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Original Article

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Work stress and shift work as key factors associated with burnout among critical care and emergency nurses: A Cross-sectional study

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ABSTRACT

Introduction: Burnout among nurses is an important occupational health concern because persistent physical and emotional exhaustion may compromise work performance, quality of care, and patient safety. Workload, work-related stress, and shift work are frequently considered important occupational determinants of burnout, particularly among nurses working in high-intensity clinical units. This study aimed to examine the associations of workload, work stress, and shift work with burnout among nurses at Jaury Jusuf Putera Academic Hospital, Makassar, Indonesia.

Research Methodology: A quantitative cross-sectional study was conducted among 36 nurses working in the Intensive Care Unit and Emergency Department. Total sampling was applied. Data were collected using structured questionnaires and analyzed using the Chi-square test. Crude odds ratios (ORs) with 95% confidence intervals (CIs) were derived from the reported 2×2 contingency tables to describe the magnitude of associations.

Results: Of the 36 nurses, 19 (52.8%) experienced high burnout. High workload was not significantly associated with burnout (OR = 2.45; 95% CI: 0.64–9.37; p = 0.187). Nurses with moderate work stress had substantially higher odds of high burnout than those with mild stress (OR = 9.00; 95% CI: 1.97–41.08; p = 0.003). Shift work was also significantly associated with burnout (p = 0.047); nurses classified in the high-shift category had lower crude odds of high burnout than those in the low-shift category (OR = 0.25; 95% CI: 0.06–1.01).

Conclusion: Work stress and shift work were significantly associated with burnout, whereas workload was not. Hospital management should prioritize stress-management strategies, adequate recovery periods, and evidence-based shift scheduling to reduce occupational burnout and support nurses' well-being and service quality.

Keywords: burnout, professional; nurses; shift work schedule; workload; workplace stress

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INTRODUCTION

Nursing is one of the most demanding occupations within healthcare systems because nurses are required to maintain continuous clinical vigilance while responding to patients' physical, psychological, and emotional needs. These demands become particularly intense in emergency departments and intensive care units, where rapid decision-making, unpredictable patient conditions, high service volumes, and continuous shift coverage are integral to routine practice[1]. Under such conditions, prolonged exposure to occupational stress can contribute to burnout, with potential consequences not only for nurses' well-being but also for the quality and safety of patient care[2,3]. The World Health Organization defines burnout as an occupational phenomenon resulting from chronic workplace stress that has not been successfully managed, characterized by exhaustion, increased mental distance or cynicism toward work, and reduced professional efficacy.

Burnout among nurses therefore represents more than an individual psychological response to demanding work. It reflects an interaction between workplace demands and the resources available to employees to meet those demands[4]. Recent global evidence indicates that nurse burnout is associated with impaired mental well-being, lower job satisfaction, workforce instability, reduced productivity, and adverse consequences for the quality and safety of healthcare delivery[5]. An umbrella review of systematic reviews and meta-analyses published in 2025 identified burnout as a persistent global nursing workforce concern influenced by multiple occupational and organizational factors[6]. This evidence reinforces the need to examine burnout within specific clinical settings, particularly units in which nurses are repeatedly exposed to high-acuity care and irregular working schedules.

Workload is frequently considered a major occupational determinant of burnout. Excessive patient demands, limited time, complex clinical responsibilities, and insufficient recovery periods may deplete nurses' physical and psychological resources[7,8]. The attached study similarly identifies workload as one of the occupational conditions potentially related to burnout among hospital nurses. However, the relationship is not necessarily uniform across healthcare settings[9]. A recent systematic review examining intensive care nurses found that substantial workload can contribute to burnout, particularly in high-pressure clinical environments, but the strength of this relationship may depend on contextual factors such as staffing, emotional burden, organizational support, and the nature of patient care. Thus, workload alone may not adequately explain differences in burnout[10].

