



Mental Workload and Burnout Among Emergency Department Nurses in the Era of Digitalization of Health Services

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Abstract

Emergency Department (ED) nurses work in a fast-paced environment that requires rapid clinical decisions, frequent task switching, and sustained attention. These demands may increase mental workload and contribute to burnout. This study examined the association between mental workload and burnout among ED nurses at Cilegon City Regional General Hospital in 2026. A quantitative, descriptive-correlational study with a cross-sectional design included all 32 nurses working in the ED (total sampling). Mental workload was assessed using the NASA Task Load Index (NASA-TLX), and burnout was assessed using the Maslach Burnout Inventory (MBI). Both measures were categorized using study-specific cutoffs, and the association was examined using the Chi-Square test with continuity correction. The univariate results showed that most respondents had high mental workload (53.1%) and high burnout (56.3%). A statistically significant association was observed ($p = 0.036$). Because the study involved a small, single-hospital population and used cross-sectional data, the findings should be interpreted cautiously and cannot establish causation or be generalized to other settings. The findings highlight the need to assess and reduce sources of mental workload and strengthen psychological support for ED nurses.

Keywords: *Burnout, Health Service Digitalization, Mental Workload, NASA-TLX, Nurses*

INTRODUCTION

Previous studies in Indonesia have examined nurse workload and burnout, but findings on their relationship have not been consistent. In particular, evidence focusing on mental workload among emergency department (ED) nurses remains limited. This question is important because mental workload captures the cognitive effort required to manage competing clinical priorities, interruptions, time pressure, and documentation demands—not simply the amount of work performed. Understanding its association with burnout may help hospital managers identify modifiable work demands and support nurses' psychological well-being.

ED nurses are highly exposed to mental demands because they work in a fast-paced and unpredictable environment that requires rapid clinical decision-making while managing multiple patients and tasks. Digital documentation may need to be performed concurrently with direct patient care. Research evidence indicates that the use of electronic health records can contribute



to stress and burnout, particularly when systems are difficult to use, cause interruptions, or require substantial documentation time (Alobayli et al., 2023; Kremer et al., 2022; Shan et al., 2023).

Mental workload refers to the cognitive resources and effort required to perform a task. The NASA Task Load Index (NASA-TLX) assesses six dimensions: mental demand, physical demand, temporal demand, performance, effort, and frustration (Hart & Staveland, 1988). In the ED, these demands may accumulate when nurses must assess patients, prioritize competing needs, remember multiple care requirements, respond to interruptions, and make decisions under time pressure. The Job Demands-Resources model proposes that sustained job demands, when not balanced by adequate resources, can contribute to energy depletion and burnout (Bakker & Demerouti, 2017).

Burnout is characterized by emotional exhaustion, depersonalization, and reduced personal accomplishment. Nurses working in ED settings may be particularly vulnerable because they face unpredictable patient volumes and conditions, high acuity, time pressure, and exposure to stressful clinical situations. Studies have reported substantial levels of burnout among ED nurses, although the strength of its relationship with workload varies across healthcare settings (Butera et al., 2021; Pameria et al., 2025; Permatasari et al., 2023).

Workload and psychological strain among nurses remain important concerns. ED nurses must manage unpredictable patient arrivals, patients with varying acuity, rapid decisions, and emotionally demanding situations. These conditions can place sustained demands on attention, working memory, and emotional regulation. Examining mental workload alongside burnout can therefore provide information that is more specific to the cognitive demands of emergency nursing than a general measure of workload alone.

However, previous studies examining the relationship between mental workload and burnout among ED nurses have produced inconsistent findings. Permatasari et al. (2023) reported no significant relationship, whereas Pameria et al. (2025) found a significant relationship between workload and burnout. Evidence specifically addressing mental workload in the context of healthcare digitalization in regional hospitals remains limited. Cilegon City Regional General Hospital has implemented integrated digital health documentation, making it a relevant setting in which to examine this issue.

