



WORKLOAD AND WORK-RELATED STRESS AMONG INTENSIVE CARE UNIT NURSES: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Nurses in intensive care units (ICUs) face substantial physical, cognitive, and emotional demands that may contribute to work-related stress, although evidence on this relationship remains inconsistent. This review aimed to synthesize recent evidence on the association between workload and work-related stress among ICU nurses and identify factors explaining differences in findings. Methods: This review followed PRISMA 2020 and the Population–Exposure–Outcome (PEO) framework. PubMed/MEDLINE, Scopus, and Google Scholar were searched for English or Indonesian studies published between 2023 and 2026. Quality was appraised using the Joanna Briggs Institute checklist for analytical cross-sectional studies. Of 45 records identified, eight observational studies were included. Five of eight studies reported significant associations between higher workload and greater work-related stress or burnout. One study identified workload as the most prominent source of stress, whereas another found no significant association. Differences in workload measures, outcomes, staffing, and work environments may explain this variation. Higher workload was frequently associated with work-related stress or burnout among ICU nurses, although findings were not uniform. Because the evidence was observational, causality cannot be established. Workload management should integrate objective monitoring, psychological assessment, adequate staffing, and organizational support.

Keywords: ICU nurses; workload; work-related stress

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INTRODUCTION

The Intensive Care Unit (ICU) is a specialized hospital area intended for patients in critical, complex, or life-threatening condition who require continuous physiological monitoring, advanced life support, and immediate clinical action. Within this high-acuity setting, ICU nurses play a pivotal role in protecting patients and delivering prompt, accurate care. Intensive care also imposes substantial physical, cognitive, and emotional demands on nurses, so workload and work-related stress are urgent issues for health systems around the globe (Bruyneel et al., 2025; Li et al., 2025).

Recent international evidence indicates that high workload is a common problem for ICU nurses worldwide. A global meta-analysis of the Nursing Activities Score (NAS) by Li et al. (2025) reported a pooled mean NAS of 66.2% (95% CI: 62.6–69.8%) from 70 observational studies, meaning that on average ICU nurses spend nearly two-thirds of a shift giving direct care to a single patient. Additionally, a national survey in France reported a median burnout risk of 64.7% across hospital sites, and both burnout and intention to leave the job were related to workload and to the quality of the work environment, as described by Bruyneel et al. (2025). Burnout among ICU nursing staff has also been connected with a lower perceived quality of life, as reported by Meneguín et al. (2023).

ICU nursing workload is inherently multidimensional. Physical tasks include repositioning heavy patients, managing invasive lines, and providing frequent hygiene care, alongside a considerable mental burden. Cognitive demands involve calculating complex medication doses, interpreting real-

time hemodynamic monitors, working around shift schedules, and making urgent critical decisions under intense time pressure, as noted by Gündüz & Öztürk (2025). ICU nurses further bear an emotional load from repeatedly witnessing patient deaths and abrupt clinical decline and from communicating empathetically with, and supporting, distressed families. Work-related stress may emerge when these cumulative demands exceed nurses' coping capacity or the resources their organization is able to provide (Bruyneel et al., 2025; Gündüz & Öztürk, 2025). Features of shift work, including long shifts and limited control over scheduling, have also been linked to nurse burnout, according to Dall'ora et al. (2023), and the relationship between alarm fatigue and mental workload in ICU nurses has been studied by Seok et al. (2023).

Although it seems logical that heavier workload produces more work-related stress, the empirical evidence is strikingly inconsistent and sometimes contradictory. For instance, in a recent Indonesian ICU study, Kertabudhi et al. (2025) found that 86.4% of ICU nurses carried a moderate workload and 81.8% had normal stress levels, but observed no statistically significant association between workload and work-related stress ($p = 1.000$). Kertabudhi et al. (2025) (Kertabudhi et al., 2025) proposed that, within their sample, work-related stress was driven by other organizational and personal factors rather than workload alone. In contrast, international studies such as those by Gündüz & Öztürk (2025) and Bruyneel et al. (2025) identified meaningful links between higher mental or objective workload and burnout among ICU nurses, implying that heavy care demands are associated with psychological strain. A study of ICU night-shift nurses in Egypt similarly identified workload as the highest-scoring source of stress (Reshia et al., 2025).

