the source data. Values are reproduced as supplied.

Regarding patient safety competency, 75 nurses (68.8%) demonstrated high competency, 31 (28.4%) had moderate competency, and only 3 (2.8%) demonstrated low competency, indicating that most emergency nurses had a high level of patient safety competency (table 2).

Table 2. Overall level of patient safety competency among emergency nurses (N = 109)

Competency level	Score range	Frequency (n)	Percentage (%)
Low	1–30	3	2.8
Moderate	31–60	31	28.4
High	61–75	75	68.8

Staffing and workload concerns included high patient volume (93.6% agreement) and fatigue affecting safe care (94.0%), with the highest mean score of 4.44 ± 0.60 (table 3). In communication and teamwork, 84.4% reported that miscommunication created safety risks. Regarding training and protocols, 91.8% identified the lack of standard protocols as a concern. Additionally, 79.9% reported that the emergency department layout hindered safe care, while 84.4% feared blame or punishment when reporting safety incidents.

Table 3. Nurses' responses to patient safety barrier items (N = 109)

Domain	Item	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)	Mean ± SD
Staffing and workload	1. Enough staff to handle ED workload	5 (4.6)	5 (4.6)	12 (11.0)	43 (39.4)	44 (40.4)	4.06 ± 1.056
	2. High patient volume affects safety	2 (1.8)	3 (2.8)	2 (1.8)	64 (58.7)	38 (34.9)	4.22 ± 0.774
	3. I rush patient care due to time pressure	0 (0)	2 (1.8)	16 (14.7)	51 (46.8)	40 (36.7)	4.183 ± 0.747
	4. Fatigue reduces ability to provide safe care	0 (0)	0 (0)	6 (5.5)	49 (45.0)	54 (49.0)	4.44 ± 0.5998
Communication and teamwork	5. Team members support each other	1 (0.9)	1 (0.9)	8 (7.3)	50 (45.9)	49 (45.0)	4.33 ± 0.7335
	6. Miscommunication causes safety risks	3 (2.8)	2 (1.8)	12 (11.0)	51 (46.8)	41 (37.6)	4.14 ± 0.8905
	7. Comfortable speaking up about safety	1 (0.9)	6 (5.5)	6 (5.5)	54 (49.5)	42 (38.5)	4.192 ± 0.844
Training and protocols	8. Adequate training to manage emergency patients safely	2 (1.8)	10 (9.2)	11 (10.1)	43 (39.4)	43 (39.4)	4.055 ± 1.016
	9. Lack of standard protocols contributes to unsafe care	1 (0.9)	7 (6.4)	1 (0.9)	50 (45.9)	50 (45.9)	4.293 ± 0.853
	10. Continuing education on patient safety is available and useful	0 (0)	11 (10.1)	3 (2.8)	59 (54.1)	36 (33.0)	4.100 ± 0.87077
Equipment and environment	11. Medical equipment is always available and functioning properly	5 (4.6)	3 (2.8)	12 (11.0)	57 (52.3)	32 (29.4)	3.99 ± 0.9670
	12. Physical layout of ED hinders safe patient care	4 (3.7)	9 (8.3)	9 (8.3)	38 (34.9)	49 (45.0)	4.09 ± 1.093
Organizational and reporting culture	13. Management supports patient safety initiatives	4 (3.7)	9 (8.3)	10 (9.2)	33 (30.3)	53 (48.6)	4.119 ± 1.111
	14. Staff are encouraged to report patient safety incidents	1 (0.9)	9 (8.3)	8 (7.3)	54 (49.5)	37 (33.9)	4.073 ± 0.9098
	15. Fear blame or punishment if reporting a safety incident	0 (0)	3 (2.8)	14 (12.8)	37 (33.9)	55 (50.5)	4.321 ± 0.8037
	16. Structured	0 (0)	4 (3.7)	11	48	46 (42.2)	4.247 ±

	incident reporting system exists			(10.1)	(44.0)		0.7835
	17. Whistleblowers are penalized in the institute	0 (0)	4 (3.7)	0 (0)	61 (56.0)	44 (40.4)	4.33 ± 0.6673

Note: Response categories and means/SDs are transcribed from the supplied results. Some item wording describes positive conditions (e.g., adequate staffing/support), so interpretation as a barrier should be made carefully.

Most nurses supported strategies to improve patient safety culture (table 4). A confidential electronic incident-reporting system was supported by 86.3% (mean = 4.39 ± 0.82), formal recognition and rewards by 92.6% (mean = 4.36 ± 0.80), and regular multidisciplinary safety huddles by 85.3% (mean = 4.15 ± 0.78).

