

Original Paper

# Determinants of Missed Nursing Care for Cardiac Patients in Iran: A Mixed-method Study



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**Citation** Amrolahi-Mishavan F, Emami-Sigaroudi A, Jafaraghaee F, Shahsavari H, Maroufizadeh S, Babaeipour-Divshali M. Determinants of Missed Nursing Care for Cardiac Patients in Iran: A Mixed-method Study. *J Holist Nurs Midwifery*. 2025; 35(1):71-80. <https://doi.org/10.32598/jhnm.35.1.2124.1>

**Running Title** Determinants of Missed Nursing Care for Cardiac Patients

**doi** <https://doi.org/10.32598/jhnm.35.1.2124.1>

## Article info:

Received: 10/08/2024

Accepted: 25/11/2024

Available Online: 01/01/2025

## Keywords:

Cardiovascular nursing, Missed nursing care, Mixed-method design

## ABSTRACT

**Introduction:** The cardiac care unit (CCU) is a stressful environment where nurses play a crucial role in providing critical care to cardiac patients. Consequently, missed nursing care in these units can have detrimental effects on patient outcomes.

**Objective:** This study aims to develop a model for the determinants of missed nursing care in the CCUs of hospitals in Iran.

**Materials and Methods:** This is a mixed-method study that was conducted in 2023 in two stages. In the first stage, an initial model of the determinants of missed nursing care in CCUs was developed by combining the results of previous studies. In the second stage (quantitative phase), six questionnaires were completed by 202 CCU nurses from a teaching hospital in Rasht, Iran. To measure the missed nursing care score, job profile, work-life conflict, clinical competence, cardiac room climate, and organizational management, which included the MISSCARE survey, the work-family conflict scale (WFCS), and the competency inventory for registered nurse (CIRN). Data were analyzed using Pearson's correlation test, independent t-test, one-way ANOVA, and hierarchical multiple linear regression analysis.

**Results:** As the total score for nurses' clinical competence increased, the total score of missed nursing care significantly decreased ( $\beta = -0.010$ , 95%CI: -0.014%, -0.007%,  $P < 0.001$ ). Also, as work-life conflict scores increased, the total score of missed nursing care increased significantly ( $\beta = -0.162$ , 95% CI: -0.269 %, -0.055%,  $P = 0.003$ ). Overall, 41.6% of the variance in missed nursing care was explained by the variables in the regression model.

**Conclusion:** Attention should be given to demographic and job-related characteristics, work-life conflicts, and clinical competencies of nurses to reduce missed nursing care in CCUs.

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## Highlights

- Key components in the study model included demographic/job-related factors, work-life conflict, clinical competence, cardiac room climate, and organizational management.
- Increased work-life conflict and clinical competence in nurses can predict decreased missed nursing care in the cardiac care unit (CCUs) of hospitals in Iran.
- Missed nursing care in the CCUs of hospitals in Iran is associated with nurses' sex, educational level, and the type of ward.

## Plain Language Summary

Working in the CCUs is a stressful job where missed nursing care can have serious consequences for cardiac patients. This study aimed to identify the determinants of missed nursing care in the CCUs of hospitals in Iran. Several factors including the nurse's demographic/job-related characteristics, work-life conflict, clinical competence, cardiac room climate, and organizational management were added to the study model. The results showed that female nurses and those with lower educational level, higher clinical competence, and higher work-life conflict were less likely to report missed nursing care. Additionally, a positive work environment and effective organizational management played a significant role in reducing the occurrence of missed nursing care.