This sharp divergence between local empirical findings (for instance, (Kertabudhi et al., 2025)) and the international literature reveals a distinct research gap. Whether ICU workload influences work-related stress directly, indirectly, or via contextual factors remains unclear; such factors include how outcomes are measured (activity-based versus perception-based instruments), organizational culture, coping strategies, and nurse-to-patient staffing arrangements (Bae, 2024; Mathew et al., 2025). Previous reviews have generally looked at workload or stress in isolation and have not systematically integrated how different workload assessment tools relate to stress outcomes in contemporary intensive care settings.

A systematic literature review is thus needed to consolidate current global evidence, reconcile these conflicting results, and shed light on the mechanisms linking workload to work-related stress among ICU nurses. This review aims to critically appraise and synthesize recent empirical studies on the association between workload and work-related stress in ICU nurses, to identify the main organizational and individual moderating factors, and to derive evidence-based implications for nursing management and health policy.

METHOD

This study employed a systematic literature review (SLR) design and was reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. The review question and eligibility criteria were structured using the Population–Exposure–Outcome (PEO) framework. The population comprised nurses working in intensive care units (ICUs) or critical care settings, the exposure was nursing workload, and the outcome was work-related stress. This framework guided the identification of relevant studies and the formulation of the eligibility criteria.

PubMed/MEDLINE, Scopus, and Google Scholar were searched to identify relevant studies. The search strategy combined terms related to workload, work-related stress, and ICU or critical care nurses using Boolean operators. The search terms were: (workload OR "work burden" OR "job demands") AND ("work-related stress" OR "occupational stress" OR "nursing work stress") AND ("ICU nurse*" OR "intensive care nurse*" OR "critical care nurse*"). The search syntax was

adapted to the requirements of each database. Reference lists of relevant articles were also hand-searched to identify potentially eligible studies. The review considered articles published in English or Indonesian between 2023 and 2026.

Study selection followed the PRISMA flow, which consists of identification, removal of duplicates, screening, eligibility assessment, and inclusion. Once duplicates were removed, titles and abstracts were checked against the eligibility criteria, and articles passing this stage proceeded to full-text review. Articles that did not meet the criteria were excluded, with reasons recorded. Articles satisfying all eligibility criteria were included in the final synthesis, and the number of articles at each stage was shown in the PRISMA flow diagram.

Studies were eligible for inclusion if they met the following criteria: (1) the study population comprised nurses working in intensive care units (ICUs) or critical care settings; (2) nursing workload was assessed as an exposure or independent variable; (3) work-related stress was assessed as an outcome; (4) the study used an observational design, including cross-sectional, cohort, or case-control designs; (5) the study reported original empirical findings; (6) the full text was available; and (7) the article was published in English or Indonesian between 2023 and 2026. Studies were excluded if they were editorials, letters to the editor, opinion pieces, protocols, or literature reviews; involved non-ICU nurses without separately reportable ICU data; did not measure workload or work-related stress; lacked accessible full text; or fell outside the specified publication period or languages.

Data were extracted using a predefined data extraction form. The extracted information included author and year, research title, method & sample, key findings and correlations. Information that was not reported in the original articles was recorded as “not reported” rather than inferred. The extracted data were subsequently organized in a summary table to facilitate comparison across the included studies. The methodological quality of the included studies was appraised using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Analytical Cross-Sectional Studies (Moola et al., 2024). The appraisal covered the clarity of inclusion criteria, description of study subjects and settings, validity and reliability of exposure and outcome measurements, identification and management of confounding factors, and appropriateness of statistical analysis. The appraisal findings were intended to inform the interpretation of the evidence and the consideration of potential sources of bias. The results of the quality appraisal should be reported transparently for each included study.