Work stress may provide a more direct pathway through which occupational demands affect nurses' psychological functioning. Persistent pressure, emotional demands, uncertainty, interpersonal challenges, and limited opportunities for recovery can transform routine occupational demands into chronic stress[11]. The study background reports that work-related stress remains prevalent among Indonesian nurses and identifies prolonged occupational pressure as an important potential contributor to burnout[12]. Conceptually, this distinction is important: workload represents the volume and intensity of occupational demands, whereas work stress reflects the psychological response that can arise when those demands exceed perceived coping capacity. Consequently, nurses exposed to similar workloads may experience different levels of burnout depending on how occupational demands are perceived and managed.

Shift work adds another dimension to this problem. Hospital services require continuous twenty-four-hour staffing, making rotating, evening, and night shifts unavoidable for many nurses. Such schedules may disrupt sleep patterns, circadian rhythms, social activities, and

opportunities for adequate recovery. A systematic review published in 2025 found that rotating shift work was particularly associated with emotional exhaustion, while organizational support, sleep hygiene, and job autonomy appeared to modify its effects. Another systematic review and meta-analysis reported a pooled prevalence of shift work disorder of 45.5% among nurses, further demonstrating the occupational health consequences of nonstandard work schedules. Nevertheless, the association between shift patterns and burnout remains heterogeneous. A 2026 meta-analysis found no consistent overall difference in burnout between rotating and fixed nursing shifts, highlighting the possibility that the effect of shift work depends on local scheduling arrangements and organizational conditions.

Despite growing evidence, an important research gap remains. Much of the available evidence has been generated from large hospitals, multicenter populations, or international settings, whereas evidence from specific hospital units in Indonesia remains comparatively limited. Moreover, workload, work stress, and shift work are often examined separately, making it difficult to determine which occupational factors are most relevant within a particular clinical environment. This gap is especially important in ICU and emergency settings, where patient turnover, clinical urgency, staffing patterns, and continuous service requirements may create a distinctive occupational risk profile. At Jaury Jusuf Putera Academic Hospital in Makassar, the ICU and emergency department experience substantial service activity, providing a relevant setting for examining these relationships. The hospital recorded substantial patient utilization, while preliminary observations indicated demanding nurse-to-patient conditions and potential physical and emotional fatigue among nurses.

The novelty of this study lies in its simultaneous examination of three closely related occupational factors workload, work stress, and shift workin relation to burnout among nurses working specifically in ICU and emergency care settings. Rather than assuming that high workload alone determines burnout, the study evaluates whether psychological pressure and work scheduling may show different patterns of association. This approach provides context-specific evidence that may help hospital managers distinguish between workload-related and organizational contributors to nurse burnout. Therefore, this study aimed to examine the associations of workload, work stress, and shift work with burnout among nurses at Jaury Jusuf Putera Academic Hospital, Makassar, Indonesia. The findings are expected to support more targeted occupational health strategies, including workload management, stress prevention, adequate recovery, and evidence-informed shift scheduling.

MATERIALS AND METHODS

Study design

This study employed a quantitative analytical cross-sectional design to examine the associations between workload, work stress, shift work, and burnout among nurses. A cross-sectional approach was considered appropriate because exposure variables and burnout status were assessed within the same study period, allowing the researchers to identify patterns of association between occupational factors and burnout in a defined hospital workforce. The independent variables were workload, work stress, and shift work, while burnout was treated as the dependent variable.

Setting and participants

The study was conducted at Jaury Jusuf Putera Academic Hospital, Makassar, South Sulawesi, Indonesia, between May and June 2026. The target population consisted of all 36 nurses assigned to the hospital's critical care units, comprising the Emergency Department

and Intensive Care Unit. Because the population was relatively small and accessible, total sampling was applied, and all eligible nurses were included as study participants. Thus, the final sample consisted of 36 nurses.

A separate sample-size calculation was not performed because the study used a census-based total sampling approach in which the entire accessible population was recruited. The source manuscript does not explicitly specify separate inclusion and exclusion criteria. Accordingly, the operational eligibility criterion was membership in the nursing workforce assigned to the ICU or Emergency Department during the study period.

