Research in Health Science
ISSN 2470-6205 (Print) ISSN 2470-6213 (Online)
Vol. 10, No. 2, 2025
www.scholink.org/ojs/index.php/rhs

Original Paper

Current Situation of Occupational Fatigue of ICU Nurses and Its Correlation with Psychological Resilience

Zheng Wang[1#], Shuang Chen[2#], Mengran Hao[2], Weina Zhang[3], Jia Feng[3], Hongying Tian[4], Biao Hua[5] & Yanling Li[3*]

[1] School of Nursing, Hebei University, Baoding 071000, China

[2] Department of Intensive Care Medicine, Affiliated Hospital of Hebei University, Baoding 071000, China

[3] Department of Nursing, Affiliated Hospital of Hebei University, Baoding 071000, China

[4] Integrated Service Center, Affiliated Hospital of Hebei University, Baoding 071000, China

[5] Development & Planning Office, Affiliated Hospital of Hebei University, Baoding 071000, China

[*] Corresponding author: Yanling Li, E-mail: xsliyanling@163.com

[#] These authors contributed equally to this work.

Abstract

Objective: *This study aims to analyze the status of occupational fatigue among intensive care unit (ICU) nurses, explore the correlation between occupational fatigue and psychological resilience, and identify key factors influencing occupational fatigue. These findings are intended to provide a basis for improving the occupational mental health of ICU nurses.* ***Methods:*** *Between January and February 2025, a convenience sample of 158 ICU nurses who met the inclusion and exclusion criteria was selected from five hospitals in Hebei Province. A self-designed questionnaire was used to collect data on nurses' general information, occupational fatigue (assessed using the Occupational Fatigue Exhaustion Recovery Scale), and psychological resilience (assessed using the Psychological Resilience Scale).* ***Results:*** *The mean occupational fatigue score among ICU nurses was 33.84 ± 8.60, indicating a high level of fatigue. Psychological resilience was found to have a significant negative correlation with occupational fatigue ($P < 0.001$). Multiple linear regression analysis revealed that psychological resilience, mode of employment, years of service, and marital status were significant factors influencing occupational fatigue among ICU nurses ($P < 0.05$).* ***Conclusion:*** *Occupational fatigue is a significant issue among ICU nurses and warrants intervention from multiple perspectives. Future studies should consider expanding the sample size to further explore potential influencing factors and effective intervention strategies.*

Keywords

ICU nurses, occupational fatigue, psychological resilience

1. Introduction

Occupational fatigue, often referred to as Occupational burnout, is an extreme state of fatigue that arises from prolonged exposure to occupational stress, characterized by severe psychological, physiological, and emotional exhaustion[1]. Both domestic and international studies have demonstrated that nurses are particularly susceptible to occupational fatigue due to their long-term exposure to high-intensity workloads, complex interpersonal interactions, and high-risk responsibilities[2,3]. Statistics indicate that the prevalence of occupational fatigue among nurses is high, significantly impairing their quality of life at work. Intensive Care Units (ICU) are specialized hospital settings where patients with acute and critical illnesses are treated. ICU nurses face unique challenges, including the need to maintain high levels of concentration to manage patients' rapidly changing conditions, work long continuous shifts, and endure substantial psychological pressure. These factors contribute to a higher prevalence of occupational fatigue among ICU nurses compared to those in other departments[4]. Long-term occupational fatigue in ICU nurses not only poses serious risks to their physical and mental health, such as anxiety, depression, and decreased immunity, but also threatens patient safety through potential work errors, thereby compromising the quality of medical care.

Psychological resilience, defined as the process of positive adaptation in the face of stressful events such as illness and adversity, has garnered significant attention in psychology and related fields in recent years[5]. Research has shown a correlation between psychological resilience and occupational fatigue, with individuals who exhibit higher levels of psychological resilience more likely to employ positive coping strategies when confronted with work stress, thereby reducing their risk of occupational fatigue[6,7].