RESULT

The literature search was conducted in PubMed/MEDLINE, Scopus, and Google Scholar to identify studies examining workload and work-related stress among intensive care unit (ICU) or critical care nurses. The search identified 45 records, comprising 12 from PubMed/MEDLINE, 8 from Scopus, and 25 from Google Scholar. After 10 duplicate records were removed, 35 records remained for title and abstract screening. Of these, 18 were excluded because they did not involve ICU or critical care nurses ($n = 11$) or were published before 2023 ($n = 7$). The remaining 17 reports underwent full-text eligibility assessment, and nine were excluded because workload was not assessed as an exposure ($n = 4$) or work-related stress was not assessed using an eligible measure ($n = 5$). Finally, eight studies met the eligibility criteria and were included in the synthesis. The selection process is presented in Figure 1.

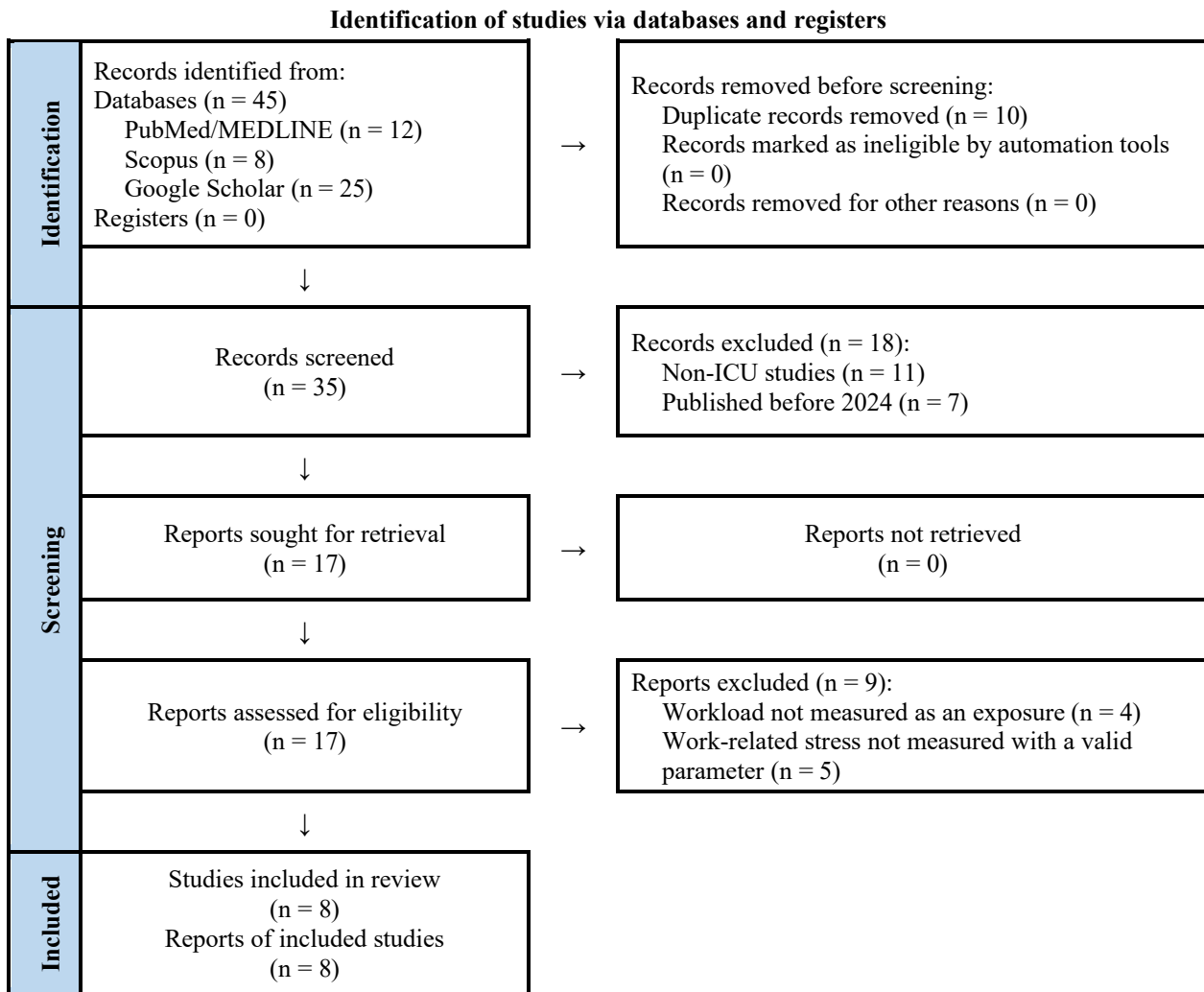


Figure 1. PRISMA 2020 Flow Diagram of the Study Selection Process

The eight included studies used observational designs and involved nurses working in ICUs or critical care settings. The reported sample sizes ranged from 24 to 1,271 nurses. The studies varied in their settings, workload assessment methods, and psychological outcomes. Workload was assessed using different approaches, including the Nursing Activities Score (NAS), mental workload scales, job-demand measures, working hours, and patient numbers. The outcomes included work-related stress, occupational stress, burnout, and moral distress. These differences in study characteristics and measurement approaches are relevant when comparing findings across studies. The characteristics and principal findings of the included studies are summarized in Table 1.

Table 1.
summarizes the characteristics of the included studies.

No	Author & Year	Research Title	Method & Sample	Key Findings & Correlations
1	Al Hasan (2025)	Hubungan Beban Kerja Perawat Intensive Care Unit (ICU) dengan Tingkat Stres Perawat	Analytical observational study with a cross-sectional design; population of 85 ICU nurses, with 70 participants selected through purposive sampling. Workload and work-related stress were assessed using standard questionnaires referenced to Nursalam (2017), and the relationship was analyzed using Spearman's rho.	Most nurses reported a moderate workload (48/70, 68.6%) and moderate work-related stress (46/70, 65.7%). Spearman's rho analysis identified a weak positive and statistically significant correlation between workload and work-related stress ($r_s = 0.296$, $p = 0.013$; $n = 70$).

No	Author & Year	Research Title	Method & Sample	Key Findings & Correlations
2	Bruyneel et al. (2025)	Association of Burnout and Intention-to-Leave the Job with Objective Nursing Workload and Nursing Working Environment: A Cross-Sectional Study among Intensive Care Nurses	Cross-sectional survey involving 1,271 ICU nurses across 61 ICUs in France. Workload was assessed using the Nursing Activities Score (NAS), and burnout was measured using the Maslach Burnout Inventory.	ICUs with a lower prevalence of NAS scores exceeding 100% per nurse had lower odds of burnout (OR = 0.69, 95% CI: 0.50–0.88) and intention to leave (OR = 0.68, 95% CI: 0.50–0.92). A better work environment was significantly associated with all burnout dimensions and intention to leave.
