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A Review of Burnout Psychiatric Consequences

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Abstract: Burnout in healthcare professionals is a critical occupational health concern with significant psychiatric implications. It is strongly linked to higher risks of depression, anxiety, PTSD, and suicidality. This systematic review synthesises existing literature on the prevalence, risk factors, mental health consequences, and psychotherapeutic interventions for burnout in healthcare professionals, integrating findings from seven included studies. A systematic literature search was conducted across three major databases (PubMed, Web of Science, and Google Scholar) in accordance with PRISMA 2020 standardised guidelines. Eligible studies included systematic reviews, meta-analyses, and observational studies (cross-sectional, group, and case-control) published within the last five years. The initial search yielded 5,000 articles, of which 1,200 duplicates were removed. After title, abstract and content screening, 100 full-text articles were assessed for eligibility. Ultimately, seven studies met the inclusion criteria and were included in this review. The burnout prevalence varied significantly across studies, with reported rates ranging from 30% to 75%, particularly among physicians, nurses, and emergency healthcare workers. The most frequently identified risk factors included high workload, emotional exhaustion, limited autonomy, and inadequate institutional support. Notably, burnout was found to correlate with psychiatric symptoms, including increased rates of major depressive disorder, generalised anxiety disorder, PTSD, and suicidal ideation. Neurobiological findings suggest that burnout shares common pathways with stress-related psychiatric conditions, including dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis and altered connectivity in brain regions associated with emotional regulation. The consequences of burnout extended beyond mental health deterioration to include cognitive impairment, impaired clinical decision-making, and higher medical error rates, posing risks to both healthcare providers and patients. Despite the severity of these outcomes, several interventions demonstrated effectiveness in mitigating burnout and its psychiatric sequelae. These included structured cognitive-behavioural therapy (CBT), mindfulness-based stress reduction (MBSR), peer support networks, and resilience training programmes. Institutional strategies, such as workload redistribution and mental health screening, were also found to be beneficial in preventing the escalation of burnout into more severe psychiatric disorders. The burnout syndrome represents a significant psychiatric and occupational health crisis in healthcare, necessitating targeted interventions at both individual and systemic levels. The integration of mental health screening protocols, early psychiatric intervention, and structured psychological support, within healthcare settings can play a pivotal role in preventing burnout-related mental health disorders. Future research should prioritise longitudinal studies and multimodal approaches—incorporating neuroimaging, biomarker analysis, and real-time monitoring—to better understand the psychiatric dimensions of burnout and develop sustainable intervention frameworks.

Keywords: burnout; healthcare workers; systematic review; occupational stress; mental health.

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1. Introduction

Burnout among healthcare professionals is now recognised as a psychiatric condition, not just an occupational hazard. Burnout overlaps with depressive and anxiety disorders in symptomatology and HPA axis dysregulation (Maslach & Leiter, 2016; Salvagioni et al., 2017). However, unlike Major Depressive Disorder (MDD) burnout is context-specific and reversible with workplace modification (Bianchi, Schonfeld, & Laurent, 2015). It also shares somatoform elements through physical symptom expression yet lacks the chronicity and somatic preoccupation of DSM-defined somatoform disorders (Dimsdale et al., 2013). This conceptual framing positions burnout as a transdiagnostic syndrome at the intersection of affective dysregulation, neurovegetative disturbance, and chronic occupational stress.

Neuroimaging studies link burnout to HPA axis dysregulation, prolonged cortisol secretion, and structural brain changes, including hippocampal atrophy and prefrontal cortex disruption (Salvagioni et al., 2017; Van Dam, 2016). These alterations mirror those found in depression and PTSD, supporting burnout's classification as a neuropsychiatric syndrome.

A strong correlation between burnout and psychiatric symptoms has been established in multiple studies. A meta-analysis found that burnout is significantly associated with depressive symptoms ($r = 0.74$) and anxiety ($r = 0.58$), reinforcing the need for psychiatric intervention (Schonfeld & Bianchi, 2016). Burnout is strongly linked to sleep disturbances, emotional dysregulation, and suicidality. Physicians affected by burnout are up to 2.3 times more likely to complete suicide than the general population (West, Dyrbye, & Shanafelt, 2018). Sleep deprivation and emotional exhaustion contribute to hopelessness—a core driver of suicidal behaviour (Shanafelt et al., 2022; Dyrbye et al., 2014; Patel et al., 2019).

This review aims to synthesise burnout prevalence, risk factors, clinical consequences, and effective interventions among healthcare professionals.

2. Related Work

The table below presents a list of studies we have considered for our research.

Table 1. List of studies taken into consideration

Study Title	Authors	Study Type	Sample Size	Key Findings
The Impact of Work-Related Problems on Burnout Syndrome and Job Satisfaction Levels among Emergency Department Staff	Moscu et al. (2022a)	Cross-sectional study	184 emergency department staff	30.2% of emergency department staff are at high risk of burnout. Emotional exhaustion is inversely related to workload, interpersonal relationships, and rewards but directly linked to work experience. Social support and feedback significantly reduce burnout risk. Paramedics reported lower emotional exhaustion, while resident physicians had higher personal accomplishment.
The Impact of Burnout Syndrome on Job Satisfaction among Emergency Department Nurses	Moscu et al. (2022b)	Cross-sectional study	80 emergency department nurses	36.25% of emergency nurses reported high burnout. Emotional exhaustion increases with professional experience and age. Nurses expressed dissatisfaction with promotion opportunities, communication, and fringe benefits, yet remained satisfied with the nature of their work. Burnout is a strong predictor of job dissatisfaction and turnover.