A preliminary study conducted in April 2026 through interviews with the head of the ED unit and three ED nurses indicated that nurses experienced additional demands after implementation of the digital system. They reported switching between direct patient care and computer-based documentation, while occasional system delays caused work to accumulate. Such interruptions may require nurses to shift attention, retain unfinished tasks in memory, resume work after interruptions, and reconcile clinical priorities with documentation requirements. Against this background, this study aimed to examine the association between mental workload and burnout among ED nurses at Cilegon City Regional General Hospital in 2026.

METHODS

This quantitative study used a descriptive-correlational design with a cross-sectional approach (Capili, 2021; Wang & Cheng, 2020). It was conducted in the Emergency Department of Cilegon City Regional General Hospital, Banten, Indonesia. The study population comprised all 32 nurses working in the ED. and total sampling was used; therefore, all 32 eligible nurses were invited and included as respondents. Total sampling was employed to recruit all eligible nurses in the accessible study population. Given the limited sample size and the single-center setting, the findings were interpreted within the context of the study population, with caution regarding their generalizability



to ED nurses in other healthcare institutions. Data were collected from June 2 to 16, 2026, using questionnaires administered in coordination with the ED unit head.

Mental workload was measured using the NASA Task Load Index (NASA-TLX), which assesses mental demand, physical demand, temporal demand, performance, effort, and frustration (Hart & Staveland, 1988; Nurrianti et al., 2019). The total score ranges from 0 to 100. For this study, scores below 80 were classified as low and scores of 80 or higher as high, using the sample median as a study-specific cut point. This dichotomization was used for the categorical association analysis and should not be interpreted as a universally validated clinical threshold. Burnout was measured using the 22-item Maslach Burnout Inventory (MBI; Maslach & Jackson, 1981), with response options scored from 1 to 5. Scores below the sample mean of 55.72 were classified as low and scores of 55.72 or higher as high. This mean-based cutoff was also study-specific rather than an established diagnostic threshold.

Internal consistency was acceptable for both instruments in this sample: Cronbach's alpha was 0.833 for NASA-TLX and 0.751 for the MBI. The six NASA-TLX items and all 22 MBI items met the study's validity criteria. Univariate analyses summarized respondent characteristics and the distributions of mental workload and burnout. The association between the two categorized variables was examined using the Pearson Chi-square test with continuity correction (Yates correction), with statistical significance set at $\alpha = 0.05$ (Hastono, 2018). Because the sample was small and the cutoffs were sample-specific, the analysis was considered exploratory.

The study applied informed consent, confidentiality, voluntary participation, and the ethical principles of data confidentiality, beneficence, non-maleficence, justice, and respondents' right to withdraw from the study during data collection. Ethical approval was obtained from the Health Research Ethics Committee under Ethics No. 003669/UNIVERSITAS FALETEHAN/2026, issued on May 28, 2026.

RESULTS

Table 1. Characteristics of ED Nurse Respondents

Variable	f	%
Sex		
Female	21	65,6
Male	11	34,4
Educational Background		
Diploma III in Nursing	13	40,6
Bachelor of Nursing	2	6,3
Professional Nurse	17	53,1
Length of Employment		
< 5 Years	11	34,4
6 - 10 Years	7	21,9
> 10 Years	14	43,8

Note : Primary Data, 2026 (n = 32)

Table 1 shows that, among the 32 respondents, most were female (21 respondents; 65.6%), while 11 (34.4%) were male. Regarding educational attainment, more than half of the respondents had completed the Professional Nursing Program (17; 53.1%), followed by Diploma III in Nursing (13; 40.6%) and Bachelor of Nursing (2; 6.3%). In terms of work experience, 14 respondents (43.8%) had worked for more than 10 years, followed by 11 (34.4%) with 1-5 years of experience and 7 (21.9%) with 6-10 years of experience.

Table 2. Mental Workload and Burnout Among ED Nurses

Variable	f	%
Mental Workload		
Low	15	46,9
High	17	53,1
Burnout		
Low	14	43,8
High	18	56,3

Note : Primary Data, 2026 (n = 32)

Table 2 shows that, among the 32 respondents, most had a high mental workload (17; 53.1%), while 15 (46.9%) had a low mental workload. Regarding burnout, most respondents had high burnout (18; 56.3%), whereas 14 (43.8%) had low burnout.