Given this background, the present study aims to investigate the prevalence of occupational fatigue among ICU nurses and further analyze its correlation with psychological resilience. The findings are expected to provide a basis for improving the occupational mental health of ICU nurses and ensuring patient safety.

2. Objects and Methods

2.1 Study Population

From January to February 2025, a sample of 158 ICU nurses who met the inclusion and exclusion criteria was recruited from four hospitals in Hebei Province using a convenience sampling method. Inclusion Criteria: ①Provision of informed consent to participate in the study. ②Registered nurses holding a valid nursing practice certificate. ③At least one year of experience in clinical nursing. Exclusion Criteria: ①Nurses on internship, training, or further education programs. ②Nurses on leave due to illness, maternity, or family-related reasons.

2.2 Survey Instrument

2.2.1 Nurses' General Information Questionnaire

A self-designed questionnaire was developed based on a comprehensive literature review to collect

demographic information from the participants. The questionnaire included items related to gender, age, educational level, years of working experience, job title, employment status, marital status, parental status, monthly income, and the level of the hospital where they worked.

2.2.2 Occupational Fatigue Exhaustion Recovery Scale (OFER)

The OFER scale, developed by Winwood[8], was used to assess occupational fatigue. The scale comprises three subscales: Acute Fatigue (5 items), Chronic Fatigue (5 items), and Inter-shift Recovery (5 items), totaling 15 items. Each item is rated on a 7-point Likert scale. Higher scores on the Acute and Chronic Fatigue subscales indicate greater fatigue, while higher scores on the Inter-shift Recovery subscale indicate better recovery. In this study, only the Acute and Chronic Fatigue subscales were used to evaluate occupational fatigue among ICU nurses. The Cronbach's alpha coefficients for the Acute and Chronic Fatigue subscales were 0.765 and 0.829, respectively, indicating good reliability.

2.2.3 Psychological Resilience Scale

The Psychological Resilience Scale, revised by Xiao[9], was employed to measure psychological resilience. The scale consists of 25 items across three dimensions: Toughness (13 items), Self-improvement (8 items), and Optimism (4 items). Each item is scored on a 5-point Likert scale, with total scores ranging from 25 to 125. Higher scores indicate higher levels of psychological resilience. In this study, the Cronbach's alpha coefficients for the three dimensions ranged from 0.832 to 0.922, and the overall Cronbach's alpha coefficient for the scale was 0.870, demonstrating excellent internal consistency.

2.3 Data Collection Methods

An on-site survey was conducted in an anonymous manner. After obtaining verbal consent from the participants and their written informed consent, the paper version of the questionnaire was distributed, or the electronic version was sent via the Questionnaire Star platform. Participants were given approximately 10 to 15 minutes to complete the questionnaire. Upon completion, the investigator conducted on-site verification to ensure the integrity of the responses. If any omissions were detected, participants were promptly asked to complete the missing information to ensure the completeness of the survey data.

2.4 Statistical Methods

The questionnaire data were entered into a database using a double-entry method to ensure accuracy and then verified for consistency. Statistical analysis was performed using IBM SPSS version 25.0. Normally distributed variables were described using means and standard deviations, while non-normally distributed variables were characterized by medians and interquartile ranges. Categorical data were summarized as frequencies and percentages. To examine differences in occupational fatigue among nurses with varying socio-demographic characteristics, one-way analysis of variance (ANOVA) and independent samples t-tests were employed. Pearson correlation analysis was used to assess the relationship between occupational fatigue and psychological resilience among ICU nurses. For the multiple linear regression analysis, the dependent variable was the occupational fatigue score of ICU

nurses. Independent variables were selected based on their statistical significance in the one-way ANOVA. These variables were assigned values and entered into the regression model at a significance level of α= 0.05. Variables were excluded from the model at a significance level of α = 0.10. This process identified the key factors influencing occupational fatigue among ICU nurses. All statistical tests were two-sided, and a p-value of less than 0.05 was considered statistically significant.

