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Original Article

Factors Contributing to Nursing Errors Among Nurses Working in Critical Care Units: A Study of Teaching Hospitals in Yazd City

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Abstract

Introduction: Nursing errors in critical care settings threaten patient safety and the quality of healthcare delivery. Understanding nurses' perceptions of the factors contributing to these errors is essential for designing effective preventive strategies. This study aimed to assess the perceived factors contributing to nursing errors and their association with demographic and occupational characteristics among nurses working in intensive care units (ICUs) and coronary care units (CCUs).

Methods: This cross-sectional study was conducted in 2025 among 201 nurses working in the ICUs and CCUs of two teaching hospitals in Yazd, Iran. All eligible nurses were recruited using a census sampling method. Data were collected using a previously validated questionnaire evaluating four dimensions of perceived factors contributing to nursing errors: ward management, nurses' skills and training, environmental conditions, and team coordination. Data were analyzed using descriptive statistics, the Mann–Whitney U test, the Kruskal–Wallis test, and a multivariable general linear model.

Results: The mean total score of perceived factors contributing to nursing errors was 69.53 ± 17.24. Overall, 52.2% of nurses rated these factors as moderate, 35.3% as poor, and 12.4% as desirable. Ward management had the highest mean score (22.08 ± 6.03), whereas team coordination had the lowest (12.41 ± 3.64). Male nurses reported significantly higher scores than female nurses in the domains of ward management ($P=0.029$), skills and training ($P=0.042$), and environmental conditions ($P=0.031$). Nurses working in CCUs reported significantly higher scores across all questionnaire dimensions than those working in ICUs ($P<0.05$). In the multivariable analysis, gender ($P=0.021$) and type of critical care unit ($P=0.024$) remained independently associated with the total score.

Conclusion: Nurses perceived the factors contributing to nursing errors to be at a moderate level. Perceptions differed according to gender and type of critical care unit. These findings highlight the importance of strengthening ward management, enhancing continuing professional education, improving the work environment, and promoting effective team coordination to reduce the perceived contributors to nursing errors and improve patient safety in critical care settings.

Keywords: Nursing errors, Patient safety, Intensive care units, Critical care nursing, Nursing administration

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Introduction

Patient safety is a fundamental pillar of healthcare quality, and any error or failure in the care process can lead to serious harm to patients (1). The foremost principle in hospitals is to avoid causing harm to patients. Patient safety is therefore defined as the monitoring, prevention, and improvement of adverse outcomes or injuries resulting from healthcare processes (2). This issue is not only a national concern but also a global challenge for healthcare systems worldwide (3). In 2019, the World Health Organization estimated that in low- and middle-income countries, approximately 134 million adverse events related to unsafe care occur annually in hospitals, leading to about 2.6 million deaths (4). Studies have estimated that it is among the leading causes of death in the United States, accounting for more than 250,000 deaths each year (5).

Nurses, as the largest professional group within healthcare systems, are directly responsible for providing clinical care and therefore play a central role in maintaining patient safety (6). Nursing errors are considered an important indicator of poor healthcare quality and may have serious consequences for patients, their families, and the healthcare

system as a whole (7). From an economic perspective, the costs associated with medical errors and preventable adverse events in OECD countries are estimated to reach about 1.5 trillion dollars annually, representing roughly 15% of total healthcare expenditures in those countries (8). Evidence also shows that the nurse-to-patient ratio has a direct impact on patient mortality; for example, the addition of one extra patient to a nurse's workload can increase the risk of patient death by up to seven percent (6).

Intensive care settings, including Intensive Care Units (ICUs) and Coronary Care Units (CCUs), are among the hospital environments with the highest risk for nursing errors. This is largely due to the complexity of patients' conditions, the need for rapid and precise interventions, the use of advanced technologies and equipment, and the heavy workload in these units (9). Because of the nature of care in these settings—managing critically ill patients and making time-sensitive clinical decisions—multiple types of errors may occur (10). High levels of occupational stress and burnout among nurses working in intensive care units, affecting more than half of them, can reduce concentration, increase the likelihood of errors, and ultimately compromise the quality of care (9). In addition, research has consistently identified nursing staff shortages and excessive workload as major contributors to nursing errors in these units (11).