Table 3. Relationship Between Mental Workload and Burnout Among ED Nurses

Mental Workload	Burnout				Total		p-value	OR (95% CI)
	Low		High					
	f	%	f	%	f	%		
Low	10	66,7%	5	33,3%	15	100%	0,036	6,500 (1,377-30,682)
High	4	23,5%	13	76,5%	17	100%		
Total	14	43,8%	18	56,3%	32	100%		

Note: Pearson Chi-square test with continuity correction (Yates correction), n = 32; p = 0.036.

Table 3 shows that, among the 15 respondents classified as having low mental workload, 10 (66.7%) had low burnout and 5 (33.3%) had high burnout. Among the 17 respondents classified as having high mental workload, 13 (76.5%) had high burnout and 4 (23.5%) had low burnout. The Chi-square test with continuity correction indicated a statistically significant association between mental workload and burnout ($p = 0.036$; $\alpha = 0.05$). This result indicates an association between the categories in this sample; it does not demonstrate causation. Given the small sample and study-specific cutoffs, the result should be interpreted cautiously.

DISCUSSION

More than half of the ED nurses (53.1%) were classified as having high mental workload. This finding is consistent with the cognitive demands of emergency nursing, where nurses must assess patients rapidly, prioritize competing needs, implement interventions, communicate with the team, and document care under time pressure. Mental workload is not determined only by the number of tasks; it also reflects the mental effort needed to monitor several situations, switch attention, remember unfinished tasks, and make decisions when information or time is limited. The high proportion in this study suggests that these demands warrant focused assessment in the ED.

The high proportion of nurses classified as having high mental workload is broadly consistent with literature describing substantial cognitive demands in emergency nursing (Surendran et al., 2024; Hao et al., 2025). The present study, however, included only 32 nurses from one hospital and did not compare workload across specialties or hospitals. Its findings should therefore be understood as a description of this ED rather than evidence that its workload is higher than that of other settings.



In this study, nurses described alternating between direct care and electronic documentation, with occasional system delays. These experiences may increase mental workload through several mechanisms: interruptions disrupt concentration; switching between patient care and screens requires repeated reorientation; incomplete documentation must be retained in working memory; and delayed systems can create uncertainty about whether information has been saved or tasks completed. Nurses may consequently need to reconcile competing priorities while maintaining situational awareness of patients. These mechanisms are plausible interpretations of the reported workflow, but the study did not measure each mechanism separately. Practical responses should therefore target mental workload directly: map interruptions and task switching, review the NASA-TLX dimensions at unit level, streamline duplicate data entry, improve system reliability and interface usability, protect time for documentation where feasible, and ensure rapid technical support. Such measures should be evaluated for their effect on perceived workload rather than assuming that digitalization alone reduces it.

The proportion of respondents with high burnout in this study was 56.3%. Emotional exhaustion was the most prominent burnout dimension based on the MBI item analysis. Further analysis of the mean scores of MBI items and dimensions provided a more detailed description of burnout manifestations among ED nurses at Cilegon City Regional General Hospital. At the dimensional level, emotional exhaustion (EE) had the highest mean score of 2.94, followed by depersonalization (DP) at 2.55 and reduced personal accomplishment (PA) at 2.05. This pattern indicates that emotional exhaustion was the most dominant manifestation of burnout among ED nurses at Cilegon City Regional General Hospital, consistent with the theory of Maslach and Jackson (1981), which positions emotional exhaustion as a major and early indicator in the development of burnout.

At the individual-item level, the five statements with the highest mean scores, in descending order, were Item 2 (feeling overworked at the end of the workday, mean = 3.47), Item 1 (feeling emotionally drained by work, mean = 3.44), Item 7 (feeling that one is working too hard at the hospital, mean = 3.28), Item 14 (feeling that patients blame the nurse for some of their problems, mean = 3.13), and Item 3 (feeling tired when getting up in the morning at the prospect of another day at work, mean = 3.03). Notably, four of the five highest-scoring items (Items 1, 2, 3, and 7) belonged to the emotional exhaustion dimension, further confirming the dominance of this dimension in the burnout profile of the study population. Meanwhile, Item 14, from the depersonalization dimension, ranked fourth highest, suggesting the emergence of cynical attitudes and emotional distance toward patients.