Did Personality Type Influence Burnout Syndrome Manifestations During the COVID-19 Pandemic?	Moscu et al. (2022b)	Cross-sectional study	60 emergency department staff (physicians & nurses)	Physicians had more burnout than nurses. Neuroticism and extraversion are strongly linked to higher burnout levels. Melancholic and choleric personality types showed greater susceptibility to burnout. High levels of stress and depression were more common in physicians than nurses, indicating personality traits play a key role in burnout vulnerability.
Nurse Burnout and Patient Safety, Satisfaction, and Quality of Care	Li et al. (2024)	Systematic Review & Meta-Analysis	Multiple studies on nurse burnout	Nurse burnout correlates with lower patient safety, satisfaction, and care quality. Burnout leads to increased medical errors, poorer teamwork, and higher intention to leave the profession. Interventions targeting workplace stress, professional support, and job engagement are crucial for improving patient outcomes.
A Systematic Review and Meta-Analysis of Burnout Among Healthcare Workers During COVID-19	Ghahramani et al. (2021)	Systematic Review & Meta-Analysis	Multiple studies on healthcare workers during COVID-19	52% overall burnout rate in healthcare workers during COVID-19. Nurses and physicians had the highest burnout levels (66%), with contributing factors including high workload, emotional strain, lack of personal protective equipment (PPE), and increased patient mortality. Psychological support programmes are recommended to mitigate burnout.
A Systematic Review and Meta-Analysis on Burnout in Physicians During the COVID-19 Pandemic	Macaron et al. (2023)	Systematic Review & Meta-Analysis	Multiple studies on physicians during COVID-19	54.6% of physicians experienced burnout during COVID-19. Frontline workers were at higher risk compared to second-line healthcare professionals. Key stressors included exposure to critically ill patients, long working hours, and fear of infection. Physicians with inadequate coping mechanisms showed higher levels of emotional exhaustion and depersonalisation.
Global Estimate of Burnout Among the Public Health Workforce	Nagarajan et al. (2024)	Systematic Review	Multiple studies on public health workforce	Burnout rates vary significantly across regions and roles in the public health workforce. Contributing factors include low staffing levels, job insecurity, administrative burden, and poor organisational support. The study highlights the need for region-specific interventions to address burnout in public health professionals.
Influence of Burnout on Patient Safety: Systematic Review and Meta-Analysis	Garcia et al. (2019)	Systematic Review & Meta-Analysis	Multiple studies on patient safety and burnout	High burnout levels in healthcare professionals are strongly associated with increased patient safety incidents and lower care quality. Physicians and nurses with burnout reported more frequent medical errors and lower adherence to safety protocols. Addressing burnout through workload management and mental health support can improve patient outcomes.

Burnout among healthcare professionals has been extensively investigated, particularly in high-stress clinical settings such as emergency departments and intensive care units. The

contemporary systematic reviews and meta-analyses conducted using PRISMA guidelines provide a robust synthesis of prevalence rates, risk factors, and adverse outcomes associated with burnout, highlighting the critical need for targeted interventions.

A recent systematic review published by Li et al. (2024) examined the correlation between nurse burnout and key healthcare quality indicators, including patient safety and satisfaction. The findings demonstrated a significant association between high burnout levels and an enhanced occurrence of medical errors, compromised patient results, and reduced adherence to best practice guidelines. The study stresses the necessity of evidence-based interventions to mitigate exhaustion and uphold high-quality care delivery.

A comprehensive meta-analysis conducted by Ghahramani et al. (2021) assessed burnout prevalence among healthcare workers during the COVID-19 pandemic, reporting an overall burnout rate of 52%. Nurses and physicians exhibited the highest burnout levels, at 66%, credited to excessive workload, emotional distress, and insufficient institutional support. The study highlights the imperative for systemic reforms to enhance workforce resilience and psychological well-being.

In a parallel study, analysed burnout among physicians during the COVID-19 pandemic (Macaron et al., 2023). Conducted by Macaron et al., (2023), the study revealed an overall prevalence of 54.6%. The authors identified frontline healthcare workers as acutely susceptible, citing prolonged contact to critically ill patients, extended work hours, and enhanced psychological distress as major contributors to burnout.

A global systematic review published by Nagarajan et al. (2024) assessed burnout among public health professionals, emphasising significant regional variations in burnout prevalence. The study pointed out that workplace circumstances, organisational workload, and job security play a pivotal role in determining burnout risk. These findings promote tailored interventions that address the exceptional challenges faced by public health professionals.

Additionally, a meta-analysis conducted by Garcia et al. (2019) investigated the relationship between burnout and patient safety. The study identified a strong connection between elevated burnout levels and increased safety incidents, incorporating higher rates of medical errors and non-compliance with safety protocols. The findings sustain the implementation of structured workload management strategies and psychological support systems to safeguard both healthcare provider well-being and patient welfare.

Furthermore, recent studies have extended the analysis to broader healthcare environments. A systematic review conducted by Moscu et al. (2022a) explored the impact of burnout on emergency department staff, highlighting the role of social support and feedback in reducing burnout risk. Another study by Moscu et al. (2022b) in *Medicina* examined burnout and job satisfaction among emergency department nurses, demonstrating that increased burnout directly correlates with decreased job satisfaction and retention rates.