The factors contributing to nursing errors can generally be categorized into four main groups: managerial and organizational factors (such as nursing staff shortages, inappropriate nurse-to-patient ratios, ineffective policies, a blame culture, and weak reporting systems); skill and training factors (including insufficient continuing education and inadequate familiarity with medical equipment and clinical protocols); environmental conditions (such as poor lighting, excessive noise, long distances between the nursing station and patient beds, and lack of adequate space for documentation or essential equipment); and team coordination factors (including poor communication among team members, lack of coordination across shifts, and the absence of a culture that encourages speaking up about safety concerns)(12). Recent studies suggest that transformational leadership and a positive organizational culture can significantly influence nurses' willingness to voice safety concerns, thereby helping to prevent errors (13).

Similar concerns regarding patient safety and nursing errors have also been reported in Iran. A qualitative study involving 30 nurses working in intensive care units of teaching hospitals in Tehran found that staff shortages, long shifts, heavy workloads, the absence of a clear and safe reporting system, a blame-oriented culture, long distances between nursing stations and patient beds, poor lighting, excessive noise, weak team communication, insufficient familiarity with medical equipment, and a lack of continuing education were among the major contributors to nursing errors (14). Statistics indicate that only about 15–20% of actual errors are reported, and more than 70% of nurses consider existing reporting systems ineffective (15). Moreover, up to 68 percent of nurses avoid reporting errors due to fear of administrative consequences, criticism from colleagues, and a lack of managerial support (16). In some intensive care units, the nurse-to-patient ratio reaches 1:4 or even 1:5, whereas the international standard is typically around 1:2 (17).

A recent study conducted in emergency departments of hospitals affiliated with Iran University of Medical Sciences found that the most common nursing errors included failure to use protective equipment (38%), not adhering to sterile techniques (36%), poor communication with patients (35%), and inadequate patient education prior to discharge (32%). The main contributing factors reported for these errors were overcrowded, busy work environments (64%), fatigue due to heavy workloads (53%), and staff shortages (52%) (18).

Given the importance of this issue and the limited comprehensive research on the dimensions of nursing errors in intensive care settings in Iran, the present study was conducted to examine these dimensions in the ICU and CCU of Shahid Beheshti Hospital in Taft and Shahid Sadoughi Hospital in Yazd, from the perspective of nurses working in these units. Identifying these dimensions can provide a foundation for designing targeted interventions aimed at improving patient safety, reducing nursing errors, and enhancing the overall quality of care.

Methods

Study type

This cross-sectional study was conducted in 2025 at Shahid Beheshti Hospital in Taft and Shahid Sadoughi Hospital in Yazd, Iran.

Population and Sample

The target population comprised all nurses working in the ICU and CCU wards of the two aforementioned hospitals. The inclusion criteria were having at least six months of continuous work experience in these units and willingness to participate in the study. Due to the limited and accessible size of the population, a census sampling approach was adopted, and all eligible nurses were invited to participate. The exclusion criteria included incomplete questionnaires or withdrawal from the study. A total of 201 nurses met the inclusion criteria and agreed to participate. All distributed questionnaires were returned complete, resulting in a response rate of 100%.

Data Collection

Data were collected using a previously validated questionnaire developed by Mashouf et al. (15), which has previously demonstrated acceptable content validity and reliability (Cronbach's alpha = 0.82). The questionnaire consisted of two main sections. The first section collected demographic, social, and occupational characteristics of the participants. The second section assessed perceived factors contributing to nursing errors across four dimensions: ward management (items 1–13), nurses' skills and training (items 14–24), environmental conditions of the ward (items

25–33), and team coordination (items 34–40). Each item was scored on a 3-point Likert scale ranging from 1 to 3. Dimension scores were calculated by summing the corresponding item scores, yielding the following possible ranges: ward management 13–39, skills and training 11–33, environmental conditions 9–27, and team coordination 7–21. The total questionnaire score was obtained by summing all 40 items, with a possible range of 40–120. All dimensions were scored in a positive direction; therefore, higher scores indicate a greater perceived contribution of the corresponding factor to the occurrence of nursing errors. The questionnaires were distributed in person at the beginning of each shift in coordination with ward supervisors. Participants completed the questionnaires during short break periods between shifts. The completed forms were collected at the end of the same shift or within a maximum of two working days. For descriptive purposes, the total questionnaire score was categorized into three levels (poor: 40–64; moderate: 65–89; optimal: 90–120). These categories were used solely to facilitate interpretation and did not influence the inferential statistical analyses.