Table 4. Nurses' views on strategies to improve patient safety culture (N = 109)

Strategy	Strongly disagree n (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly agree n (%)	Mean ± SD
18. Simplified, confidential, preferably electronic incident-reporting system without fear of retribution	0 (0)	4 (3.7)	11 (10.1)	33 (30.3)	61 (56.0)	4.385 ± 0.8154
19. Formal recognition/reward for safe clinical practices	0 (0)	7 (6.4)	1 (0.9)	47 (43.1)	54 (49.5)	4.357 ± 0.799
20. Regular multidisciplinary safety huddles/debriefings	0 (0)	5 (4.6)	11 (10.1)	56 (51.4)	37 (33.9)	4.146 ± 0.7796

Both Kolmogorov–Smirnov and Shapiro–Wilk tests showed significant deviations from normality across the reported study variables ($p < 0.001$). Therefore, non-parametric statistical tests were considered appropriate for subsequent analyses (table 5).

Table 5. Tests of normality for study variables (N = 109)

Variable	Kolmogorov–Smirnov statistic	df	Sig.	Shapiro–Wilk statistic	df	Sig.
Overall patient safety competency (PSCSPT)	0.3498	109	<0.001	0.7899	109	<0.001
Skills domain (SD_PSCSE)	0.310	109	<0.001	0.7297	109	<0.001
Attitude domain (AD_PSCE)	0.281533	109	<0.001	0.7575	109	<0.001
ENBPSQ5_CT	0.28855	109	<0.001	0.7554	109	<0.001

Note: The source also contains an additional normality-test row (K–S = 0.527; Shapiro–Wilk = 0.3610; df = 109; p < 0.001), but its variable name is missing; it has therefore not been assigned a label. SPSS Sig. = 0.000 is conventionally presented as p < 0.001.

Age was significantly associated with patient safety competency ($\chi^2 = 12.794$, $p = 0.046$), shown in table 6. Nurses aged 40–49 years had the highest number of high competency scores (n = 50), followed by those aged 30–39 years (n = 34).

Table 6. Association between age and patient safety competency (N = 109)

Age group	Low n	Moderate n	High n	Total n	χ^2	p-value
20–29 years	1	0	3	4	12.794	0.046*
30–39 years	2	9	34	45		
40–49 years	0	6	50	56		
50+ years	0	0	4	4		

*Note: *Statistically significant at p < 0.05. Counts are reproduced from the source.*

No statistically significant association was observed between educational qualification and patient safety competency ($\chi^2 = 5.819$, $p = 0.213$), although the reported cross-tabulation showed 53 BSN nurses with high

competency (table 7).

Table 7. Association between education and patient safety competency (N = 109)

Education group	Low n	Moderate n	High n	Total n	χ^2	p-value
Diploma in Nursing	2	9	30	41	5.819	0.213
Bachelor's degree in Nursing (BSN)	1	6	53	60		
Master's degree in Nursing (MSN)	0	0	8	8		

Note: Important data discrepancy: these cross-tabulation totals (41, 60, 8) do not match the demographic table (68, 34, 7). Verify against the original SPSS output before publication.

Years of nursing experience were significantly associated with patient safety competency ($\chi^2 = 33.795$, $p < 0.001$), shown in table 8. Nurses with 6–10 years of experience had the highest number of high competency scores (n = 48), followed by those with 11–15 years (n = 40).

Table 8. Association between years of nursing experience and patient safety competency (N = 109)

Experience	Low n	Moderate n	High n	Total n	χ^2	p-value
<1 year	0	0	0	0	33.795	<0.001*
1–5 years	2	3	1	6		
6–10 years	0	8	48	56		
11–15 years	1	3	40	44		
>15 years	0	1	2	3		

*Note: Important data discrepancy: cross-tabulation totals (0, 6, 56, 44, 3) do not match the demographic table (12, 21, 45, 29, 2). The zero total for <1 year also indicates missing/misaligned data. Verify before publication. *Statistically significant at $p < 0.05$.*

DISCUSSION

In the present study, the emergency nurses had high patient safety competency level with 68.8% having high competency, moderate competency with 28.4% and low competency with 2.8%. This suggests a fairly good level of competency generally, but there is a need to improve almost one-third of the participants. Likewise, Tai et al. (2024) found a variety of competency profiles among clinical nurses, such as 42.2% in the high competency group and 48.3% in the moderate competency group. They also identified work experience, psychological safety, and organizational climate as important factors. This outcome is evidence of the need for ongoing competency development and supportive clinical settings [13,14].

Patient care competency was significantly related to age ($\chi^2 = 12.794$, $p = 0.046$) and the age group of 40-49 years had the largest proportion of highly competent nurses (n = 50). There was no significant relationship between competency and education ($\chi^2 = 5.819$, $p = 0.213$). This age association could be due to prior experience and/or clinical exposure. The education and experience cross-tabulations, however, include totals that differ from the totals in the demographic table: thus, care must be taken in interpreting these results until the SPSS data are verified. Other factors mentioned by Tai et al. (2024) include working years and professional attributes [13].