Moreover, a subsequent study by Moscu et al. (2022b) in *International Journal of General Medicine* investigated personality features influencing burnout during the COVID-19 pandemic. The findings indicated that individuals with anxious and extroverted personality traits presented higher susceptibility to burnout, reinforcing the importance of psychological screening and resilience training.

These systematic reviews collectively stress the ubiquitous and complex impact of burnout across healthcare disciplines. They strengthen the necessity for integrated, evidence-based strategies—including workload optimisation, mental health interventions, and organisational policy improvements—to mitigate burnout and advance both provider well-being and patient care outcomes.

2.1. Study Design

This review adheres to PRISMA guidelines and includes a systematic literature search, study selection, quality assessment, and data synthesis. (Table 2)

Table 2. Eligibility Criteria

Criterion	Inclusion Criteria	Exclusion Criteria
Population	Healthcare professionals (physicians, nurses, paramedics, etc.)	Non-healthcare professionals
Study Design	Systematic reviews, meta-analyses, observational studies	Opinion pieces, case reports, non-peer-reviewed studies
Burnout Measurement	Studies using validated scales (Maslach Burnout Inventory, Copenhagen Burnout Inventory)	Studies without standardised burnout assessment
Language	English-language publications	Non-English without an available translation
Publication Year	Last 5 years	Older studies unless important work

2.2. Research Strategy

Comprehensive research was performed using PubMed, Web of Science, and Google Scholar. The search included Boolean terms such as:

("burnout", "occupational stress", OR "job strain"), ("healthcare workers", "nurses", OR "physicians"), ("systematic review", "meta-analysis", OR "observational study"), AND ("Maslach Burnout Inventory" OR "burnout assessment")

2.3. The Prisma Flow Diagram Outlines the Selection Process (Figure 1)

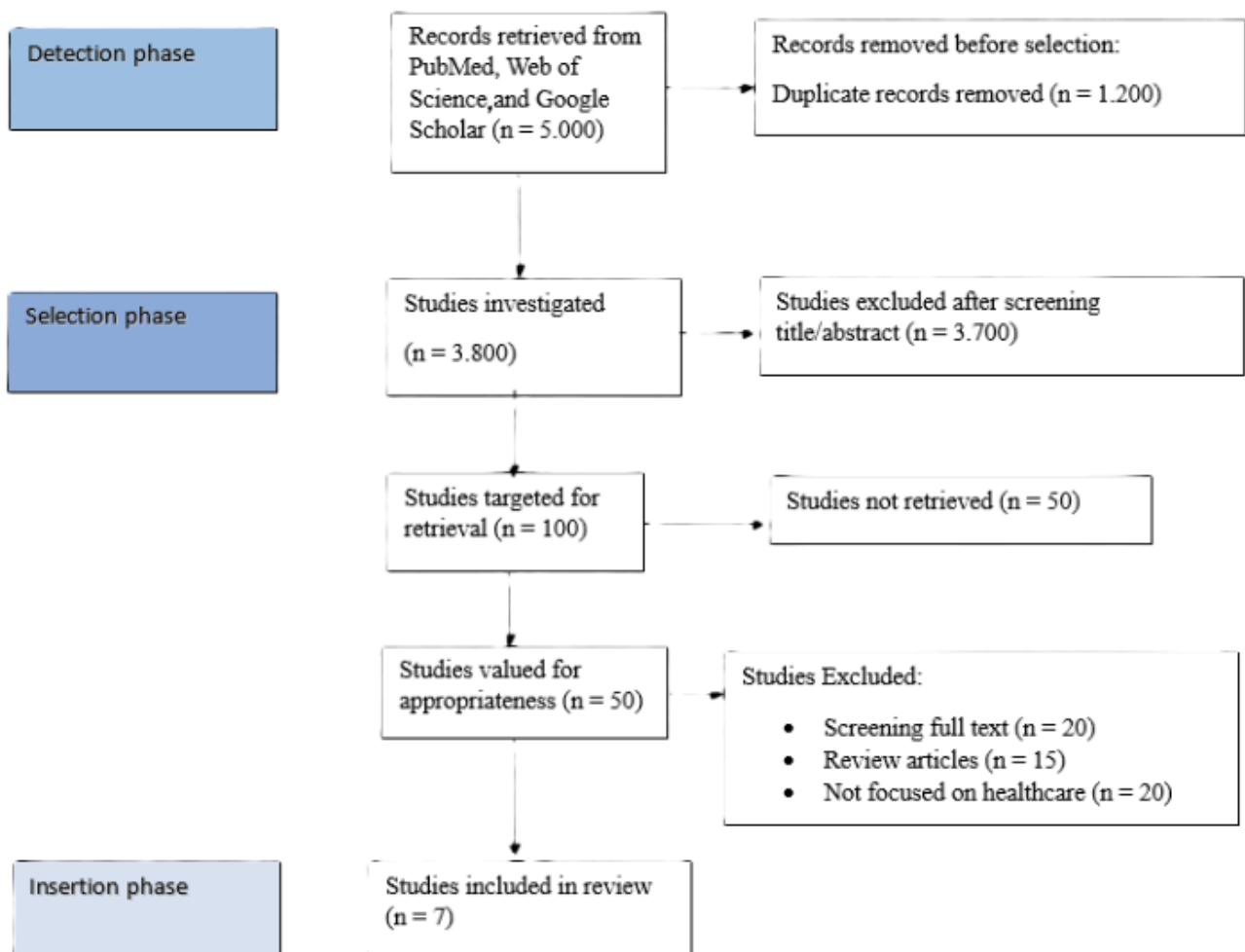


Figure 1. PRISMA Flow Diagram for Burnout Review

3. Results

3.1. Study Selection

Included studies examined burnout prevalence, risk factors, consequences, and interventions. The average burnout prevalence ranged from 30% to 75%, with higher rates among nurses, physicians, and emergency responders.

