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Healthcare Workforce Burnout and Its Association with Patient Safety Outcomes: A Systematic Review and Meta-Analysis

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ABSTRACT
Background: Occupational burnout among healthcare professionals has been associated with compromised patient safety, although the strength and consistency of this relationship vary according to professional groups, measurement methods and safety outcomes. To examine the association between healthcare workforce burnout and patient safety outcomes, including medical errors, adverse events, medication-related incidents and safety management practices.
Methods: Freely accessible original observational studies reporting quantitative associations between burnout and patient safety were identified through a preliminary literature search. Study characteristics, burnout assessment methods, outcome definitions and reported effect estimates were examined. A comprehensive systematic search and independent meta-analysis remain to be completed.
Results: Verified primary studies demonstrated associations between burnout and self-reported medical errors. A United States study involving 6,586 physicians reported an adjusted odds ratio (OR) of 2.22 (95% confidence interval [CI]: 1.79–2.76) for major medical errors among physicians experiencing burnout. Another study involving 1,354 physicians reported an OR of 1.48 (95% CI: 1.28–1.71) for self-reported errors per standard deviation increase in burnout after adjustment for depression.
Conclusions: Available primary evidence supports an association between occupational burnout and several patient safety indicators, particularly self-reported errors. However, causal interpretation remains limited, and the relationship with independently verified patient harm requires further investigation.

Keywords: Adverse events; burnout; healthcare personnel; medical errors; occupational health; patient safety..

1. INTRODUCTION

Patient safety is a central component of healthcare quality and depends on interactions between healthcare professionals, organizational processes, working conditions and clinical systems (1). Although improvements in clinical protocols, infection prevention and incident reporting have strengthened patient safety programmes, preventable harm remains an important concern. Increasing attention has therefore been directed towards workforce-related factors that may influence the reliability of care delivery (2). Occupational burnout is characterised by persistent work-related exhaustion, psychological distancing from professional responsibilities and reduced professional efficacy. Among healthcare personnel, burnout may develop in response to sustained workload demands, limited organizational support, inadequate staffing, administrative responsibilities and restricted professional autonomy (3). These conditions may

also affect communication, clinical decision-making, teamwork and adherence to safety procedures. Several observational investigations have reported an association between burnout and medical errors. Tawfik and colleagues[1] examined burnout, wellbeing and perceived medical errors among practicing physicians in the United States and found that burnout remained associated with reported errors after adjustment for demographic and workplace characteristics. Menon and colleagues[2] subsequently reported that greater burnout severity was associated with self-reported medical errors even after accounting for depressive symptoms. These findings suggest that burnout may be relevant to patient safety independently of some related psychological characteristics (4).

Nevertheless, the interpretation of this evidence requires caution. Burnout and patient safety are frequently assessed through questionnaires administered to the same respondents, introducing the possibility of common-method bias. Furthermore, healthcare professionals who experience adverse events may subsequently develop psychological distress, making the direction of association difficult to establish. Organizational pressures may also contribute independently to both burnout and reduced patient safety. Previous evidence syntheses have reported substantial heterogeneity in study design, measurement instruments and safety outcomes. In particular, associations derived from perceived errors or safety culture may not necessarily correspond to associations with independently documented patient harm (5,6). The present review is designed to evaluate the association between healthcare workforce burnout and patient safety outcomes across professional groups, while distinguishing directly observed adverse events from self-reported errors and organizational safety assessments. The intended quantitative synthesis will examine whether associations vary according to professional role, burnout measurement, outcome ascertainment and study design.