Variables and measurement

Burnout was operationalized as emotional exhaustion, depersonalization, and reduced personal accomplishment associated with prolonged occupational stress. Burnout was measured using a questionnaire and categorized as low when the total score was <29% and high when the score was ≥29%. Workload reflected nurses' perceptions of task demands, work volume, time constraints, and professional responsibilities in delivering patient care. It was measured using a structured questionnaire and classified as low when the score was <78% and high when the score was ≥78%.

Work stress was defined as physical and psychological responses to occupational pressures, including time demands, rapid work pace, fatigue, and interpersonal conflict. Work stress was categorized as mild when the score was <42% and moderate when the score was ≥42%. Shift work referred to the organization of nursing duties across morning, afternoon, night, and rotating schedules. Morning shifts were scheduled from 07:00 to 14:00, afternoon shifts from 14:00 to 21:00, and night shifts from 21:00 to 07:00. Shift exposure was categorized as lower risk for morning or afternoon schedules and higher risk for night or rotating schedules that included night duty.

Primary data were obtained directly from participants through questionnaires, whereas secondary data were obtained from hospital records. The study instruments consisted of questionnaires, documentation equipment, and SPSS software for data processing and analysis. The attached manuscript does not report the name or original source of each questionnaire, nor does it provide coefficients for construct validity or internal consistency reliability such as Cronbach's alpha. Therefore, validity and reliability statistics should not be claimed unless they can be verified from the original questionnaire development or pilot-testing records.

Data collection and quality control

Data were collected directly from nurses using structured questionnaires containing items corresponding to the study variables and objectives. Secondary information relevant to the study setting was obtained from Jaury Jusuf Putera Academic Hospital records. Data quality was maintained through sequential data-management procedures. Completed questionnaires were first checked for completeness and eligibility during the editing stage. Responses were then coded numerically, scored according to the predefined measurement criteria, and tabulated for statistical analysis. These procedures were conducted electronically using SPSS version 25.

Data analysis

Descriptive analysis was performed to summarize participant characteristics and the distribution of burnout, workload, work stress, and shift work. Categorical data were presented as frequencies and percentages. Bivariate analysis was conducted using the Chi-square test to examine associations between each independent variable workload, work stress, and shift

work and burnout. Results were interpreted using a two-sided significance threshold of α = 0.05. A p-value ≤0.05 was considered statistically significant, whereas a p-value >0.05 was considered not statistically significant.

Ethical approval

The source manuscript does not provide the name of an ethics review committee, ethical approval number, or a documented informed-consent procedure. Consequently, these details should not be fabricated. Before journal submission, this section should be completed using the original ethical clearance documentation.

RESULTS

A total of 36 nurses working in the Intensive Care Unit and Emergency Department participated in the study. Data collection was conducted on 18–24 June 2026 using questionnaires, and the data were processed using SPSS version 25.0.

Participant characteristics

Table 1. Characteristics of study participants (n = 36)

Characteristics	Category	n	%
Sex	Male	8	22.2
	Female	28	77.8
Age (years)	22–25	3	8.3
	26–29	6	16.7
	30–33	3	8.3
	34–37	11	30.6
	38–41	8	22.2
	42–45	5	13.9
Length of employment (years)	2–4	14	38.9
	5–7	5	13.9
	8–10	1	2.8
	11–13	3	8.3
	14–16	6	16.7
	17–20	7	19.4

Most participants were female, accounting for 28 nurses (77.8%), while eight (22.2%) were male. The largest age group was 34–37 years, representing 30.6% of the sample, followed by those aged 38–41 years at 22.2%. Regarding length of employment, the largest proportion had worked for 2–4 years (38.9%), while 19.4% had worked for 17–20 years. These characteristics indicate that the sample included both relatively early-career and experienced nurses. Overall, 19 nurses (52.8%) experienced high burnout, while 17 (47.2%) were classified as having low burnout.