3	Kertabudhi et al. (2025)	The Relationship between Workload and Work-Related Stress among ICU Nurses at Al-Ihsan Regional General Hospital, West Java Province	Quantitative correlational study involving 32 ICU nurses. The relationship between workload and work-related stress was examined.	No statistically significant association was found between workload and work-related stress ($p = 1.000$). The manuscript reported that 86.4% of nurses had a moderate workload and 81.8% had normal stress levels.
4	Nababan (2025)	The Relationship between Nurse Workload and Nurse Stress Level in the Intensive Care Unit (ICU)	Analytical cross-sectional study involving 24 ICU nurses selected through total sampling. Associations were examined using the chi-square test.	Patient numbers were related to nurses' stress levels ($\chi^2 = 6.446$), but working hours were not ($\chi^2 = 3.154$).
5	Gündüz & Öztürk (2025)	Mental Workload as a Predictor of Burnout in Intensive Care Nurses	Descriptive-correlational study involving 156 ICU nurses at a hospital in southern Turkey. Data were collected from September to December 2023. Mental workload and burnout were assessed using the Mental Workload Scale and Maslach Burnout Scale, respectively.	Most participants (95.5%) reported high mental workload. Mental workload was strongly and positively associated with burnout. Emotional workload was significantly associated with emotional exhaustion, personal accomplishment, and depersonalization (all $p \leq 0.003$).
6	Reshia et al. (2025)	Work-Related Stress in Intensive Care Unit Night Shift Nurses: A Cross-Sectional Analysis of Prevalence and Determinants	Descriptive cross-sectional study involving 362 ICU night-shift nurses at Mansoura University Hospitals, Egypt. Participants were selected through convenience sampling, and stress was measured using the Nursing Stress Scale (RNSS), as reported in the manuscript.	High stress was reported by 22.1% of nurses, while 37.6% experienced moderate stress. Workload had the highest mean score among the stress-related domains (21.11 ± 11.12), followed by patients and their families (14.84 ± 7.83). Stress levels did not differ significantly by gender ($p = 0.322$) or ICU experience ($p = 0.221$).
7	Fitria et al. (2025)	The Relationship between Workload and Occupational Stress Level among ICU and ICCU Nurses at dr. H. Koesnadi Regional General Hospital, Bondowoso	Quantitative correlational cross-sectional study involving 37 ICU and ICCU nurses from a population of 41. Workload was measured using the Job Content Questionnaire, occupational stress using the New Job Stress Scale, and the association was analyzed using Spearman's rho.	Workload was moderately and positively correlated with occupational stress ($r_s = 0.503$), ($p = 0.001$).