## Introduction

**N**ursing care has a significant impact on patient outcomes [1-3]. Evidence shows a strong correlation between nursing care and patient recovery [4]. In some situations, nursing care may be missed due to factors such as staff shortages [5]. Missed nursing care refers to delayed or unfinished care [6, 7]. In a study by Hessels et al., the rate of missed nursing care was 10-27% [8], while in Blackman et al.'s study it was 34% [9]. Jones revealed that missed nursing care, as a major issue in hospitals, affects nurses' care prioritization and results in unmet educational, emotional, and psychological needs, thereby increasing patient vulnerability [10]. Missed nursing care is linked to various negative outcomes, including prolonged hospital stays, decreased patient satisfaction [11], reduced sense of safety in the patient, decline in hospital reputation [12], skin problems, and medication errors [5]. Overall, missed nursing care is a key indicator in assessing the quality of nursing services. Therefore, understanding the factors contributing to missed nursing care and improving nursing practice are crucial [13], especially in cardiac care units (CCUs), where missed nursing care can be dangerous to patients. The factors associated with missed nursing care may vary depending on the study setting and the financial and human resources of the healthcare system [7]. There is scant research on missed nursing care, specifically in CCUs.

Mixed-method studies, which combine qualitative and quantitative approaches, can provide comprehensive and reliable results [14]. Given the importance of nursing care in CCUs and its impact on the recovery of cardiac patients, this study aims to design and evaluate a model of missed nursing care in CCUs. Previously, we conducted two separate studies, a scoping review [15] and a qualitative study [16], to identify factors contributing to missed nursing care. The scoping review highlighted factors such as nurses' personal and job-related characteristics, workload, job satisfaction, available resources, professional communication, teamwork, work environment, management performance, and the use of technology in patient care delivery. The qualitative study identified factors such as the nurse's job profile, work-life conflict, clinical competence, cardiac room climate, and organizational management as key determinants of missed nursing care in CCUs. The findings from these two studies are used in the present study.

## Materials and Methods

This is a mixed-method study, conducted in two consecutive stages in 2023. In the first stage, results from the scoping review and qualitative studies [15, 16] were integrated using the side-by-side joint display approach. The integration was done by preserving the classifications and findings from the qualitative study, as primary data, while incorporating and consolidating the initial codes from the scoping review. Notably, no data from

the scoping review exceeded the data from the qualitative study; all review data were integrated into the qualitative data, resulting in the identification of main themes. These themes were introduced as variables influencing missed nursing care in CCUs, forming the initial model of the determinants of missed nursing care. [Figure 1](#) shows the conceptual model of the study.

The second stage had an analytical cross-sectional design, conducted from April to June 2023 with the participation of 225 nurses working in the CCUs (two cardiology units, two cardiac surgery units, two intensive care units, two emergency units, post-angiography and electrophysiology units, and pacemaking and Holter monitoring units) of a specialized teaching hospital affiliated with [Guilan University of Medical Sciences](#) in Rasht, Iran. Inclusion criteria were having a nursing degree (bachelor's or higher) and currently working in a CCU. In this stage, based on the developed model, the quantitative data were collected for each variable, and the fit of the proposed model was evaluated, revised, and finalized. Ultimately, the main determinants of missed nursing care in CCUs and the relationships between them were identified.

The main variable in this study was “missed nursing care”, and five independent variables derived from the integration of the scoping review and qualitative study were nurse's job profile, work-life conflict, nurse's clinical competence, cardiac room climate, and organizational management. To assess these variables, the MISSCARE survey (for missed nursing care), the work-family conflict scale (WFCS), and the competency inventory for registered nurse (CIRN) were used. For the three variables of cardiac room climate, organizational management, and nurse's job profile (personal and job-related), researcher-developed questionnaires were employed due to the lack of related assessment tools.