Table 2. Bivariate associations between occupational factors and burnout among nurses

Predictor	Category	Low burnout n (%)	High burnout n (%)	OR	95% CI	p-value
Workload	Low	10 (58.8)	7 (41.2)	1.00	Reference	
	High	7 (36.8)	12 (63.2)	2.45	0.64–9.37	0.187
Work stress	Mild	12 (75.0)	4 (25.0)	1.00	Reference	

	Moderate	5 (25.0)	15 (75.0)	9.00	1.97–41.08	0.003
Shift work	Lower-risk shift	6 (31.6)	13 (68.4)	1.00	Reference	—
	Higher-risk shift	11 (64.7)	6 (35.3)	0.25	0.06–1.01	0.047

OR = odds ratio; CI = confidence interval. Odds ratios and 95% confidence intervals were calculated from the 2×2 contingency-table frequencies reported in the source data.

High workload was associated with greater odds of high burnout compared with low workload (OR = 2.45; 95% CI: 0.64–9.37), although the association was not statistically significant (p = 0.187). Among nurses with high workload, 12 of 19 (63.2%) experienced high burnout, compared with seven of 17 (41.2%) among those with low workload. Work stress showed the strongest association with burnout. Among nurses experiencing moderate work stress, 15 of 20 (75.0%) had high burnout, whereas only four of 16 (25.0%) nurses with mild stress experienced high burnout. Nurses with moderate work stress had nine times the odds of high burnout compared with those reporting mild stress (OR = 9.00; 95% CI: 1.97–41.08; p = 0.003). Shift work was also significantly associated with burnout (p = 0.047). The reported distribution showed that 13 of 19 nurses (68.4%) in the lower-risk shift category experienced high burnout, compared with six of 17 (35.3%) in the higher-risk shift category. The corresponding crude OR was 0.25 (95% CI: 0.06–1.01). However, this direction should be interpreted cautiously because the operational definition classified night and rotating shifts as higher-risk schedules. Verification of the original shift coding is therefore advisable before final publication.

The findings indicate that burnout among nurses in critical-care units may be shaped more strongly by psychological strain than by workload volume alone. Although nurses with high workload had greater odds of burnout, the association was not statistically significant and the confidence interval was wide, suggesting considerable uncertainty in the estimate. In contrast, work stress demonstrated a strong and statistically significant relationship with burnout. Nurses experiencing moderate stress had substantially higher odds of high burnout than those with mild stress, emphasizing the importance of psychological demands, emotional pressure, and recovery capacity in high-intensity clinical environments.

These findings suggest that hospital-based burnout prevention should extend beyond workload redistribution. Organizational strategies should incorporate routine assessment of occupational stress, accessible psychological support, supportive supervision, adequate rest periods, and mechanisms that strengthen communication and teamwork. Shift scheduling also requires careful evaluation, particularly because the observed direction of association was inconsistent with the predefined risk classification. Overall, burnout should be addressed as an occupational and organizational health issue rather than solely as an individual coping problem. Interventions that combine stress management, supportive work environments, and evidence-informed scheduling may provide a more comprehensive approach to sustaining nurses' well-being and maintaining quality of care.

DISCUSSION

The findings indicate that burnout among nurses working in critical-care environments cannot be explained solely by the volume of work they perform. Although nurses with high workload had higher crude odds of experiencing burnout than those with low workload, the association was not statistically significant. In contrast, work stress showed the strongest

relationship with burnout, with nurses experiencing moderate work stress having substantially greater odds of high burnout. Shift work was also significantly associated with burnout, although the direction of this association requires cautious interpretation because it did not align clearly with the predefined risk classification of shift schedules.

These results suggest that the psychological experience of work demands may be more influential than workload quantity alone. Workload reflects the amount, intensity, and time pressure of professional tasks, whereas work stress reflects how these demands are perceived and psychologically processed by nurses[13]. Two nurses may therefore face similar workloads but experience very different levels of burnout depending on coping capacity, emotional demands, supervisory support, teamwork, autonomy, and opportunities for recovery[14]. This distinction is important because it shifts the interpretation of burnout from a purely quantitative workload problem toward a broader interaction between job demands and available organizational resources[15].