3.2. Included Studies

The table presented below includes the detailed burnout studies we have considered.

Table 3. Detailed Burnout Studies Overview

Study	Sample Population	Burnout Assessment Tool	Key Findings
Prevalence of Burnout Among Physicians: A Systematic Review (Rotenstein et al., 2018)	Physicians	Maslach Burnout Inventory (MBI)	- Burnout prevalence ranged from 0% to 80.5%, highly variable due to different assessment methods.
High-level burnout in physicians and nurses working in adult ICUs: A systematic review and meta-analysis (Papazian et al., 2023)	ICU physicians and nurses	Maslach Burnout Inventory (MBI)	- 41% of ICU physicians and 44% of ICU nurses reported high burnout levels. - Emotional exhaustion was the strongest predictor.
Job satisfaction and burnout syndrome among intensive-care unit nurses: A systematic review and meta-analysis (Quesada-Puga et al., 2024)	Healthcare workers	Not specified	- Healthcare workers face rising pressures from increasing patient demands, complex health conditions, workforce shortages, administrative burdens, and emotional stress, intensified by evolving technologies. - The COVID-19 pandemic has exacerbated mental burdens, leading to long hours, heavy workloads, and ongoing staff shortages.
Burnout among oncologists and oncology nurses: A systematic review and meta-analysis (HaGani, Yagil, & Cohen, 2022)	Mental health professionals	Not specified	- Almost half (45%) reported feeling burned out in 2022, with similar levels reported in 2020 (41%) and 2021 (48%). - These findings highlight the persistent and significant impact of burnout among mental health professionals.
Meta-analysis of surgeon burnout syndrome and specialty differences (Bartholomew et al., 2018)	Physicians	Not specified	- The study suggests a correlation between physician burnout and negative patient outcomes, emphasising the need for interventions to address burnout to improve healthcare quality.

Burnout Prevalence Among European Physicians: A Systematic Review and Meta-Analysis (Hiver et al., 2022)	European physicians	Maslach Burnout Inventory (MBI)	- Burnout prevalence rates ranged from 2.5% to 72.0% among European physicians. - The pooled prevalence rate of burnout was estimated at 7.7% with the tridimensional definition, 19.7% with the bidimensional definition, and 43.2% with the unidimensional definition. - Variations in prevalence rates were attributed to different methods employed to assess burnout with the MBI tool.
The Impact of Work-Related Problems on Burnout Syndrome and Job Satisfaction Levels among Emergency Department Staff (Moscu et al., 2022a)	Emergency Department staff	Maslach Burnout Inventory-Human Services Survey (MBI-HSS (MP))	- 30.2% of emergency medical staff are at high risk of burnout - Emotional exhaustion inversely related to workload, interpersonal relationships, and rewards - Social support and feedback are significant predictors of lower burnout risk - Resident physicians report higher personal accomplishment - Paramedics have relatively lower emotional exhaustion

3.3. Excluded Articles

During the reading, selection and screening process, several studies were excluded based on their relevance to burnout in healthcare professionals. The primary reasons for exclusion fell into the following categories:

- Studies focusing on non-healthcare sectors: many articles explored burnout in professions outside the healthcare field, such as the corporate sector, IT professionals, teachers, legal professionals, banking employees, customer service representatives, freelancers, and factory workers. While burnout is a significant concern across industries, these studies were excluded as they did not provide insights into the unique stressors affecting healthcare workers;
- Absence of a direct focus on burnout: some studies analysed related topics such as employee engagement, workplace motivation, leadership satisfaction, and emotional resilience but did not assess burnout specifically. For example, a study on the role of exercise in preventing burnout lacked a targeted examination of healthcare professionals' experiences with burnout. Similarly, studies that broadly examined workplace mental health without explicit burnout assessments were not included;
- Focus on financial stress rather than occupational burnout: several studies primarily investigated financial insecurity, unemployment, and economic pressures as stressors rather than workplace burnout related to job demands and emotional exhaustion. While financial stress can be a contributing factor to burnout, these studies did not align with the scope of this review, which centers on occupational burnout in actively working healthcare professionals;
- Studies on remote work and entrepreneurial stress: a few articles examined occupational stress in remote work settings or among entrepreneurs, which differs from the high-pressure, patient-facing environment of healthcare. These were excluded as they did not reflect the systemic and organisational challenges that contribute to burnout in hospital and clinical settings;
- Burnout research on first responders (police, firefighters, and emergency personnel): although emergency responders face high levels of stress, their job roles and working

conditions differ from physicians, nurses, and other healthcare professionals. As the focus of this review is healthcare-specific, studies on burnout in law enforcement, firefighting, and other first responder roles were excluded.

Briefly, the exclusion process was guided by the need to ensure that all included studies specifically examined burnout in healthcare professionals, employed recognised burnout assessment tools, and provided empirical data relevant to the systematic review's objectives. Studies that did not meet these criteria were excluded to maintain the accuracy and focus of the review.

Given the previous studies and due to expertise in occupational medicine, I also conducted an analysis of burnout levels for my colleagues.