The MISSCARE survey consists of 24 items that assess missed nursing care by a self-report method using a five-point Likert scale from 1 (never missed) to 5 (always missed). The Persian version of this questionnaire has been previously validated by [Chegini et al. \[17\]](#). The internal consistency of this instrument in this study using Cronbach's  $\alpha$  was determined as 0.91. The WFCS is an 18-item, 6-factor questionnaire measuring three aspects (time-based, strain-based, and behavior-based) of work-family conflict based on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). The Persian version of this scale was validated by [Rajabi et al. \[18\]](#), and its internal consistency was confirmed with a Cronbach's  $\alpha$  of 0.96. The CIRN is a self-assessment tool with seven subscales and 55 items, measuring the

frequency of using each skill on a five-point Likert scale from 0 (never) to 4 (always). This scale was translated and psychometrically evaluated in Iran by [Ghasemi et al.](#), who tested it on nursing faculty members and reported its acceptable face validity and content validity (content validity ratio [CVI]=0.94) [\[19\]](#). In this study, the internal consistency of this tool was determined with a Cronbach's  $\alpha$  of 0.94.

The researcher-made cardiac room climate scale had 15 items and three subscales (management climate, care climate, and professional communication), and the researcher-made organizational management scale had 17 items and four subscales (staff management, resource management, education, and satisfaction). Responses were based on a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). To determine their content and face validity, they were examined by 10 nursing faculty members, and their CVR and content validity index (CVI) were calculated. The overall CVI for the cardiac room climate scale was 0.98, with a CVR of 0.95, while the organizational management scale had a CVI of 0.97 and a CVR of 0.95. Test re-test reliability was assessed by administering the questionnaires to 15 CCU nurses twice at a 10-day interval. The results reported interclass correlation coefficients of 0.98 for the cardiac room climate scale and 0.99 for the organizational management scale.

Descriptive and inferential statistics were used to analyze the collected data. The relationship between the main variables was assessed using Pearson's correlation test. The relationship between missed nursing care scores and nurse's job profile variables was examined using independent t-tests, one-way ANOVA, and Pearson's correlation test. Hierarchical multiple linear regression was used to determine factors predicting the missed nursing care. In this regard, the relationship between nurse's job profile variables and missed nursing care was first evaluated (model 1). Other variables were then added to model 2 to assess the prediction power of the model. Data analysis was conducted in SPSS software, version 16, and the significance level was set at 0.05.

## Results

In this study, 202 questionnaires were returned, yielding a response rate of 90%. The demographic and job-related characteristics of the nurses are presented in [Table 1](#). The mean age of the nurses was  $33.41 \pm 7.9$  years, and their mean work experience was  $9.24 \pm 7.24$  years. Among 202 nurses, 29(14.4%) were male, 138(68.3%) were married, and 13(6.4%) had a master's degree.

**Table 1.** Demographic and job-related characteristics of nurses

Variables		Mean±SD/No.(%)
Age (y)		33.41±7.9
Sex	Female	173(85.6)
	Male	29(14.4)
Marital status	Single	64(31.7)
	Married	138(68.3)
Educational level	Bachelor's degree	189(93.6)
	Master's degree	13(6.4)
	Work experience (y)	9.24±7.24
Employment status	Permanent	121(59.9)
	Temporary	31(15.3)
	Obligation	50(24.8)
Work shift	Fixed	33(16.3)
	Rotating	169(83.7)
Type of work unit	Medical	43(21.3)
	Surgical unit	24(11.9)
	Intensive care unit	68(33.7)
	Emergency unit	41(20.3)
	Electrophysiology, pacemaking, Holter monitoring, and post-angiography	26(12.9)

The results related to the correlations between the main variables are presented in [Table 2](#). The results showed a significant negative correlation (moderate) between clinical competence and missed nursing care ( $r=-0.445$ ,  $P=0.001$ ). The cardiac room climate had a weak but significant negative correlation with missed nursing care ( $r=-0.149$ ,  $P=0.035$ ) and work-family conflict ( $r=-0.298$ ,  $P=0.001$ ), and a strong significant positive correlation with organizational management ( $r=0.687$ ,  $P=0.001$ ).