3. Results

3.1 Current Status of Occupational Fatigue and Psychological Resilience among ICU Nurses

The current status of occupational fatigue and psychological resilience of ICU nurses is shown in Table 1.

Table 1. Occupational Fatigue and Psychological Resilience of ICU Nurses (mean ± SD, *n*=158)

Item	Score range	Total score	Item average score
fatigue	4-60	33.84±8.60	3.38±0.86
Acute fatigue	0-30	16.72±4.35	3.34±0.87
Chronic Fatigue	4-30	17.12±4.28	3.42±0.86
Mental Flexibility	40-125	82.04±16.31	3.28±0.65
Toughness	21-65	42.16±8.46	3.24±0.65
Self-improvement	15-40	26.62±5.10	3.33±0.64
Optimism	4-20	13.27±2.83	3.32±0.71

3.2 Univariate Analysis of Occupational Fatigue of ICU nurses Analyzed by Univariate Analysis

A univariate analysis was conducted with the total occupational fatigue score as the dependent variable and the sociodemographic information of ICU nurses as the independent variable. The results showed that the differences in occupational fatigue scores of ICU nurses were statistically significant ($P < 0.05$) in six variables: different ages, mode of employment, years of work experience, job title, marital status, and income, as shown in Table 2.

Table 2. Univariate Analysis of Occupational Fatigue among ICU Nurses (mean ± SD, *n*=158)

Item	Classification	*n*	score	*t* / *F*	*P*
Gender	Male	16	32.81±9.09	-0.501[a]	0.617
	Female	142	33.95±8.57		
Age (years)	≤25	7	20.00±8.14	12.325[b]	＜0.001
	26-29	23	31.04±8.95		
	30-39	91	33.80±7.14		
	≥ 40	37	38.27±8.52		

Hospital Level	Grade-III	129	34.40±8.28	1.738[a]	0.084
	Grade-II	29	31.34±9.66		
Mode of Employment	Labor dispatch	6	19.50±10.62	10.442[b]	＜0.001
	Contractual	126	34.04±8.31		
	Preparation	26	36.15±6.40		
Academic qualifications	Specialized and below	12	30.58±12.89	-0.930[a]	0.174
	Undergraduate and above	146	34.10±8.15		
Years of working experience	≤3	9	21.78±7.95	10.398[b]	＜0.001
	4-9	39	32.56±8.39		
	10-14	58	33.57±7.53		
	≥15	52	37.17±7.96		
Title	Nurse	17	25.88±7.86	6.031[b]	＜0.001
	Junior Nurse Practitioner	33	34.21±9.37		
	Senior Nurse Practitioner	95	35.00±8.14		
	Associate Nurse Practitioner and above	13	34.77±5.51		
Marital status	Married	123	33.80±8.16	2.736[b]	＜0.001
	Unmarried	30	32.60±9.78		
	Other	5	42.20±8.79		
Number of children	≤1	87	31.70±7.54	-3.514[a]	0.068
	≥2	71	36.45±9.13		
Income	below 3000	12	26.08±8.23	4.626[b]	0.004
	3000-5999	69	33.80±8.54		
	6000-8999	67	34.60±7.59		
	9000 and above	10	38.30±11.24		

Note. [a] Two independent samples t-test; [b] One-way ANOVA.

3.3 Correlation between Occupational Fatigue and Psychological Resilience of ICU Nurses

The correlation between occupational fatigue and psychological resilience of ICU nurses was analyzed, and the results showed that the total score of occupational fatigue and the scores of each subscale were negatively correlated with the total score of psychological resilience and the scores of each dimension, and it was statistically significant ($P < 0.001$).

3.4 Multifactorial Analysis of ICU Nurses' Occupational Fatigue

In this study, multiple linear regression analysis was employed to identify the key factors influencing occupational fatigue among ICU nurses. The total occupational fatigue score of ICU nurses served as the dependent variable, while independent variables were selected based on their statistical significance ($P < 0.05$) in the preceding univariate and correlation analyses. A multiple regression model was constructed to elucidate the determinants of occupational fatigue.