Data analysis

Descriptive statistics were used to summarize the demographic characteristics and study variables. The normality of continuous variables was assessed using the Shapiro–Wilk test. Since the main study variables showed non-normal distributions ($P < 0.05$), non-parametric tests were applied for group comparisons. Accordingly, the Mann–Whitney U test was used to compare two groups, and the Kruskal–Wallis test was employed for comparisons among more than two groups. In addition, a multivariable general linear model (GLM) was performed to examine the independent association between demographic and occupational variables and the total nursing errors score, while adjusting for the other covariates. Gender, age group, education level, nursing work experience, critical care work experience, employment status, type of special care unit, marital status, managerial experience, and having a second job were entered into the model simultaneously. The assumption of homogeneity of variances was assessed before interpreting the results. Continuous variables in grouped analyses are presented as medians and interquartile ranges (IQRs). All statistical analyses were performed using SPSS version 27, and a *P*-value of less than 0.05 was considered statistically significant.

Results

A total of 201 nurses working in intensive care units participated in this study. The majority of participants were female (63.7%), and the largest age group was 25–30 years (33.3%). Regarding educational level, 91.5% of the participants held a bachelor's degree, while only 8.5% had a master's degree or higher.

As shown in Table 1, 31.8% of the nurses had less than five years of work experience in the nursing profession, and 44.3% had less than five years of experience working in intensive care units. In terms of employment status, 48.8% were formally employed, 22.4% were on contractual governmental employment, 21.9% were serving in mandatory service positions, and 7% were employed on temporary contracts.

Table 1. Demographic characteristics of nurses participating in the study

Variable	Category	Frequency	Percentage (%)
Gender	Male	73	36.3
	Female	128	63.7
Age	<25 years	30	15.0
	25–30 years	67	33.3
	30–35 years	43	21.4
	35–40 years	32	15.9
	>40 years	29	14.4
Education Level	Bachelor's degree	184	91.5
	Master's degree or higher	17	8.5
Nursing Experience	<5 years	64	31.8
	5–10 years	49	24.4
	10–15 years	35	17.4
	15–20 years	35	17.4
	>20 years	18	9.0
ICU/CCU Experience	<5 years	89	44.3
	5–10 years	66	32.8
	10–15 years	29	14.4
	15–20 years	9	4.5
	>20 years	8	4.0
Employment Status	Permanent	98	48.8
	Contractual	45	22.4
	Mandatory service	44	21.8
	Short-term contract	14	7.0
Unit Type	ICU	173	86.1
	CCU	28	13.9
Marital Status	Married	75	37.3
	Single	126	62.7
Managerial Experience	Yes	39	19.4
	No	162	80.6
Second Job	Yes	24	11.9
	No	177	88.1

Most participants worked in the ICU (86.1%), while 13.9% worked in the CCU. Additionally, 62.7% of the nurses were single, 16.2% reported having a second job, and 19.4% had previous managerial experience.

Figure 1 illustrates the frequency distribution of the total scores for the dimensions of the nursing error factors questionnaire. According to the figure, the highest frequency was observed in the score range of 65–89 (moderate), accounting for 52.2% of participants. The score range of 40–64 (poor) ranked second at 35.32%, while the lowest frequency was for the score range of 90–114 (desirable), representing 12.5% of participants. These findings indicate that the majority of nurses participating in the study (52.2%) evaluated the factors contributing to nursing errors at a moderate level.