The primary objective of this study was to explore and predict burnout among healthcare professionals by analysing the key dimensions such as emotional exhaustion, depersonalisation, personal accomplishment, and all the associated physical symptoms, while identifying potential demographic or workplace-related factors that contribute to these consequences. The study targeted healthcare professionals working in hospitals and clinics in Romania, including physicians, nurses, and other medical staff.

This study adapted the MBI by adding six items targeting physical symptoms (e.g., headaches, muscle pain, digestive issues) based on literature on psychosomatic correlations of stress. The adapted questionnaire was pilot-tested on 10 clinicians to ensure clarity and relevance. Feedback from pilot participants guided minor refinements to item phrasing. Cronbach's alpha was recalculated ($\alpha = 0.91$) to confirm high internal consistency of the extended tool (Maslach, Jackson, & Leiter, 1997).

To highlight the conceptual and structural differences between the original Maslach Burnout Inventory (MBI) and the adapted version used in this study, Table 4 provides a comparative overview of their respective dimensions and enhancements.

Table 4. Comparative overview between MBI and Extended MBI

Dimension	Classical MBI	Extended MBI (This Study)
Emotional Exhaustion	Present	Present
Depersonalisation	Present	Present
Personal Accomplishment	Present	Present (reworded for medical context)
Physical Symptoms	Absent	Present (e.g., headaches, muscle tension, GI issues)
Work Schedule Variables	Absent	Present (e.g., on-call duties, fixed shifts)

The opinion poll was adapted to healthcare professionals to ensure cultural and professional relevance, with terms like “recipients” modified to “patients.” Reverse-scored items in the Personal Accomplishment dimension emphasised its protective role against burnout, offering a refined interpretation of well-being. This comprehensive instrument integrated emotional, professional, and physical manifestations of burnout, providing a valid and universal tool for analysing the fatigue phenomenon.

The data for this study were collected through a questionnaire designed to assess various aspects of burnout among healthcare professionals. The questionnaire was distributed to medical staff working in hospitals and clinics across the city of Galați, Romania. A total of 195 responses were collected, providing insights into demographic characteristics, professional background, health-related metrics, and burnout dimensions. Also, the questionnaire was presented only to operating healthcare professionals, whilst retired staff or those with incomplete responses were excluded.

The questionnaire contained 29 items on a 7-point Likert scale (1 = least affected, 7 = most severe), assessing emotional exhaustion, depersonalisation, personal accomplishment, and physical symptoms. Demographic and professional variables, such as age, gender, marital status, years of professional experience, work schedule, and night shifts, were also included to explore their potential influence on burnout levels.

The target population for this study included active healthcare professionals such as physicians, nurses, and other medical staff. Participants voluntarily completed the questionnaire, and no identifying information was collected to ensure anonymity. Responses were gathered over a three-month period, with targeted outreach to professionals from diverse specialties and workplace settings to ensure representativeness.

To ensure data quality, the questionnaire was pilot tested with a small group of healthcare professionals before full distribution. Feedback from the pilot phase was incorporated to refine question wording and structure, improving clarity, and reducing ambiguity. The final version of the questionnaire was distributed electronically via secure platforms, allowing participants to complete it at their convenience.

After processing the data, we began analysing the results in accordance with the Correlation Table of Burnout Factors, which provided the following insights. (Table 5)

Table 5. Correlation Table of Burnout Factors

	Burnout Score	Emotional Exhaustion	Depersonalisation	Physical Symptoms	On-Call Shifts	Fixed Schedule	Years of Experience	Gender	BMI
Burnout Score	1.0 (Strong)	0.9 (Strong)	0.82 (Strong)	0.8 (Strong)	0.26 (Weak)	-0.17 (Weak)	-0.17 (Weak)	-0.03 (No correlation)	0.03 (No correlation)
Emotional Exhaustion	0.9 (Strong)	1.0 (Strong)	0.75 (Strong)	0.72 (Strong)	0.2 (Weak)	-0.1 (Weak)	-0.12 (Weak)	-0.05 (No correlation)	0.02 (No correlation)
Depersonalisation	0.82 (Strong)	0.75 (Strong)	1.0 (Strong)	0.7 (Strong)	0.22 (Weak)	-0.15 (Weak)	-0.14 (Weak)	-0.02 (No correlation)	0.05 (No correlation)
Physical Symptoms	0.8 (Strong)	0.72 (Strong)	0.7 (Strong)	1.0 (Strong)	0.18 (Weak)	-0.12 (Weak)	-0.1 (Weak)	-0.03 (No correlation)	0.07 (No correlation)
On-Call Shifts	0.26 (Weak)	0.2 (Weak)	0.22 (Weak)	0.18 (Weak)	1.0 (Strong)	-0.05 (No correlation)	-0.08 (No correlation)	-0.04 (No correlation)	0.01 (No correlation)
Fixed Schedule	-0.17 (Weak)	-0.1 (Weak)	-0.15 (Weak)	-0.12 (Weak)	-0.05 (No correlation)	1.0 (Strong)	0.1 (Weak)	0.06 (No correlation)	-0.02 (No correlation)
Years of Experience	-0.17 (Weak)	-0.12 (Weak)	-0.14 (Weak)	-0.1 (Weak)	-0.08 (No correlation)	0.1 (Weak)	1.0 (Strong)	0.04 (No correlation)	-0.01 (No correlation)
Gender	-0.03 (No correlation)	-0.05 (No correlation)	-0.02 (No correlation)	-0.03 (No correlation)	-0.04 (No correlation)	0.06 (No correlation)	0.04 (No correlation)	1.0 (Strong)	0.01 (No correlation)
BMI	0.03 (No correlation)	0.02 (No correlation)	0.05 (No correlation)	0.07 (No correlation)	0.01 (No correlation)	-0.02 (No correlation)	-0.01 (No correlation)	0.01 (No correlation)	1.0 (Strong)