Categorical independent variables were assigned numerical values and dummy variables were created as necessary, while continuous independent variables were included in the regression model using their original values. The results indicated that four variables—psychological resilience, mode of employment, years of service, and marital status—were significant predictors of occupational fatigue ($F = 70.896$, $P < 0.001$). The adjusted R^2 value was 0.690, suggesting that these variables collectively explained 69.0% of the variance in occupational fatigue among ICU nurses.

4. Discussion

4.1 High Levels of Occupational Fatigue Among ICU Nurses

The results of this study indicate that the occupational fatigue score of ICU nurses was 3.38 ± 0.86, reflecting a high degree of fatigue. This finding is consistent with that of Lv[10], who reported similarly high occupational fatigue scores among ICU nurses, highlighting that this population generally experiences significant occupational stress. Compared with international studies[11], the occupational fatigue scores of ICU nurses in this study were slightly higher, which may be attributed to the higher intensity of work in the selected ICU and the heavier workloads shouldered by nurses. Additionally, the relatively more abundant medical resources and more rational nurse staffing ratios in foreign countries may have alleviated work pressure to some extent. These findings suggest that the issue of occupational fatigue among ICU nurses should be prioritized, with efforts to optimize the allocation of medical resources, improve working environments, and reduce nurse workloads.

4.2 The Relationship Between Psychological Resilience and Occupational Fatigue

This study demonstrates a significant negative correlation between psychological resilience and occupational fatigue among ICU nurses, aligning with the findings of Zhai et al. [6]. Psychological resilience, as a crucial psychological trait for coping with stress, effectively buffers the negative impact of occupational stress. ICU nurses with higher psychological resilience are more likely to adopt positive coping strategies, such as seeking social support and adjusting their mental states, when facing high-intensity work and complex conditions, thereby reducing the risk of occupational fatigue. Conversely, nurses with lower psychological resilience may be more susceptible to negative emotions, making it difficult for them to effectively manage work challenges and potentially increasing their level of occupational fatigue. Therefore, enhancing the psychological resilience of ICU nurses through psychological training programs and counseling services is essential to improve their ability to cope with occupational stress.

4.3 Multifactorial Influences on Occupational Fatigue

Multiple linear regression analysis identified four key factors influencing occupational fatigue among ICU nurses: psychological resilience, mode of employment, years of working experience, and marital status. Psychological resilience, as previously discussed, negatively correlates with occupational fatigue, emphasizing the importance of cultivating nurses' psychological resilience to mitigate fatigue levels. Regarding employment mode, labor dispatch nurses exhibited significantly lower occupational

fatigue scores compared to contract and establishment nurses, who had higher scores. This may be due to the greater work flexibility and lower perceived work pressure among labor dispatch nurses, who may have different expectations regarding job stability. Hospitals should consider optimizing nurse employment systems, rationalizing work tasks across different employment modes, and enhancing overall job satisfaction. In terms of working experience, nurses with longer tenure exhibited higher occupational fatigue scores, consistent with the findings of Zheng et al.[12] Long-serving nurses, who are often in long-term high-intensity working conditions, may experience physical and mental exhaustion and face career development bottlenecks, contributing to higher levels of occupational fatigue. Tailored training and career development plans should be implemented for nurses with varying lengths of service to help new nurses quickly improve their skills and provide senior nurses with more opportunities for career advancement and professional growth. Regarding marital status, married nurses had relatively higher occupational fatigue scores, aligning with the study by Zhou et al.[13]. Married nurses may need to balance work and family responsibilities, such as household chores and caring for family members, which can distract their energy and contribute to higher occupational fatigue. Hospitals and society should provide more support and care for married nurses, such as flexible work arrangements and family support services, to help them better manage the dual pressures of work and family.