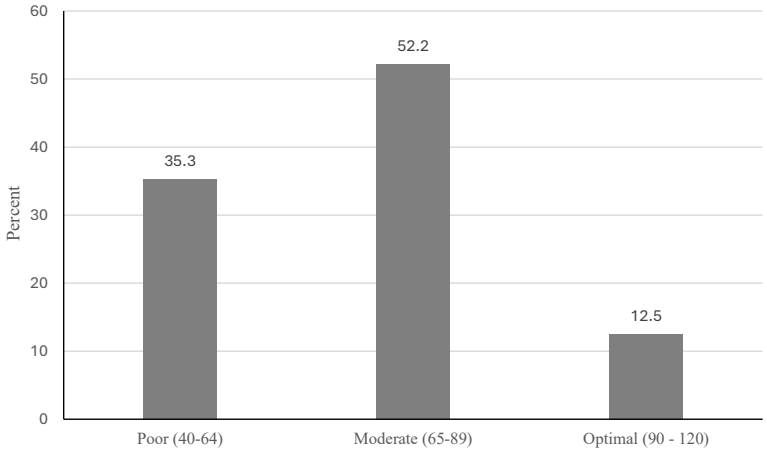

Figure 1. Frequency distribution of total scores of factors contributing to nursing errors among nurses working in critical care units

As shown in Table 2, significant gender differences were observed in several dimensions of nursing errors. The median score for forward management was significantly higher among male nurses than female nurses [23 (20–26) vs. 21 (16–26), $P=0.029$]. Likewise, male nurses reported a significantly higher median score in the skills and training of nursing staff dimension compared with female nurses [19 (16–22) vs. 17.5 (14–22), $P=0.042$]. A significant gender difference was also observed in the environmental conditions of the ward dimension, with male nurses having a higher median score than female nurses [16 (15–20) vs. 16 (13–20), $P=0.031$]. These findings suggest that gender was significantly associated with the perceived contribution of managerial factors, staff skills and training, and environmental conditions to nursing errors among intensive care unit nurses.

Significant differences were also observed between nurses working in the ICU and CCU across several dimensions of factors contributing to nursing errors. In the ward management dimension, nurses working in the CCU reported a higher median score [22.5 (20–27)] than those working in the ICU [22 (17–26)], a difference that was statistically significant ($P=0.026$). A similar pattern was observed in the nurses' skills and training dimension, where the median score in the CCU [21 (18–24)] was significantly higher than that in the ICU [17 (14–21)] ($P=0.020$). In the environmental conditions dimension, CCU nurses reported a higher median score [18 (16–22)] compared with ICU nurses [16 (13–20)] ($P=0.016$). In addition, nurses with managerial experience had a significantly higher median score in the environmental conditions dimension [17 (14–20)] than those without managerial experience [14 (12–18)] ($P=0.049$). A significant difference was also found in the team coordination dimension between CCU [13 (12–15)] and ICU nurses [12 (10–14)] ($P=0.022$). Furthermore, the overall questionnaire score was significantly higher among CCU nurses [73.5 (65–82)] than ICU nurses [68 (58–79)] ($P=0.023$).

Furthermore, significant associations were observed between work experience in intensive care units and several dimensions of factors contributing to nursing errors. In the ward management dimension, a significant difference was found across different levels of ICU work experience ($P=0.029$), with the highest median score reported among nurses with 15–20 years of experience [23.44 (19–27)] and the lowest among those with more than 20 years of experience [20.37 (17–25)]. In the nurses' skills and training dimension, significant differences were observed based on both overall nursing experience ($P=0.012$) and ICU work experience ($P=0.033$). The highest median score for nursing experience was reported among nurses with less than five years of experience [20.12 (16–24)], while the lowest was among those with more than 20 years of experience [17.27 (14–21)]. Similarly, in ICU work experience, the highest median score was observed among nurses with less than five years of experience [19.66 (15–23)] and the lowest among those with more than 20 years of experience [16.87 (13–20)]. ICU work experience showed a significant relationship with environmental conditions ($P=0.048$), team coordination ($P=0.014$), and the overall questionnaire score ($P=0.038$). In these dimensions, the highest overall median score was observed among nurses with less than five years of ICU experience [72.52 (60–81)], while the lowest was reported among those with more than 20 years of ICU experience [64.37 (55–78)].