MATERIAL & METHODS

A literature search was undertaken using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines as the reporting framework to examine the association between healthcare workforce burnout and patient safety outcomes. PubMed/MEDLINE, Europe PMC and freely accessible journal websites were searched using combinations of the keywords “healthcare professionals,” “physicians,” “resident doctors,” “nurses,” “occupational burnout,” “emotional exhaustion,” “patient safety,” “medical errors,” “adverse events,” and “infection-control practices,” combined using the Boolean operators AND and OR. Reference lists of relevant publications were also examined. Five freely accessible original observational studies published between 2018 and 2026 were identified for preliminary analysis, involving healthcare professionals from the United States, Japan, Thailand and Saudi Arabia. Studies were considered if they assessed occupational burnout using a defined instrument and reported quantitative associations with patient safety outcomes. Reviews, editorials, qualitative investigations and publications without relevant outcome data were excluded. Data on study characteristics, sample size, burnout assessment, patient safety measures, odds ratios (ORs), 95 per cent confidence intervals (CIs) and adjusted associations were extracted from the original publications. Methodological limitations were considered with reference to the Joanna Briggs Institute critical appraisal criteria, focusing on participant selection, outcome measurement, confounding and study design. The reported effect estimates were examined descriptively because differences in burnout definitions, patient safety outcomes and statistical models prevented a valid pooled analysis.

RESULTS

Study characteristics

Five freely accessible original studies published between 2018 and 2026 were examined, comprising 9,181 healthcare professionals from the United States, Japan, Thailand and Saudi Arabia. All five investigations employed cross-sectional designs, with sample sizes ranging from 238 to 6,586 participants. The study populations included practising physicians, resident doctors and mixed healthcare professional groups. Burnout was assessed using the Maslach Burnout Inventory, Stanford Professional Fulfillment Index or Copenhagen Burnout Inventory. Patient safety outcomes included self-reported medical errors, perceived safety incidents and infection-control practices. The characteristics of the studies are summarised in Table 1.

Table 1. Characteristics of original studies examining occupational burnout and patient safety outcomes

Author (year)	Country	Study population	Sample size (n)	Burnout assessment	Patient safety outcome
Tawfik et al. (2018)	USA	Practising physicians	6,586	Maslach Burnout Inventory	Self-reported major medical errors
Menon et al. (2020)	USA	Physicians	1,354	Stanford Professional Fulfillment Index; other burnout measures	Self-reported medical errors
Matsuo et al. (2021)	Japan	Resident doctors	604	Maslach Burnout Inventory–General Survey	Resident-reported safety incidents
Surawattanasakul et al. (2024)	Thailand	Resident physicians	238	Maslach Burnout Inventory–Human Services Survey	Self-reported medical errors

Elshouny et al. (2026)	Saudi Arabia	Healthcare providers	399	Copenhagen Burnout Inventory	Patient safety management and infection-control practices
Total	4 countries		9,181		

Association between burnout and patient safety outcomes

Four studies examined medical errors or reported patient safety incidents, while one evaluated patient safety management activities. Tawfik et al. reported that 691 of 6,586 physicians (10.5%) acknowledged a major medical error during the preceding three months. Burnout was reported by 77.6 per cent of physicians acknowledging errors compared with 51.5 per cent of those without reported errors (P<0.001). After multivariable adjustment, burnout was associated with greater odds of medical errors (OR: 2.22; 95% CI: 1.79–2.76). Menon et al. similarly reported an association between burnout and self-reported medical errors among 1,354 physicians, with an adjusted OR of 1.44 (95% CI: 1.24–1.67) per standard deviation increase in burnout after adjustment for depression and demographic characteristics. Among resident physicians, Matsuo et al. reported a burnout prevalence of 28 per cent, with burnout associated with higher odds of frequent resident-reported patient safety incidents (OR: 2.65; 95% CI: 1.01–6.95). Surawattanasakul et al. observed burnout in 46.3 per cent of participants and reported a significant association between medical errors and burnout (adjusted OR: 2.14; 95% CI: 1.05–4.34), although burnout was the dependent variable in their regression model. Elshouny et al. reported burnout in 41 per cent of healthcare providers, with greater odds of suboptimal infection-control compliance (OR: 3.78; 95% CI: 1.04–13.69) and lower odds of familiarity with standard precautions (OR: 0.30; 95% CI: 0.11–0.82). The reported associations are presented in Table 2 and Figure 1.