5. Conclusion

This study surveyed and analyzed 158 ICU nurses from four hospitals in Hebei Province to gain an in-depth understanding of the current status of occupational fatigue among ICU nurses, its correlation with psychological resilience, and the key factors influencing occupational fatigue. The results revealed that occupational fatigue among ICU nurses was at a high level, with psychological resilience showing a significant negative correlation with occupational fatigue. Psychological resilience, mode of employment, years of working experience, and marital status were identified as important factors influencing occupational fatigue among ICU nurses.

Based on these findings, we recommend that hospitals and relevant departments implement targeted measures to effectively reduce occupational fatigue and improve the occupational mental health of ICU nurses. These measures include enhancing nurses' psychological resilience through training and support, optimizing employment systems to improve job satisfaction, tailoring training and career development plans for nurses with varying lengths of service, and providing additional support for married nurses to help them balance work and family responsibilities. These interventions are expected to ensure patient safety and enhance the quality of healthcare services.

Future studies should expand the sample size to include ICU nurses from different regions and hospitals of varying levels, explore additional potential influencing factors, and assess the effectiveness of interventions. This will provide a more comprehensive theoretical basis and practical guidance for improving the occupational health of ICU nurses.

Funding

Affiliated Hospital of Hebei University Fund Project (No. ZLX202516)

References

[1] Drake, D. A., & Steege, L. M. B. Interpretation of Hospital Nurse Fatigue Using Latent Profile Analysis. *Advances in nursing science*, 2016, *39*(3), E1-E16.

[2] Barker, L. M., & Nussbaum, M. A. Fatigue, performance and the work environment: A survey of registered nurses. *Journal of Advanced Nursing*, 2011, *67*(6), 1370-1382.

[3] Li, M. Y., Huang, K. H., Hu, Y. L., et al. Current Status and Influencing Factors of Nurse Occupational Fatigue. *Chinese Journal of Nursing*, *2022*(7), 853-858.

[4] Krishna, G. G., Harbli, N. M. A., Krishnan, N., et al. Burnout Among ICU and Non-ICU Healthcare Professionals in Saudi Arabia: A Comparative Cross-Sectional Analysis. *Journal of Multidisciplinary Healthcare*, 2025, *18*, 995-1005.

[5] Connor, K. M., & Davidson, J. R. T. Development of a New Resilience Scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depression and Anxiety*, 2003, *18*(2), 76-82.

[6] Zhai, L., Zhang, H., & Zhang, Y. A. The Relationship Between Psychological Resilience and Burnout Among ICU Nurses. *Chinese Journal of Health Psychology*, *2024*(10), 1550-1554.

[7] Yu, H. Y., Hu, J. J., Lu, Y., et al. Correlation Analysis of Psychological Resilience, Burnout, and Mental Health Among Nursing Staff. *Psychology Monthly*, *2024*(22), 19-21, 51.

[8] PC, W., K, L., & AH, W. Further Development and Validation of the Occupational Fatigue Exhaustion Recovery (OFER) Scale. *Journal of Occupational and Environmental Medicine*, 2006, *48*(4), 381-389.

[9] Yu, X. N., & Zhang, J. X. Comparison of the Self-Toughness Scale and the Connor-Davidson Resilience Scale. *Psychological Science*, *2007*(5), 1169-1171.

[10] Lv, F. F. The Relationship Between Burnout and Retention Intention of ICU Nurses in Tertiary Hospitals. *Dalian Medical University*, 2024.

[11] Quesada-Puga, C., Izquierdo-Espin, F. J., Membrive-Jiménez, M. J., et al. Job Satisfaction and Burnout Syndrome Among Intensive-Care Unit Nurses: A Systematic Review and Meta-Analysis. *Intensive and Critical Care Nursing*, 2024, *82*, 103660.

[12] Zheng, J., Feng, S., Feng, Y., et al. Relationship Between Burnout and Turnover Intention Among Nurses: A Network Analysis. *BMC Nursing*, 2024, *23*(1), 921.

[13] Zhou, N., & Yu, Y. Potential Profiling of Occupational Fatigue Among Emergency Department Nurses. *Psychology Monthly*, *2024*(13), 31-33, 147.