[Table 3](#) shows the results related to the relationship of demographic and job-related characteristics with missed nursing care scores. As can be seen, male nurses had significantly higher missed nursing care scores than female nurses ( $P=0.001$ ). Nurses with a master's degree had significantly higher missed care scores than those with a bachelor's degree ( $P=0.047$ ). Furthermore, a significant difference in missed nursing care scores was

observed based on the type of unit where the nurses worked ( $P=0.001$ ).

[Table 4](#) presents the factors in the linear regression model. Based on the findings for model 1, missed nursing care was more likely in male nurses than in female nurses by 0.461 units ( $\beta=0.461$ , 95%CI; 0.243%, 0.679%,  $P=0.001$ ). Nurses with a master's degree were more likely to report missed nursing care than those with a bachelor's degree by 0.328 units ( $\beta=0.328$ , 95%CI; 0.019%, 0.637%,  $P=0.038$ ). Compared to nurses working in internal medicine wards, those in intensive care units ( $\beta=-0.396$ , 95%CI; -0.601%, -0.190%,  $P<0.001$ ) and invasive units ( $\beta=-0.362$ , 95%CI; -0.627%, -0.096%,  $P=0.008$ ) were less likely to report missed nursing care. The coefficient of determination ( $R^2$ ) for the model included demographic and job-related characteristics was 0.262, indicating that these variables can explain 26.2% of the variance in missed nursing care.

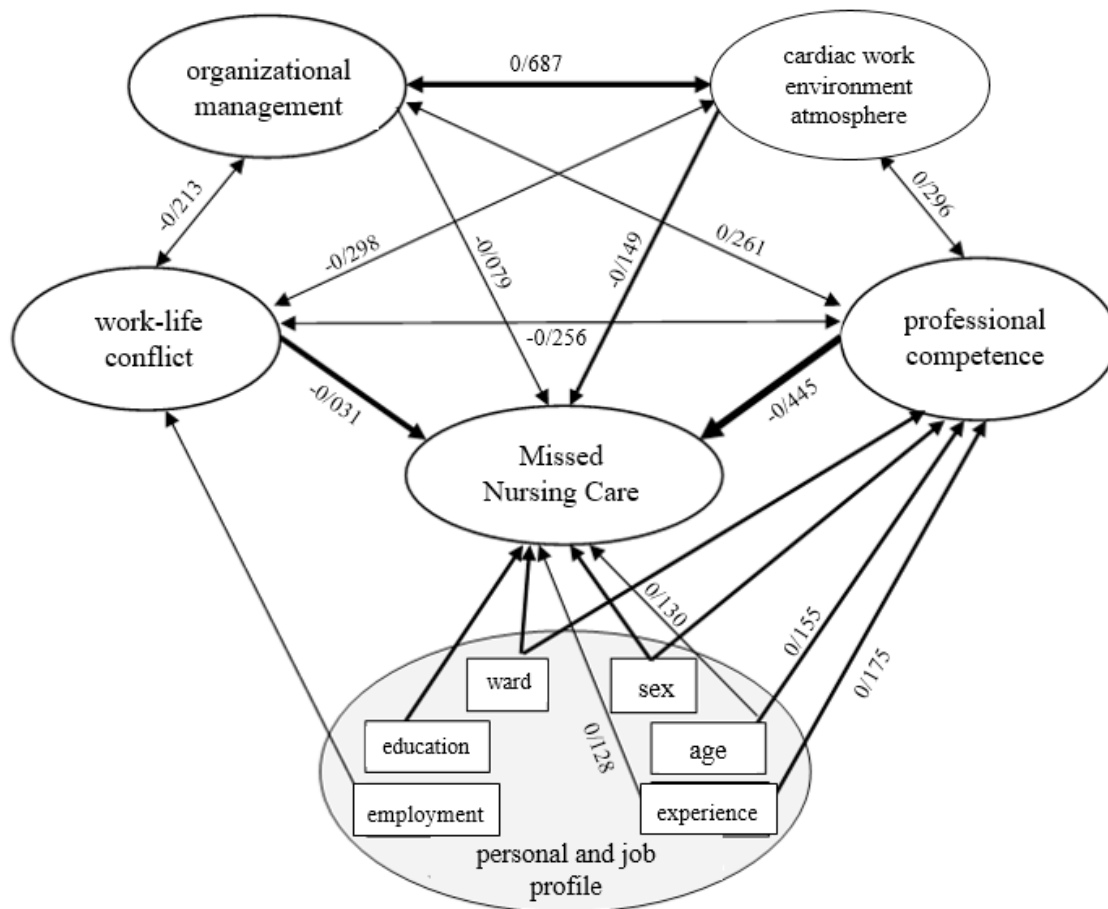
**Table 2.** Mean scores and correlation coefficients between the study variables