As shown in Table 3, a multivariable general linear model was conducted to examine the independent association between demographic and occupational factors and the total nursing errors score. After adjusting for all covariates, gender ($F=5.415$, $P=0.021$, partial $\eta^2=0.029$) and type of special care unit ($F=5.176$, $P=0.024$, partial $\eta^2=0.028$) were significantly associated with the total score. However, age group, education, nursing work experience, critical care work experience, employment status, marital status, managerial experience, and having a second job were not significantly associated with the total score ($P>0.05$).

Discussion

More than half of the participating nurses perceived the factors contributing to nursing errors to be at a moderate level, while over one-third rated them as poor. These findings suggest that more than 87% of nurses working

Table 2. Comparison of the factors contributing to nursing errors among nurses working in critical care units based on studied variables

Variables	Group	Ward Management Median (IQR)	Skills and Training of Nursing Staff Median (IQR)	Environmental Conditions of the Ward Median (IQR)	Team Coordination Median (IQR)	Total Questionnaire Score Median (IQR)
Gender	Male	23(20-26)	19(16-22)	16(15-20)	13(10-15)	71(65-80)
	Female	21(16-26)	17.5(14-22)	16(13-20)	12(9-14)	68(55-80)
Mann–Whitney Test	*P*-value	0.029	0.042	0.031	0.053	0.067
Marital Status	Married	22(18-25.8)	18(15-22)	16(13-20)	12.5(10-15)	68.5(56.2-80)
	Single	22(17-26)	18(15-22)	16(13-19.5)	12(10-14)	69(60-78.5)
Mann–Whitney Test	*P*-value	0.663	0.502	0.649	0.814	0.786
Education Level	Bachelor's	22(17-26)	18(16-22)	16(13-20)	12(10-14)	69(58-80)
	Master's and above	21(18-27)	19(17-23)	15(11-19)	12(7-14)	70(53-77)
Mann–Whitney Test	*P*-value	0.747	0.646	0.270	0.394	0.871
Age- Year Mean ± SD	<25 years	22.30 (5.81)	19.26 (5.33)	16.96 (4.62)	12.46 (3.12)	71.00 (17.17)
	25–30 years	22.47 (6.36)	19.07 (5.64)	16.07 (4.65)	12.55 (3.70)	70.17 (17.32)
	30–35 years	21.90 (6.09)	18.32 (4.97)	16.69 (4.69)	12.06 (3.45)	69.00 (17.35)
	35–40 years	22.18 (6.50)	18.25 (4.83)	16.18 (5.12)	12.43 (4.03)	69.06 (18.36)
	≥40 years	21.10 (5.10)	17.51 (4.70)	16.72 (4.95)	12.48 (4.04)	67.82 (16.67)
Kruskal–Wallis Test	*p*-value	0.963	0.782	0.824	0.967	0.987
Type of ICU Unit	ICU	22(17-26)	17(14-21)	16(13-20)	12(10-14)	68(58-79)
	CCU	22.5(20-27)	21(18-24)	18(16-22)	13(12-15)	73.5(65-82)
Mann–Whitney Test	*P*-value	0.026	0.020	0.016	0.022	0.023
Managerial Experience	Yes	21(17-25)	18(15-22)	17(14-20)	13(10-15)	70(60-80)
	No	22(18-26)	16(14-21)	14(12-18)	12(10-14)	68(57-78)
Mann–Whitney Test	*P*-value	0.356	0.239	0.049	0.182	0.347
Second Job	Yes	22.5(18-27)	18(15-22)	15.5(13-19)	13(10-15)	70(60-81)
	No	22(17-26)	18(14-22)	17(14-20)	12(10-14)	69(58-79)
Mann–Whitney Test	*P*-value	0.779	0.651	0.520	0.373	0.839
Nursing Work Experience Mean ± SD	<5 years	23.01 (5.98)	20.12 (5.54)	16.84 (4.93)	12.87 (3.26)	72.85 (16.86)
	5–10 years	21.75 (6.15)	18.06 (5.37)	15.73 (4.12)	11.95 (3.69)	67.51 (17.69)
	10–15 years	21.31 (5.70)	17.42 (3.79)	16.37 (4.41)	12.57 (3.59)	67.68 (14.25)
	15–20 years	22.28 (6.32)	18.34 (5.17)	16.74 (5.27)	12.31 (4.02)	69.68 (18.81)
	≥20 years	20.77 (6.11)	17.27 (4.93)	16.61 (5.46)	11.83 (4.28)	66.50 (19.36)
Kruskal–Wallis Test	*P*-value	0.574	0.012	0.844	0.646	0.627
ICU/CCU Work Experience Mean ± SD	<5 years	23.05 (6.20)	19.66 (5.63)	16.88 (4.53)	12.92 (3.38)	72.52 (17.11)
	5–10 years	21.19 (5.59)	17.84 (4.37)	15.81 (4.27)	11.86 (3.52)	66.72 (15.57)
	10–15 years	21.17 (5.65)	17.82 (4.66)	17.24 (5.07)	12.82 (3.74)	69.06 (16.71)
	15–20 years	23.44 (7.43)	17.33 (6.50)	14.77 (7.18)	11.00 (5.36)	66.55 (24.98)
	≥20 years	20.37 (6.88)	16.87 (5.40)	15.87 (6.28)	11.25 (4.52)	64.37 (22.35)
Kruskal–Wallis Test	*P*-value	0.029	0.033	0.048	0.014	0.038
Employment Status	Permanent	21.5(17-26)	17.5(14.5-21.5)	17(13-20)	12(10-14)	68(58-79)
	Contractual	22(18-27)	19(16-23)	16(13-20)	13(10-15)	70(61-80)
	Temporary contract	22(17-26)	17.5(14-22)	16.5(13-20)	13.5(11-14)	70(60-81)
	Mandatory service	23(19-27)	18.5(16-23)	15(12-19)	12(10-14)	71.5(63-82)
Kruskal–Wallis Test	*p*-value	0.592	0.424	0.980	0.830	0.761