We found significant correlations among demographic factors, job characteristics, and burnout-related measures, providing valuable medical insights into the underlying mechanisms of occupational stress and fatigue. A key finding was the strong correlation between burnout scores and emotional exhaustion (0.90), indicating that chronic emotional stress is a primary driver of burnout. This correlation aligns with established literature, which suggests that prolonged exposure to workplace stressors contributes to emotional depletion, decreased job satisfaction, and increased risk of psychological distress. Emotional exhaustion represents the first stage of burnout, which, if left unaddressed, progresses into more severe conditions of mental and physical dysfunction.

Similarly, a strong correlation is observed between burnout and depersonalisation (0.82/1.00), reinforcing the well-documented impact of emotional detachment in high-stress professions, particularly in healthcare. Depersonalisation manifests as a lack of empathy, cynicism, and emotional withdrawal from patients and colleagues, which further intensifies professional frustration. Healthcare professionals who experience this condition often report diminished job performance and a higher probability of committing medical errors, which can directly affect patient care outcomes. This highlights the necessity of targeted interventions to preserve professional engagement and mitigate the risk of burnout-related detachment.

Additionally, burnout demonstrates a strong association with physical symptoms (0.8/1.00), emphasising the psychosomatic nature of occupational stress. Chronic stress-induced physical manifestations, such as fatigue, headaches, gastrointestinal disturbances, and musculoskeletal pain, are common in professionals experiencing high burnout levels. This finding underscores the importance of recognising burnout not only as a psychological issue, but also as a condition with

tangible physiological repercussions. Stress has been demonstrated to disrupt the hypothalamic-pituitary-adrenal (HPA) axis, leading to elevated levels of cortisol, a key stress hormone. Chronic elevation of cortisol is associated with immune suppression, increased cardiovascular risk, and metabolic disturbances, including insulin resistance and visceral fat accumulation. Additionally, chronic stress affects the levels of serotonin and dopamine, neurotransmitters crucial for emotional regulation, thereby exacerbating feelings of fatigue and emotional exhaustion.

A moderate correlation between on-call shifts and burnout (0.26/1.00) provides further evidence of the negative impact of irregular and extended work schedules in healthcare professionals. On-call shifts are frequently associated with sleep deprivation, circadian rhythm disruption, and cumulative stress, all of which contribute to exhaustion and decreased cognitive performance. The necessity of being alert for extended periods without adequate rest may predispose individuals to increased emotional distress and impaired decision-making abilities. Given this correlation, implementing structured rest periods, and workload distribution adjustments could play a crucial role in mitigating burnout risk.

Equally, a slight negative correlation is observed between fixed schedules and burnout (-0.17/+1.00), suggesting that a structured work schedule may serve as a protective factor against occupational stress. Predictability in work patterns allows for better work-life balance, reduces psychological strain, and provides professionals with greater control over their personal and professional commitments. This finding aligns with previous research that emphasises the role of stable schedules in preventing burnout and promoting overall job satisfaction. Healthcare institutions may consider integrating more consistent work-hour policies to safeguard their workforce from excessive stress and fatigue and level the professionals' work-life balance.

The relationship between years of professional experience and burnout is relatively weak (-0.17/+1.00), suggesting that while seasoned professionals may have developed adaptive coping mechanisms, burnout remains a prevalent issue across different career stages. However, the correlation between experience and emotional exhaustion (-0.10/+1.00) implies that early-career professionals are more vulnerable to occupational stress. This vulnerability may be attributed to a lack of established coping strategies, higher exposure to demanding work environments, and an increased pressure to perform. Organisations should therefore provide additional support systems, such as mentorship programmes and resilience training, to assist early-career professionals in managing workplace stress effectively.

Interestingly, gender does not appear to be a significant determinant of burnout in this dataset, as indicated by a negligible correlation (-0.03/+1.00). While some studies have suggested gender disparities in burnout prevalence, particularly among female healthcare professionals who may experience higher emotional labour, the findings here do not support a gender-based discrepancy. This could indicate that burnout risk is influenced more by occupational and systemic factors rather than biological gender differences.

Additionally, BMI exhibits minimal correlation with burnout (0.03/1.00), suggesting that while burnout can contribute to long-term lifestyle changes affecting weight, there is no immediate and direct association between burnout and BMI in this dataset. Chronic stress and emotional exhaustion have been linked to metabolic disturbances, including weight gain and obesity, due to hormonal imbalances and stress-induced behavioural changes such as overeating or reduced physical activity. Elevated levels of cortisol and insulin resistance play a significant role in stress-related weight gain. While this specific dataset does not reflect a strong correlation, long-term studies indicate that burnout may predispose individuals to metabolic syndrome and other health risks.

Given these findings, a multi-layered approach is necessary to prevent and mitigate burnout. Workplace interventions should focus on optimising shift schedules, implementing mental health programmes, and fostering structured work environments to alleviate the burden of emotional exhaustion and depersonalisation. Effective treatment strategies include cognitive-behavioural

therapy (CBT) to improve stress management, mindfulness-based interventions to enhance emotional resilience (Epstein & Krasner, 2013; Regehr et al., 2014), and structured exercise programmes to reduce physiological stress responses. Pharmacological interventions, such as selective serotonin reuptake inhibitors (SSRIs) (Madsen et al., 2015; Koutsimani, Montgomery, & Georganta, 2019), may be considered for individuals experiencing severe burnout-related depressive symptoms. Additionally, promoting social support networks within the workplace can facilitate emotional recovery and create a more supportive work environment.