Variables	1	2	3	4	5
1. Clinical competence	1				
2. Cardiac room climate	0.296*	1			
3. Organizational management	0.261*	0.687*	1		
4. Work-life conflict	-0.256*	-0.298*	-0.213*	1	
5. Missed nursing care	-0.445*	-0.149*	-0.079	-0.031	1
Possible range	0-4	1-5	1-5	1-5	1-5
Observed range	1.93-4	1.40-4.47	1-4.88	1.61-5	1-4.45
Mean±SD	3.21±0.43	2.72±0.65	2.2±0.84	3.41±0.69	1.83±0.6

\*Pearson correlation test ( $P < 0.05$ ).

In model 2, the results showed that clinical competence was significantly associated with missed nursing care. For each one-unit increase in clinical competence, the overall missed nursing care score decreased by 0.01 units ( $\beta = -$

0.010, 95%CI; -0.014%, -0.007%,  $P < 0.001$ ). An increase in work-family conflict was also significantly associated with reduced missed nursing care ( $\beta = -0.162$ , 95%CI; -0.269%, -0.055%,  $P = 0.003$ ). When the variables of clinical compe-



**Figure 1.** Conceptual model of the determinants of missed nursing care in CCUs

**Table 3.** The relationship between demographic/job-related characteristics and missed nursing care

Variables		Mean±SD	Test Results
Age (y)			R=-0.13, P=0.066*
Sex	Female	1.75±0.53	P=0.001**
	Male	2.31±0.76	
Marital status	Single	1.85±0.59	P=0.814**
	Married	1.83±0.61	
Educational level	Bachelor's degree	1.81±0.6	P=0.047**
	Master's degree	2.15±0.61	
Work experience (y)			R=-0.128, P=0.069*
Employment status	Permanent	1.84±0.63	P=0.94***
	Temporary	1.8±0.55	
	Obligation	1.85±0.56	
Work shift	Fixed	1.71±0.45	P=0.104**
	Rotating	1.86±0.62	
Type of ward	Medical	2.03±0.88	P=0.001***
	Surgical ward	1.72±0.31	
	Intensive care unit	1.63±0.36	
	Emergency ward	2.18±0.63	
	Electrophysiology, pacemaking, Holter monitoring, and post-angiography	1.58±0.28	

SD: Standard deviation

\*Pearson correlation test; \*\*Independent t-test; \*\*\*One-way ANOVA.

tence, work-family conflict, organizational management, and cardiac room climate were added to the regression model, there was a significant increase of 15.4% in the  $R^2$  value. In model 2, the variables explained 41.6% of the variance in missed nursing care.

## Discussion

The purpose of this study was to identify the determinants of missed nursing care in the CCUs of hospitals in Iran using a mixed-method approach. Based on our previous studies, factors such as nurse demographic/job-related characteristics, work-life conflict, clinical competence, cardiac room climate, and organizational management were considered as the components of the model of the determinants of missed nursing care.