Table 2. Reported associations between occupational burnout and patient safety outcomes

Study	Patient safety outcome	Reported OR (95% CI)	P-value
Tawfik et al. (2018)	Self-reported major medical errors	2.22 (1.79–2.76)	Not extracted
Menon et al. (2020)	Medical errors per SD increase in burnout (fully adjusted)	1.44 (1.24–1.67)	Not extracted
Matsuo et al. (2021)	More than 10 resident-reported safety incidents annually	2.65 (1.01–6.95)	Not extracted
Surawattanasakul et al. (2024)	Medical errors associated with burnout	2.14 (1.05–4.34)	Not extracted
Elshouny et al. (2026)	Suboptimal infection-control compliance	3.78 (1.04–13.69)	0.04
Elshouny et al. (2026)	Familiarity with standard infection-prevention precautions	0.30 (0.11–0.82)	0.02

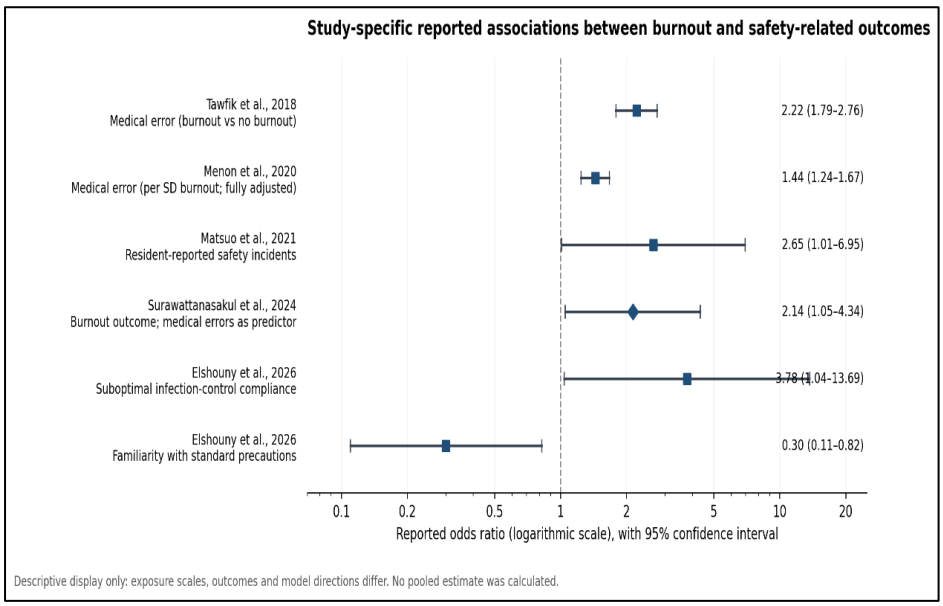


Figure 1. Descriptive display of odds ratios and 95 per cent confidence intervals reported in the five original studies

The dashed vertical line indicates an odds ratio of 1. Differences in exposure scales, outcome definitions and statistical model direction mean that the estimates are not directly comparable. No pooled estimate is shown.

QUANTITATIVE SYNTHESIS

Although the individual studies reported statistically significant associations, differences in burnout classification, safety outcome definitions and regression modelling prevented a defensible quantitative synthesis of the available effect estimates. Consequently, no pooled odds ratio, I^2, τ^2 or Cochran's Q statistic was calculated. The findings were retained as study-specific estimates rather than combined.