No	Author & Year	Research Title	Method & Sample	Key Findings & Correlations
8	Cerela-Boltunova & Millere (2025)	Exploring the Relation Between Nursing Workload and Moral Distress, Burnout, and Turnover in Latvian Intensive Care Units: An Ecological Analysis of Parallel Data	Secondary analysis of two cross-sectional studies conducted from February to May 2025. The study included 3,420 NAS protocols from three hospitals and questionnaire data from 155 ICU nurses across 16 ICUs. Organizational-level workload data were compared with nurse-reported outcomes.	The hospital with the highest workload (mean NAS >100; nurse shortage up to 82.1%) also had the highest burnout and moral distress scores. However, the unit-level association between NAS and moral distress was not statistically significant ($\rho = 0.60$), ($p > 0.05$); three hospitals). Moral distress was significantly correlated with burnout ($r = 0.357$), ($p < 0.001$).

DISCUSSION

The findings of this systematic review suggest that workload is associated with occupational psychological outcomes among intensive care unit (ICU) nurses, although evidence regarding its direct relationship with work-related stress is mixed. Among the studies directly examining workload and stress, Al Hasan (2025) reported a weak but significant positive correlation ($r = 0.296$), whereas Fitria et al. (2025) found a moderate positive correlation ($r = 0.503$, $p = 0.001$). In contrast, Kertabudhi et al. (2025) found no statistically significant association ($p = 1.000$). Nababan (2025) reported that patient numbers were associated with nurses' stress levels, whereas working hours were not. Reshia et al. (2025) identified workload as the highest-scoring domain of work-related stress; however, this finding should be interpreted descriptively rather than as evidence of a direct association between separately measured workload and stress variables.

Other included studies examined related but distinct occupational outcomes, including burnout, moral distress, and intention to leave the job. Bruyneel et al. (2025) found that lower prevalence of high objective nursing workload was associated with lower odds of burnout and intention to leave. Gündüz & Öztürk (2025) reported a positive association between mental workload and burnout. Cerela-Boltunova & Millere (2025) found that the hospital with the highest workload also had the highest burnout and moral distress scores, although the organizational-level association between workload and moral distress was not statistically significant. These findings broaden the understanding of the potential consequences of demanding ICU work but should not be interpreted as direct evidence of a relationship between workload and work-related stress.