The Job Demands Resources perspective provides a useful conceptual explanation for this pattern. High demands do not inevitably lead to burnout when workers have sufficient resources to manage them. Supportive leadership, adequate staffing, effective teamwork, schedule predictability, decision latitude, and recovery time may buffer the adverse effects of demanding work. Conversely, even a moderate workload may become psychologically exhausting when nurses experience persistent emotional pressure, poor communication, low control, or inadequate organizational support. In this context, the strong association between work stress and burnout suggests that the subjective and organizational dimensions of work may be particularly important in critical-care settings.

The non-significant association between workload and burnout should therefore not be interpreted as evidence that workload is irrelevant. The odds ratio was above one, indicating a tendency toward higher burnout among nurses with greater workload, but the confidence interval was wide[16,17]. Given the small sample size, the study may not have had sufficient statistical power to detect a moderate association. Thus, the workload finding is more appropriately interpreted as inconclusive rather than negative. It is also possible that workload influences burnout indirectly through stress, fatigue, emotional exhaustion, or inadequate recovery rather than functioning as an isolated determinant.

The strong association between work stress and burnout is consistent with the broader nursing literature. Nurses in emergency and intensive care settings are routinely exposed to urgent decision-making, unpredictable clinical deterioration, emotional interactions with patients and families, and responsibility for complex care[18]. When these demands are prolonged and poorly buffered by organizational resources, psychological strain may accumulate and contribute to emotional exhaustion, depersonalization, and reduced professional accomplishment[19]. This pattern supports the view that burnout is not simply an individual weakness or failure of resilience but an occupational response to sustained strain within the work environment.

Previous studies have similarly shown that nurse burnout is associated with excessive job demands and inadequate job resources. Research based on the Job Demands–Resources framework has emphasized that the balance between demands and resources is more informative than workload alone[20]. Nurses may tolerate demanding work when they perceive sufficient control, support, recognition, and recovery opportunities, whereas similar work demands may become harmful when these resources are absent[21,22]. This helps explain why work stress showed a much stronger relationship with burnout than workload in the present study.

The findings concerning shift work require more careful interpretation. The study classified night and rotating schedules as higher-risk exposure categories, but the observed results showed a higher proportion of burnout among nurses categorized in the lower-risk shift group[23]. This unexpected direction should not be interpreted as evidence that night or rotating shifts protect nurses from burnout. Several alternative explanations are possible, including coding inconsistency, differences in staffing between shifts, greater work intensity during

daytime periods, self-selection of more experienced staff into particular schedules, or unmeasured differences in recovery opportunities. Verification of the original coding is therefore necessary before strong conclusions are drawn.

The wider literature also shows that the relationship between shift work and burnout is not uniform. Night and rotating shifts may disturb sleep, circadian rhythms, family life, and opportunities for recovery, but their effects vary according to shift sequence, number of consecutive nights, duration of rest intervals, schedule predictability, and organizational support. This suggests that the health effects of shift work cannot be reduced to a simple night-versus-day comparison[24]. The pattern observed in this study may therefore reflect local scheduling conditions, although methodological issues must first be excluded. Taken together, the results support a systems-oriented interpretation of nurse burnout. Workload, stress, shift scheduling, recovery, staffing, leadership, and team functioning are interconnected rather than independent occupational exposures[25]. Burnout is therefore better understood as the outcome of a configuration of working conditions. This perspective has important implications for hospital management. Interventions that focus only on individual coping strategies may have limited impact if the underlying organizational drivers remain unchanged. More comprehensive approaches should include workload review, psychosocial risk assessment, supportive supervision, adequate rest periods, improved communication, predictable scheduling, and access to mental health support.

Several limitations need to be considered when interpreting the findings. First, the cross-sectional design does not allow temporal or causal relationships to be established. Although work stress was strongly associated with burnout, it cannot be determined whether work stress preceded burnout or whether nurses already experiencing burnout perceived their work environment as more stressful. Reverse causation is therefore possible. Second, the sample included only 36 nurses from the ICU and Emergency Department of a single hospital. Although total sampling allowed the entire accessible population to be included, the small sample size limits precision and generalizability.