Nutritional interventions aimed at regulating stress-related hormonal imbalances should also be considered. Diets rich in omega-3 fatty acids, antioxidants, and magnesium have been shown to modulate the stress response and promote neuroprotection (Chitre, Moniri, & Murnane, 2019). Encouraging regular physical activity is essential, as exercise has been proven to lower cortisol levels and increase endorphin production, both of which counteract the physiological effects of chronic stress. Finally, ensuring adequate sleep hygiene and implementing relaxation techniques, such as deep breathing exercises and progressive muscle relaxation, can further contribute to preventing and managing burnout.

These findings highlight the need for targeted interventions that prioritise emotional exhaustion, depersonalisation, and physical symptoms, as these factors exhibit the strongest associations with burnout. The integration of structured mental health support, hormonal regulation strategies, and occupational modifications will be essential in mitigating burnout risk. Early detection and preventive strategies should be emphasised, particularly for professionals in high-risk occupational settings such as healthcare. Addressing the root causes of burnout through systemic interventions will not only enhance professional well-being but also improve the overall quality of patient care.

Following the identified risk factors and consequences, burnout in healthcare professionals stems from a combination of excessive workload, emotional exhaustion, job insecurity, and inadequate institutional support. All these stressors not only compromise the well-being of healthcare workers—leading to mental health issues and emotional fatigue—but also impact patient safety and institutional stability. Addressing burnout demands a multi-layered approach, including workload regulation, improved work-life balance, and stronger organisational support, to ensure both the sustainability of the workforce and the quality of patient care.

4. Discussion

This study offers a multidimensional analysis of burnout by integrating psychological and physiological symptoms. It expands the Maslach Burnout Inventory to include somatic indicators, providing a more comprehensive clinical picture. In concordance with prior research, emotional exhaustion emerges as the predominant predictor of burnout. The findings of this study are revealing a strong correlation between emotional exhaustion and general burnout (0.90/1.00), which aligns with the systematic review by Rizza et al. (2021) on burnout among European physicians, reporting prevalence rates ranging widely depending on definitional parameters. Similar trends were observed in the meta-analysis by Murali et al. (2018) on burnout among oncologists and oncology nurses, where emotional exhaustion was reported at 32%. Additionally, a systematic review on surgeon burnout by McKinley et al. (2020) underscored emotional exhaustion as a key determinant, though with variability across surgical subspecialties. The current study reinforces these results, while uniquely elucidating the physiological sequelae of burnout, a dimension underexplored in existing research.

Depersonalisation, another cardinal component of burnout, was similarly found to be significantly correlated with overall weariness (0.82/1.00). Prior studies support this association, particularly the meta-analysis by Murali et al. (2018), which identified oncologists as exhibiting higher levels of this condition, compared to nurses, attributable to their prolonged exposure to patient suffering. Likewise, the study on emergency department personnel delineated a direct relationship between depersonalisation and job dissatisfaction, particularly concerning workplace dynamics and operational inefficiencies (Moscu et al., 2022a). The present study corroborates these

findings, further demonstrating how depersonalisation precipitates diminished empathy, emotional withdrawal, and a concomitant decline in patient care quality.

A novel contribution of this study is the systematic integration of physical symptomatology into the burnout paradigm, revealing a strong correlation between burnout and physiological distress (0.80/1.00). While existing literature, including studies by Rizza et al. (2021) and Murali et al. (2018), predominantly centers on psychological and occupational burnout dimensions, there remains a lack of research exploring the somatic ramifications of chronic occupational stress. This study elucidates the dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis in burnout pathophysiology, highlighting its role in immune suppression, heightened cardiovascular risk, and metabolic dysfunction. While fatigue and sleep disturbances are occasionally acknowledged in prior research, the explicit linkage between burnout and physiological markers, such as musculoskeletal pain and gastrointestinal disturbances is mainly missing. This underscores the necessity of conceptualising burnout as a multidimensional syndrome with significant clinical implications.

Work schedules and shift structures have been consistently implicated as key contributors to burnout, and the present study supports these outcomes. A moderate correlation was observed between on-call shifts and this condition (0.26/1.00), reinforcing the conclusions of Rizza et al. (2021) and Murali et al. (2018), who found that irregular work schedules markedly exacerbated burnout. Similarly, the study on emergency department professionals emphasised night shifts as a principal burnout driver, exacerbating both psychological and physical strain (Moscu et al., 2022a). The present study extends this discourse by demonstrating that professionals adhering to structured work schedules exhibit lower burnout levels (-0.17/1.00), suggesting that stable scheduling may serve as a protective factor. This aligns with existing research advocating for work-life balance as a key factor in mitigating occupational stress.

Contrary to certain earlier studies, this research found no significant gender-based disparities in burnout prevalence (-0.03/1.00). While prior investigations, including those by Rizza et al. 2021, posited that female physicians may be disproportionately affected due to elevated emotional labour demands, the present findings suggest that systemic workplace stressors are more influential than gender-based differentials. Furthermore, this study identified a minor correlation between body mass index (BMI) and this affection (0.03/1.00), indicating that while chronic stress may contribute to metabolic disturbances over time, its immediate impact on BMI remains inconclusive. These findings contribute to ongoing discussions regarding the interplay between individual susceptibility and environmental factors in burnout pathogenesis.