in intensive care units are exposed to factors contributing to errors at moderate or poor levels, highlighting the need for serious attention from healthcare managers and policymakers. Ward management ranked highest among the four dimensions, aligning with previous research highlighting managerial factors as key drivers of nursing

Table 3. Multivariable general linear model for factors associated with the total nursing errors score

Variable	df	F	*P*-value	Partial η^2
Gender	1	5.415	0.021	0.029
Age group	4	0.160	0.958	0.004
Education	1	0.157	0.693	0.001
Nursing work experience	4	0.478	0.752	0.011
Critical care work experience	4	0.875	0.480	0.019
Employment status	3	0.277	0.842	0.005
Special care unit	1	5.176	0.024	0.028
Marital status	1	1.009	0.316	0.006
Managerial experience	1	1.591	0.209	0.009
Second job	1	0.000	0.983	0.000

errors (14, 16, 19). Specifically, Ansari et al. identified weak supervision and unclear guidelines as primary contributors (19), while Faramarzpour et al. linked medication errors to staff shortages and heavy workloads (16). Significantly higher managerial dimension scores were observed in male versus female nurses, possibly due to perceptual differences. Similarly, CCU nurses reported higher scores than ICU nurses, reflecting differences in organizational structure and workload. The heightened clinical demands of the ICU—including patient instability, complex monitoring, and advanced life support—increase cognitive and physical burdens (11), Moreover, stricter staffing ratios and higher care intensity in ICU settings likely influence perceptions of error-related factors compared to CCUs (20, 21). Higher scores among less experienced ICU nurses may reflect greater sensitivity to managerial issues or gradual adaptation by veteran staff. This finding supports Reason's Swiss Cheese Model (1990), where errors arise from cumulative systemic failures (22). Specifically, flaws in the managerial layer—including poor supervision, inadequate staffing, and punitive cultures—act as breached defenses that permit errors to bypass subsequent systemic barriers.