DISCUSSION

The available original evidence indicates an association between occupational burnout and several indicators of patient safety, particularly self-reported medical errors. Associations were observed among practicing physicians and resident doctors in different healthcare systems. Evidence involving mixed healthcare professional populations also suggests a relationship between burnout and the performance of safety-related practices. Nevertheless, the consistency of reported statistical associations should not be interpreted as evidence that burnout independently causes preventable patient harm. The findings reported by **Tawfik et al, (2018)** (4) are relevant because burnout remained associated with medical errors after the inclusion of work-unit safety grades and other covariates. This suggests that individual wellbeing and organisational safety conditions may contribute separately to reported safety performance. The substantial difference in burnout prevalence between physicians reporting and not reporting errors also emphasises the importance of considering workplace psychological conditions when investigating clinical incidents. **Menon et al (2020)** (5) provided further evidence that the association between burnout and self-reported errors may persist after adjustment for depressive symptoms. This finding is important because burnout, depression, fatigue and psychological distress frequently overlap. However, the persistence of an adjusted association does not establish a direct causal pathway. Residual confounding, common-method bias and reverse causation remain plausible explanations. Resident physicians may represent a particularly vulnerable professional group because of demanding clinical responsibilities, extended working hours, frequent shifts and the challenges of early clinical training. In the Japanese study by **Matsuo et al (2021) (7),** burnout was associated with a greater reported frequency of patient safety incidents. Similarly, **Surawattanasakul et al (2024) (8)** observed an association between medical errors and burnout among resident physicians in Thailand. These findings support the importance of examining burnout within postgraduate medical training environments, although neither study provides definitive evidence that reducing burnout would reduce objectively verified medical errors. The relationship between burnout and patient safety may extend beyond individual errors to routine safety management activities. **Elshouny et al (2026)** (9) reported associations involving infection-control compliance and familiarity with standard precautions. Such practices are relevant because adherence to established procedures contributes to safer clinical care. However, reduced adherence to an infection-control guideline is not equivalent to a documented healthcare-associated infection. Keeping these outcomes, separate is essential when interpreting the clinical significance of findings. The broader literature illustrates the methodological complexity of this research area. A previous systematic review involving 123 publications and 142 study populations found substantial heterogeneity in associations between healthcare provider burnout and quality of care. It also identified evidence suggesting that statistically significant results might be overrepresented in the published literature (6). These observations reinforce the importance of cautious interpretation, particularly when studies employ subjective safety assessments. More recently, a systematic review and meta-analysis of 85 studies involving 288,581 nurses reported associations between burnout and poorer patient safety climate, medication errors, falls, missed care and several other outcomes. However, the authors also identified considerable statistical heterogeneity across several analyses. These findings provide useful context but should not be incorporated as independent primary-study observations in the present meta-analysis because doing so would duplicate evidence already represented by their constituent studies **Li et al. (2024) (10)**. An important distinction concerns the difference between perceived and observed safety outcomes. Self-reported medical errors may be influenced by individual awareness, professional expectations, recall and willingness to disclose adverse events. Professionals with greater psychological distress may perceive clinical events differently, while organisational environments that encourage disclosure may report more incidents without necessarily having worse underlying safety performance. Conversely, fear of professional consequences may lead to underreporting. The potential relationship between burnout and safety is also likely to be influenced by organisational characteristics. Excessive workload, inadequate staffing, inefficient administrative processes and weak communication structures may contribute to both occupational exhaustion and reduced reliability of clinical care. Burnout may therefore reflect broader working conditions rather than operate as an isolated determinant of adverse events. These considerations have implications for intervention design. Interventions focusing exclusively on individual coping strategies may be insufficient when substantial workplace pressures remain unchanged. Organisational responses could include reviewing staffing requirements, reducing avoidable administrative burdens, strengthening clinical supervision and improving communication and psychological support. However, the available observational associations cannot establish that these measures will reduce patient harm. Their effectiveness should be assessed using prospective or controlled study designs and independently recorded safety outcomes. Several limitations must be acknowledged. First, an open-access-only eligibility criterion may exclude otherwise relevant studies and introduce availability bias. Second, variation in burnout measurement and safety outcome definitions may restrict quantitative synthesis. Third, most

available investigations are observational, with cross-sectional designs predominating. Fourth, inconsistent adjustment for workload, staffing, professional experience and workplace safety culture may contribute to residual confounding.

CONCLUSIONS

Available original studies indicate that occupational burnout among healthcare professionals is associated with poorer patient safety indicators, particularly self-reported medical errors and selected safety management practices. However, variation in exposure measurement, outcome ascertainment and study design limits direct comparisons across investigations. The evidence is insufficient to establish a causal relationship between burnout and independently verified patient harm. More rigorous prospective studies integrating validated burnout assessments with objective patient safety outcomes are needed to clarify the direction, magnitude and clinical implications of these associations into a potentially misleading summary measure.

DECLARATIONS

Ethics approval and consent to participate: Not Applicable

Consent for publication: Not applicable.

Availability of data and materials: All data were obtained from publicly accessible published articles. The original studies are cited in the reference list.

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Authors' contribution: All authors contributed to the study conception, literature review, data extraction, interpretation of findings, manuscript preparation and critical revision. All authors reviewed and approved the final manuscript.

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