The results indicated a significant relationship between some demographic/job-related characteristics of nurses (such as sex, educational level, and type of unit where they worked) and missed nursing care. It was found that male nurses had a higher rate of missed nursing care than female nurses. This finding is consistent with the results of Vatankhah et al., who also reported higher missed nursing care among male nurses. They suggested that fatigue (due to long work hours and shiftwork) and financial concerns may contribute to the higher missed nursing care in male nurses [20]. In our study, nurses with master's degrees had higher rates of missed nursing care than those with bachelor's degrees, consistent with the results of Ebadi et al. [21]. This may be explained by the higher career expectations of nurses having higher degrees; when these expectations are not met, it can reduce their motivation.

**Table 4.** Factors associated with missed nursing care using multiple linear regression analysis

Variables	Model 1				Model 2			
	SE	B	95% CI Lower, Upper	P	SE	B	95% CI Lower, Upper	P
Age (y)	0.007	-0.011	-0.02, 0.003	0.134	0.006	-0.004	-0.01, 0.009	0.43
Sex (male to female)	0.11	0.461	0.24, 0.67	0.001	0.103	0.316	0.11, 0.51	0.003
Marital status (married to single)	0.098	-0.074	-0.26, 0.11	0.452	0.09	-0.02	-0.19, 0.15	0.919
Educational level (master's to bachelor's)	0.157	0.328	0.01, 0.63	0.038	0.142	0.327	0.04, 0.6	0.022
Employment status (temporary to permanent)	0.109	-0.009	-0.22, 0.2	0.936	0.1	0.047	-0.15, 0.24	0.607
Employment type (Obligation to Permanent)	0.113	-0.183	-0.4, 0.03	0.106	0.102	-0.093	-0.29, 0.1	0.505
Work shift (rotating to fixed)	0.122	0.001	-0.24, 0.24	0.994	0.111	0.015	-0.2, 0.23	0.891
Ward (surgical to medical)	0.138	-0.228	-0.49, 0.04	0.1	0.125	-0.293	-0.54, -0.04	0.019
Ward (intensive to medical)	0.104	-0.396	-0.6, -0.19	0.001	0.096	-0.52	-0.7, -0.33	0.001
Ward (emergency to medical)	0.117	0.12	-0.11, 0.35	0.306	0.11	-0.09	-0.3, 0.12	0.312
Ward (intensive to medical)	0.134	-0.362	-0.62, 0.09	0.008	0.121	-0.371	-0.61, -0.13	0.003
Clinical competence	-	-	-	-	0.002	-0.01	-0.01, -0.007	0.001
Cardiac room climate	-	-	-	-	0.075	-0.111	-0.26, 0.03	0.144
Organizational management	-	-	-	-	0.058	0.038	-0.07, 0.15	0.508
Work-life conflict	-	-	-	-	0.054	-0.162	-0.26, -0.05	0.003
Model specifications								
F statistic	F <sub>(11, 190)</sub> = -6.12				F <sub>(4, 186)</sub> = -12.27			
	<0.001				<0.001			
R <sup>2</sup>	0.262				0.416			

B: Regression coefficient; SE: Standard error

Furthermore, due to their involvement in research and educational activities, they may have a lower clinical focus, affecting their bedside performance. We also found that nurses in internal medicine units had lower rates of missed nursing care than those in other units, which is consistent with previous studies that reported different missed nursing care rates across different units [1, 22, 23]. The workload may contribute to more missed nursing care in these highly stressful units. Our results also showed that missed nursing care decreased with the increase of age and years of work experience, but this correlation was not statistically significant. Srulovici and Drach-Zahavy found no significant relationship between missed nursing care and age and work experience, either [24].