Ranking second, the skills and training dimension corroborates findings that deficient training and communication contribute to nursing errors (15, 17), including medication errors linked to inadequate in-service programs (15). Notably, higher scores were reported by male nurses, CCU nurses, and those with less work experience, suggesting a misalignment between academic training and the advanced clinical requirements of critical care. This underscores the vital role of continuous education; previous studies confirm that strong professional development programs (23) and simulation-based training (14) are essential for reducing error rates. Ranking third, the environmental dimension aligns with studies linking physical workspace constraints—such as overcrowding and inefficient ward layouts—to increased error rates (16). Higher scores were observed among male nurses, CCU nurses, and those with managerial or intensive care experience, the latter potentially reflecting increased awareness of environmental risks. This highlights the critical role of environmental ergonomics; previous evidence suggests that improving ICU design (e.g., lighting, noise control, and reduced walking distances) can decrease medication errors by up to 23% (17)

Team coordination received the lowest mean score, highlighting a significant area for intervention. Poor communication is a well-documented precursor to serious medical errors, with Ansari et al. reporting that 42% of medication errors stem from ineffective nurse-physician interaction (19). In this study, CCU nurses and those with more intensive care experience scored significantly higher than their ICU counterparts, suggesting that unit-specific organizational cultures play a pivotal role in coordination efficacy. Addressing these gaps is essential, as international standards like the Team STEPPS model emphasize teamwork as a cornerstone of patient safety (24). Additionally, adopting structured protocols such as SBAR can provide measurable improvements, potentially reducing communication-related errors by as much as 35% (15)

Multivariable analysis showed that only gender and type of special care unit were independently associated with the total score after adjustment for demographic and occupational characteristics. Although work experience showed significant associations in the univariate analyses, these associations were no longer statistically significant in the multivariable model, suggesting that they may have been confounded by other variables. These findings highlight the importance of organizational factors, particularly the type of critical care unit, in shaping nurses' perceptions of factors contributing to nursing errors. However, because of the cross-sectional design, causal relationships cannot be inferred. These findings are partially consistent with those of Anoosheh et al, who emphasized the importance of organizational support and educational interventions for nurses working in critical care settings (14). Collectively, these findings reinforce a system-based perspective on patient safety. Consistent with Reason's Swiss Cheese Model (22), our findings suggest that nursing errors are likely to arise from multiple interacting organizational, educational, environmental, and communication-related factors rather than from individual failures alone.

Limitation

One of the limitations of the present study is its cross-sectional design, which limits any causal interpretation of the observed associations. In addition, the data were collected using a self-reported questionnaire, which may be subject to reporting bias and differences in individual perceptions. Although a multivariable general linear model was performed to adjust for potential confounders, the explanatory power of the model was limited, indicating that other unmeasured factors may also influence perceptions of nursing errors. Furthermore, the relatively limited sample size, particularly within some subgroups, may have reduced the stability and precision of the adjusted estimates. Therefore, future studies with larger samples and more comprehensive analytical approaches are recommended to further clarify the independent contribution of these

factors.

Conclusion

This study suggests that ward management was perceived as the most important factor contributing to nursing errors in the ICU and CCU environments. Because the findings highlight the influence of organizational and environmental factors over demographic traits, interventions must focus on systemic improvements. Key recommendations include establishing non-punitive reporting systems, strengthening clinical simulation training, and improving ward ergonomics to mitigate error risks. Additionally, healthcare administrators should implement targeted support for newly employed nurses and adapt safety protocols to address the structural differences between CCU and ICU units. Such multifaceted approaches are critical for reducing errors and improving overall patient outcomes in intensive care settings.

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Competing Interests

The authors declare that there is no conflict of interest.

Ethical Approval

This study was approved by the Ethics Committee of Shahid Sadoughi University of Medical Sciences, Yazd (Ethics code: IR.SSU.SPH.REC.1404.132). All procedures were conducted in accordance with the ethical principles of the Declaration of Helsinki. Participation was voluntary, and written informed consent was obtained from all participants. Anonymity and confidentiality were strictly maintained through the use of coded questionnaires. No personally identifiable information was recorded, and all data were used solely for research purposes.

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