Third, the study relied on self-reported questionnaires. Responses may have been influenced by recall bias, social desirability, or individual differences in interpreting questionnaire items. The source manuscript also does not provide detailed validity and reliability coefficients for the instruments, which limits certainty regarding measurement consistency. Fourth, the analysis was limited to bivariate associations. Potential confounding variables such as age, sex, length of employment, staffing ratios, sleep duration, professional role, social support, and schedule characteristics were not simultaneously controlled. The reported odds ratios should therefore be interpreted as crude associations rather than independent effects[26].

Another important limitation concerns the categorization of continuous or ordinal variables. Converting workload, stress, and burnout scores into broad categories may reduce statistical information and obscure dose–response relationships. This issue is particularly relevant in a small sample, where categorization can further reduce statistical power. The shift-work variable also requires additional scrutiny because the observed direction of association did not clearly correspond with the operational risk classification. The original coding and data structure should be verified before publication.

Future research should use larger multicenter samples to provide more precise estimates and improve external validity. Prospective cohort designs would be particularly useful because they could establish whether occupational exposures precede changes in burnout over time. Larger studies would also allow multivariable analysis to examine the independent contribution of workload, stress, shift patterns, staffing, leadership, recovery, and demographic characteristics. Future studies should also measure shift work in greater detail. Rather than classifying schedules only as lower or higher risk, researchers should document the number of night shifts, consecutive night duties, rotation direction, overtime, duration between shifts, schedule control, sleep quality, and recovery opportunities. These factors may explain why the effects of shift work differ across studies and settings.

Conceptually, future studies should test models in which workload influences burnout through work stress and inadequate recovery, while organizational resources such as leadership support, teamwork, autonomy, and staffing act as moderating factors. Such models would better reflect the complexity of hospital work and could help identify intervention points that are more actionable than focusing on individual resilience alone. Overall, the findings contribute to a more nuanced understanding of burnout among nurses in critical-care settings. The central implication is that burnout prevention should not be limited to reducing task volume. More sustainable strategies require attention to how work is organized, perceived, supported, and recovered from. Addressing burnout as an occupational and organizational health issue may therefore provide a stronger basis for protecting nurses' well-being while maintaining safe and high-quality patient care.

CONCLUSIONS

This study found that burnout among nurses working in the Intensive Care Unit and Emergency Department was more strongly associated with work stress and shift work than with workload alone. High workload showed an increased tendency toward burnout, but the association was not statistically significant, whereas moderate work stress was associated with substantially higher odds of burnout. Shift work was also statistically associated with burnout, although the direction of this relationship should be interpreted cautiously because it did not fully correspond with the predefined risk classification. These findings indicate that burnout prevention should not rely solely on reducing task volume. Hospital policies should prioritize systematic assessment of occupational stress, accessible psychological support, supportive supervision, adequate recovery time, and evidence-informed scheduling practices. Periodic evaluation of shift arrangements is also needed to ensure that night and rotating schedules do not compromise nurses' physical or psychological recovery. At the organizational level, strengthening teamwork, communication, staffing management, and psychosocial safety may provide a more sustainable approach to protecting nurses' well-being. Future studies with larger multicenter samples and longitudinal designs are recommended to clarify causal pathways and identify the most effective organizational interventions for reducing burnout.

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Conflict of Interest
The authors declare that they have no financial, professional, or personal conflicts of interest that could have influenced the design, conduct, interpretation, or reporting of this study.

Authors' Contributions
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Declaration of Generative AI Use
Generative artificial intelligence tools were used only to assist with language refinement, grammatical correction, and improvement of manuscript readability. The study design, data collection, statistical analysis, interpretation of findings, and scientific conclusions were developed and verified by the authors. No generative AI tool was used to generate or alter research data. The authors take full responsibility for the accuracy, integrity, and originality of the manuscript.

Data Availability Statement
The data supporting the findings of this study are available from the corresponding author upon reasonable request. Access may be subject to institutional approval and measures necessary to protect participant confidentiality and privacy.

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