Multivariate regression analysis revealed that higher work-life conflict was significantly associated with lower missed nursing care. This suggests that nurses often prioritize their job duties over their family roles, which may lead to less missed nursing care but greater work-life conflict. This is consistent with previous studies, which indicated that work has a greater impact on family responsibilities compared to the effect of family responsibilities on work [25-28]. In the Iranian culture, the supportive role of family, such as care and emotional supports, may help reduce work-life conflict, allowing nurses to focus more on their work tasks. The regression model also showed that increased clinical competence was significantly associated with reduced missed nursing care. In a similar study, Chang and Manojlovich found that higher nursing competency was linked to



lower rates of missed nursing care [29]. Nobahar also reported the negative impact of inadequate nursing competency, particularly in areas such as recognizing patient deterioration and handling equipment, on the quality of cardiac care [30]. Given that the strongest predictor of missed nursing care in our study was clinical competence, it can be a key determinant of missed nursing care in cardiac patients.

The results also indicated that the cardiac room climate significantly affected nurse performance and missed nursing care. Due to the nature of cardiac diseases, the patient care needs, and the stressful environment of CCUs, nurses may prioritize specific tasks which can lead to missing some of them. Although the univariate data analysis results showed a weak negative correlation between cardiac room climate and missed nursing care, this relationship was not significant in multivariate data analysis, possibly due to the small sample size. Similar findings were reported by Ibrahim and Abohabieb [31], but Lake et al.'s study suggested a correlation between improved work environment and reduced missed nursing care [32]. Several other studies have reported similar findings [33-35], confirming that the work environment is still essential in determining missed nursing care.

Finally, we identified a weak negative correlation between organizational management and missed nursing care, but it was not statistically significant in either univariate or multivariate data analyses, potentially due to the small sample size or nurses' fatigue. Proper management and leadership are critical in ensuring optimal nursing care. Kim et al. identified effective nursing leadership and support as factors affecting missed nursing care [34]. Therefore, despite a non-significant correlation, organizational management remains crucial in determining missed nursing care.

The missed nursing care in CCUs of hospitals in Iran is associated with nurses' sex, educational level, and the type of work unit. Additionally, increased work-life conflict and clinical competence can predict decreased missed nursing care. The mentioned demographic/job-related variables explained 26.2% of the variance in missed nursing care. By considering work-life conflict and clinical competence, the variance in missed nursing care was explained by 41.6%. This suggests that there may be other factors that have a role in missed nursing care for cardiac patients in Iran. Healthcare managers in Iran should pay attention to the demographic and job-related characteristics of nurses working in CCUs and develop strategies to reduce their work-life conflict and

improve their clinical competence for controlling the incidence of missed nursing care in CCUs.

## Ethical Considerations

### Compliance with ethical guidelines

This study was approved by the Ethics Committee of [Guilan University of Medical Sciences](#) Rasht, Iran (Code: IR.GUMS.REC.1400.005). Participation in the study was voluntary, and informed consent to participate in the research was obtained from all participants.

### Funding

This study was extracted from a PhD dissertation, that received approval and funding from [Guilan University of Medical Sciences](#), Rasht, Iran.

### Authors' contributions

Conceptualization and study design: Abdolhossein Emami-Sigaroudi, Fatemeh Amrolahi-Mishavan, Fatemeh Jafaraghaee, Hooman Shahsavari, Saman Maroufizadeh; Data acquisition, analysis, and interpretation: Fatemeh Amrolahi-Mishavan, Abdolhossein Emami-Sigaroudi, Fatemeh Jafaraghaee, Hooman Shahsavari, Mohammad Babaeipour-Divshali; Writing the original draft: Fatemeh Amrolahi-Mishavan and Mohammad Babaeipour-Divshali; Supervision, administrative, technical, or material support, review and editing: Abdolhossein Emami-Sigaroudi, Fatemeh Jafaraghaee, Hooman Shahsavari, and Saman Maroufizadeh.

### Conflict of interest

The authors declared no conflict of interest.

### Acknowledgments

The authors would like to thank all the nurses who participated in this study for their cooperation and the Vice-Chancellor for Research and Technology of [Guilan University of Medical Sciences](#), Rasht Iran, for their financial support.

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