This pattern is consistent with the burnout concept proposed by Maslach and Jackson (1981), in which emotional exhaustion is a major manifestation. ED nurses may be vulnerable to burnout because they face unpredictable patient flow, high acuity, rapid decision-making, and emotionally demanding clinical situations. Previous studies have also reported substantial burnout among ED nurses (Butera et al., 2021; Pameria et al., 2025).

The principal finding was a statistically significant association between categorized mental workload and burnout ($p = 0.036$). High burnout was observed in 76.5% of nurses classified as having high mental workload, compared with 33.3% of those classified as having low mental workload. This difference suggests that nurses reporting greater workload may be an important group for prevention and support in this ED. However, the sample was small, and the analysis used study-specific cutoffs; the magnitude and stability of the association should not be overstated.

The association can be interpreted through the Job Demands-Resources model. Mental workload represents a demand on attention, memory, decision-making, and emotional regulation. When these demands remain high across shifts and nurses have limited opportunities for recovery, the effort



required to maintain performance may contribute to exhaustion. In this study, however, workload and burnout were measured at one time, so the direction of the relationship cannot be determined. Other factors—including staffing, shift patterns, patient acuity, leadership support, sleep, coping resources, and team support—may also influence burnout and were not examined.

The present finding differs from Permatasari et al. (2023), who reported no significant relationship between mental workload and burnout among ED nurses, while Pameria et al. (2025) reported a significant relationship between workload and burnout. Differences may reflect variations in setting, sample size, measurement instruments, workload definitions, or organizational resources. Because the present study involved only 32 nurses and categorized scores using sample-specific cutoffs, its result should be considered preliminary rather than conclusive evidence resolving the differences between previous studies.

Several limitations should be acknowledged. First, the sample comprised 32 nurses from a single hospital; total sampling covered the eligible nurses in this ED but does not ensure generalizability to other hospitals or populations. Second, the cross-sectional design cannot establish temporal order or causality. Third, the use of sample-specific cutoffs to categorize NASA-TLX and MBI scores may reduce comparability with studies reporting continuous or dimension-level scores. Finally, potential confounders such as staffing adequacy, shift patterns, patient acuity, leadership support, and individual coping resources were not analyzed. Larger multicenter studies should report continuous scores and dimension-level results, justify any thresholds with validated sources, and use appropriately powered analyses.

The findings support practical actions focused on mental workload and psychological support, rather than documentation changes alone. ED managers can periodically assess NASA-TLX scores and review which dimensions—mental demand, temporal demand, effort, or frustration—are most prominent. Work redesign may include clearer task allocation during peak periods, minimizing avoidable interruptions, structured handovers, brief protected documentation periods where safe, and rapid escalation routes for technical problems. At the organizational level, staffing and patient-flow patterns should be reviewed alongside workload results. Psychological support should include regular confidential check-ins, peer support or debriefing after distressing events, access to counseling, and early referral pathways for nurses reporting persistent distress. These actions should be implemented and evaluated locally; this study did not test their effectiveness.

CONCLUSION

Among the 32 ED nurses at Cilegon City Regional General Hospital, 53.1% were classified as having high mental workload and 56.3% as having high burnout. A statistically significant association was found between the categorized variables (Chi-square test with continuity correction, $p = 0.036$). These findings are preliminary because the study was cross-sectional, involved one hospital and a small sample, and used study-specific cutoffs. They should not be interpreted as evidence that mental workload causes burnout or as estimates generalizable to other settings.

The hospital should assess mental workload systematically, identify the NASA-TLX dimensions contributing most to nurses' perceived demands, and implement and evaluate targeted workflow improvements. Psychological and peer support, confidential check-ins, and access to counseling should also be strengthened for ED nurses. Future research should recruit larger samples across multiple hospitals, analyze continuous NASA-TLX and MBI scores as well as relevant dimensions, justify thresholds using validated sources, and account for organizational and individual factors that may influence burnout.



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