Labor and fatigue were significant issues. The high volume of patients was cited by 93.6% of nurses as an impact on patient safety, and 83.5% said that time pressure made them rush care. Fatigue was of special concern with 94.5% agreeing it impacted on their ability to provide safe care (mean = 4.44 ± 0.60). The results are in line with Cho and Steege's (2021) systematic review that was associated with nurse fatigue and poor nurse, patient-safety, and organizational outcomes. Moreover, in a meta-analysis of 85 studies with 288,581 nurses, Li et al. (2024) reported that burnout was also linked to a higher rates of medication errors, adverse events, and decreased quality of care. These results highlight the need for workload management and sufficient rest [15,16].

There is a need to pay attention to communication and reporting culture too. While 84.4% indicated that their teamwork was supportive, 84.4% said that miscommunication posed safety risks and 84.4% said they were afraid of being blamed or punished for reporting incidents. This implies that supportive relationships don't automatically equate with open communication or a non-punitive reporting system. Han et al. (2020) reported that patient safety culture, nurse safety competency and adverse events were associated with each other. In the same way, Jafree et al. (2016) stated that organizational culture is a vital factor which influences nurses' willingness to report errors in public hospitals in Pakistan [17,18].

There were other concerns such as training, protocols and clinical environment. 91.8% of participants agreed unsafe care was partly due to the absence of standard protocols and 79.9% agreed that the layout in emergency department did not enable safe care. Despite the availability and usefulness of continuing education (87.1%), training might be insufficient to solve organizational problems. Lawton et al. (2012) reported communication, individual factors, equipment and supplies as the most frequently cited factors contributing to hospital safety

incidents. Other researchers have also reported delayed treatment times and reduced care quality with lower nurse staffing in emergency departments [19,20].
The majority of participants were very positive about the practical improvements: 86.3% agreed that simplified and confidential reporting of incidents is supported (mean = 4.39 ± 0.82; SD = 0.78), 92.6% said they thought there was support for formal recognition of safe practice (mean = 4.36 ± 0.80; SD = 0.75), and 85.3% agreed there was support for multidisciplinary safety huddles (mean = 4.15 ± 0.78; SD = 0.75). Overall, the results suggest that professional development on patient safety competency must be continuous, and at the same time, organizational interventions such as addressing fatigue, communication, protocols, and incident reporting are necessary to enhance patient safety competency. However, this is a cross sectional study so causal relationships cannot be made.

Strengths and Limitations
The present study's greatest contribution was the involvement of emergency nurses at six secondary care hospitals, which allowed for an understanding of patient safety competency and barriers to patient safety in emergency care in a variety of health care settings. A structured patient safety competency assessment tool with a questionnaire about emergency nursing barriers allowed for knowledge, skills, attitudes and organizational barriers to be assessed. But there were some drawbacks to the study. The cross-sectional design did not allow causal relationships and convenience sampling and self-reported responses may have led to selection and response bias. The results may not be applicable to other hospitals. Also, discrepancies in the totals for some of the cross-tabulations of the demographics and competencies should be checked for accuracy prior to conclusions regarding the corresponding associations.

CONCLUSION
Patient safety competency among emergency nurses was generally good, but workplace stress, fatigue, communication issues, fear of blame and organisational issues were still a concern. Improving staffing arrangements, communicating and collaborating more effectively as a team, having clear and effective safety policies, encouraging staff to attend further training and learning and implementing a non-punitive reporting system could help to enhance patient safety. The management of hospitals must focus on practical measures that will enable the nurses to provide safe and effective emergency care.