Differences in measurement instruments, study settings, and analytical approaches may partly explain the variation in findings. Some studies assessed workload objectively using the Nursing Activities Score (NAS), whereas others used self-reported workload scales, mental workload measures, working hours, or patient numbers. Furthermore, the studies assessed different psychological outcomes and analyzed data at different levels. Consequently, their findings should be interpreted according to the specific variables measured rather than treated as directly equivalent. The available evidence supports the importance of workload in ICU nursing, while the consistency and nature of its relationship with work-related stress require further investigation.

The findings imply that ICU workload is a dynamic, multidimensional construct that fixed nurse-to-patient ratios alone cannot capture. Li et al. (2025) reported higher NAS values at patient admission and during the morning shift, together with a marked increase during the COVID-19 period. Patient dependency, intervention complexity, continuous monitoring, documentation demands, and shift rotation may all influence workload. A plausible explanation for the observed association is prolonged physical and psychological hypervigilance: stress may develop when accumulated clinical demands exceed a person's perceived coping ability or available resources, particularly

during demanding night shifts (Dall'ora et al., 2023; Reshia et al., 2025). Nevertheless, workload does not act in isolation; personal characteristics such as length of clinical experience, coping style, and social support (Meneguín et al., 2023; Reshia et al., 2025), may interact with contextual influences such as leadership style and organizational climate to shape nurses' overall psychological well-being.

The organizational environment may play an important role in shaping ICU nurses' occupational well-being. Bruyneel et al. (2025) reported associations between the nursing work environment, objective workload, burnout, and intention to leave the job. Although burnout and intention to leave are distinct from work-related stress, these findings highlight the relevance of organizational conditions to nurses' psychological well-being and workforce retention. Heavy workloads may be particularly challenging when staffing resources are inadequate, interprofessional communication is limited, or administrative support is insufficient (Mathew et al., 2025). Therefore, workload management should consider patient acuity, nurses' competencies, staffing adequacy, and shift arrangements rather than relying exclusively on fixed nurse-to-patient ratios (Bae, 2024). These findings have important implications for healthcare management and nursing practice. Nurse leaders should shift toward flexible staffing models that respond to real-time changes in care demand rather than relying on fixed ratios Bae, (2024). Routine workload monitoring should use a dual-metric approach, combining objective activity measures such as the NAS with subjective assessments of mental workload, so that both time requirements and cognitive and emotional strain are captured. At the organizational level, strategies to reduce stress should extend beyond individual coping or resilience training Xavier et al., (2024) and address structural factors such as stronger supervisory support, clear communication channels, better-designed shift schedules, and the involvement of staff nurses in workplace decisions.

Several limitations, in both the reviewed studies and the review process, need to be acknowledged. All included studies were observational with cross-sectional or correlational design, so firm causal pathways between increasing workload and the development of stress cannot be established. In addition, differences in measurement instruments across studies precluded statistical pooling of results, and several studies relied on small samples from a single hospital. Restricting the search to peer-reviewed articles published from 2023 to 2026 in English and Indonesian may also have excluded relevant foundational literature. To address these limitations, future research should use prospective longitudinal or time-series designs that track how objective workload, mental fatigue, and stress levels change over longer periods. Activity-based workload measures should also be combined with psychological assessment scales to build more comprehensive predictive models of nurse burnout. Finally, further research should examine how moderating variables such as organizational culture, peer support, clinical experience, and leadership style affect the relationship between heavy workload and occupational stress among intensive care nurses.

CONCLUSION

This review suggests that workload is an important occupational factor associated with work-related stress and other psychological outcomes among ICU nurses. However, the findings regarding its direct relationship with work-related stress were inconsistent, and some included studies examined burnout, moral distress, or intention to leave rather than stress itself. These outcomes should therefore be interpreted separately. Workload management strategies should address both individual and organizational factors, including patient acuity, staffing adequacy, nurses' competencies, shift arrangements, and the quality of the work environment.

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