REFERENCES

1. Abu Zaitoun R, Said NB, de Tantillo L. Clinical nurse competence and its effect on patient safety culture: a systematic review. *BMC Nurs.* 2023;22:173. https://doi.org/10.1186/s12912-023-01305-w
2. Han JH, Roh YS. Teamwork, psychological safety, and patient safety competency among emergency nurses. *Int Emerg Nurs.* 2020;51:100892. https://doi.org/10.1016/j.ienj.2020.100892
3. Habibi Soola A, Ajri-Khameslou M, Mirzaei A, Bahari Z. Predictors of patient safety competency among emergency nurses in Iran: a cross-sectional correlational study. *BMC Health Serv Res.* 2022;22:547. https://doi.org/10.1186/s12913-022-07962-y
4. Park MN, Roh YS. Emergency department nurses' reflective thinking and patient safety competency: the mediating effect of patient safety culture. *Appl Nurs Res.* 2024;80:151856. https://doi.org/10.1016/j.apnr.2024.151856
5. Jafree SR, Zakar R, Zakar MZ, Fischer F. Assessing the patient safety culture and ward error reporting in public sector hospitals of Pakistan. *J Patient Saf.* 2017;3:10. https://doi.org/10.1186/s40886-017-0061-x
6. Kakemam E, Gharaee H, Rajabi MR, Nadernejad M, Khakdel Z, Raeissi P, et al. Nurses' perception of patient safety culture and its relationship with adverse events: a national questionnaire survey in Iran. *BMC Nurs.* 2021;20. https://doi.org/10.1186/s12912-021-00571-w
7. Kausar R, Janjua K, Siddique M, Victor G. Factors associated with nurses' attitude towards patient safety culture in an international accredited tertiary care hospital, Islamabad. *J Islamabad Med Dent Coll.* 2023;12(1):49–56. https://doi.org/10.35787/jimdc.v12i1.839
8. Mahsoon AN, Dolansky M. Safety culture and systems thinking for predicting safety competence and safety performance among registered nurses in Saudi Arabia: a cross-sectional study. *J Res Nurs.* 2021;26(1–2):19–32.
9. Jalalian F, Hosseininejad SM, Montazer S, Hesamzadeh A. Emergency department nurses' clinical competence and its related factors: a cross-sectional study. *Asia Pac J Health Manag.* 2023;18(3). https://doi.org/10.24083/apjhm.v18i3.2195
10. Alanazi FK, Lapkin S, Molloy L, Sim J. Safety culture, quality of care, missed care, nurse staffing and their impact on pressure injuries: a cross-sectional multi-source study. *Int J Nurs Stud Adv.* 2023;5:100125. https://doi.org/10.1016/j.ijnsa.2023.100125
11. Park JH, Yeom I. Effects of patient safety education programs on nursing students' knowledge, attitude, and competency with patient safety: a systematic review, meta-analysis, and meta-regression. *Nurse Educ Today.* 2025;150:106675. https://doi.org/10.1016/j.nedt.2025.106675
12. Atalla ADG, Bahr RRR, El-Sayed AAI. Exploring the hidden synergy between system thinking and patient safety competencies among critical care nurses: a cross-sectional study. *BMC Nurs.* 2025;24:114. https://doi.org/10.1186/s12912-025-02717-6

13. Tai, C., Chen, D., Zhang, Y., Teng, Y., Li, X., & Ma, C. (2024). Exploring the influencing factors of patient safety competency of clinical nurses: A cross-sectional study based on latent profile analysis. *BMC Nursing, 23*, Article 154. https://doi.org/10.1186/s12912-024-01817-z
14. Kakemam, E., Albelbeisi, A. H., Rouzbahani, M., Gharakhani, M., Zahedi, H., & Taheri, R. (2024). Nurses' perceptions of patient safety competency: A cross-sectional study of relationships with occurrence and reporting of adverse events. *PLOS ONE, 19*(1), e0297185. https://doi.org/10.1371/journal.pone.0297185
15. Cho, H., & Steege, L. M. (2021). Nurse fatigue and nurse, patient safety, and organizational outcomes: A systematic review. *Western Journal of Nursing Research, 43*(12), 1157–1168. https://doi.org/10.1177/0193945921990892
16. Li, L. Z., Yang, P., Singer, S. J., Pfeffer, J., Mathur, M. B., & Shanafelt, T. (2024). Nurse burnout and patient safety, satisfaction, and quality of care: A systematic review and meta-analysis. *JAMA Network Open, 7*(11), e2443059. https://doi.org/10.1001/jamanetworkopen.2024.43059
17. Han, Y., Kim, J.-S., & Seo, Y. (2020). Cross-sectional study on patient safety culture, patient safety competency, and adverse events. *Western Journal of Nursing Research, 42*(1), 32–40. https://doi.org/10.1177/0193945919838990
18. Jafree, S. R., Zakar, R., Zakar, M. Z., & Fischer, F. (2016). Nurse perceptions of organizational culture and its association with the culture of error reporting: A case of public sector hospitals in Pakistan. *BMC Health Services Research, 16*, Article 3. https://doi.org/10.1186/s12913-015-1252-y
19. Lawton, R., McEachan, R. R. C., Giles, S. J., Sirriyeh, R., Watt, I. S., & Wright, J. (2012). Development of an evidence-based framework of factors contributing to patient safety incidents in hospital settings: A systematic review. *BMJ Quality & Safety, 21*(5), 369–380. https://doi.org/10.1136/bmjqs-2011-000443
20. Drennan, J., Murphy, A., McCarthy, V. J. C., Ball, J., Duffield, C., Crouch, R., Kelly, G., Loughnane, C., Murphy, A., Hegarty, J., Brady, N., Scott, A., & Griffiths, P. (2024). The association between nurse staffing and quality of care in emergency departments: A systematic review. *International Journal of Nursing Studies, 153*, Article 104706. https://doi.org/10.1016/j.ijnurstu.2024.104706