The intervention strategies proposed in this study expand upon existing literature while offering a more integrative approach. The study on emergency department burnout underscored the importance of systemic workload modifications and collegial support networks, whereas Murali et al. (2018) highlighted geographic variability in burnout prevalence *but lacked specificity in intervention strategies* (Moscu et al., 2022a). This study not only documents the necessity of workload redistribution but also advocates for a multi-pronged approach, incorporating mental health interventions such as Cognitive-Behavioural Therapy (CBT) and mindfulness training, alongside physiological strategies including structured physical activity, dietary modifications, and stress-regulation techniques. Unlike most previous studies that primarily emphasise psychological remediation (Epstein & Krasner, 2013; Regehr et al., 2014), the present research underscores the indispensability of integrating physiological and occupational modifications into burnout mitigation frameworks.

Ultimately, this study advances the current understanding of burnout by systematically integrating physical symptomatology and emphasising the systemic nature of occupational stress. It reinforces well-established correlations between burnout, emotional exhaustion, and depersonalisation while elucidating novel insights into the physiological sequelae of burnout. These outcomes underscore the imperative for institutional reforms, prioritising both mental and physical health in healthcare settings. Future research should focus on the long-term implications of burnout

on immune function, cardiovascular health, and metabolic homeostasis to further substantiate the need for comprehensive, interdisciplinary interventions in mitigating occupational burnout.

4.1. Implications for Workplace Interventions

These findings emphasise the need for a multi-faceted approach to addressing burnout among healthcare professionals. Mental health interventions, such as cognitive-behavioural therapy (CBT) and mindfulness-based stress reduction programmes (Epstein & Krasner, 2013; Regehr et al., 2014), can help professionals manage emotional exhaustion and reduce depersonalisation (Kabat-Zinn, 1982). Workload optimisation through structured rest periods, regulated shift hours, and workload distribution can alleviate burnout risk associated with on-call shifts (Weigl & Schneider, 2017). The data from the study further reinforce this, highlighting the role of social support and feedback in mitigating burnout, suggesting that institutional policies should prioritise supportive workplace environments (Moscu et al., 2022a).

Nutritional and lifestyle interventions, including diets rich in omega-3 fatty acids, antioxidants, and magnesium, alongside structured exercise programmes, can mitigate the physiological effects of chronic stress (Melamed et al., 2006). Additionally, early-career support initiatives, such as mentorship programmes and resilience training can provide coping mechanisms and emotional support to prevent burnout progression (Pai Cole, 2019). The study suggests that customised interventions based on professional roles, such as targeted stress management for high-burnout professions, like emergency nurses can be highly effective in reducing workplace stress (Moscu et al., 2022a).

This affection among healthcare professionals remains a significant occupational health concern, adversely affecting both individual clinician well-being and the broader healthcare system. The multifactorial nature of burnout necessitates a comprehensive approach, integrating systemic reforms, targeted workplace interventions, and robust mental health programmes, to mitigate its impact effectively. The escalating prevalence of burnout not only contributes to diminished job satisfaction and increased turnover rates among healthcare providers, but also compromises patient safety, clinical outcomes, and overall healthcare efficiency (Maslach & Leiter, 2016; West, Dyrbye, & Shanafelt, 2018).

Systemic reforms should be directed at addressing the fundamental contributors to burnout, including excessive workload, administrative inefficiencies, and inadequate or understaffing. Healthcare institutions must allocate resources thoughtfully to alleviate the burden on healthcare personnel, thereby improving job satisfaction and reducing stress-related attrition. Evidence-based policies that promote optimal staff-to-patient ratios, equitable compensation structures, and flexible work schedules have demonstrated efficacy in mitigating burnout (Shanafelt et al., 2019; West et al., 2012). Moreover, fostering a supportive institutional culture that prioritises clinician well-being through open communication, professional recognition, and opportunities for career advancement can contribute to a more sustainable healthcare workforce (West, Dyrbye, & Shanafelt, 2018; Regehr et al., 2014).

Workplace interventions serve as critical mechanisms for preventing and managing this condition. Structured and predictable shift scheduling, minimising excessive overtime, and incorporating designated recovery periods are essential for mitigating the cumulative effects of occupational stress. Access to continuing medical education, resilience training programmes, and peer support initiatives can further train healthcare professionals with adaptive coping strategies necessary for managing the psychological demands of high-intensity environments (Dyrbye et al., 2014; Arora, Diwan, & Harris, 2013). Disciplines such as emergency medicine and critical care, where exposure to acute medical crises is frequent, benefit significantly from structured debriefing sessions and interdisciplinary teamwork training to reduce emotional burden (Arora, Diwan, & Harris, 2013).

Integrating mental health programmes into healthcare supports clinicians' resilience. These should include confidential counseling, CBT, mindfulness-based stress reduction, and stress management training (Epstein & Krasner, 2013; Regehr et al., 2014). Encouraging participation in

evidence-supported relaxation modalities, including progressive muscle relaxation, guided breathing exercises, and meditative practices, can effectively attenuate physiological stress responses. Moreover, institutional efforts to de-stigmatise mental health support and facilitate early intervention are imperative in fostering a culture where seeking psychological assistance is normalised and encouraged (Maslach, Jackson, & Leiter, 1997; Epstein & Krasner, 2013; Regehr et al., 2014).

Beyond organisational initiatives, empowering individual healthcare providers to cultivate personal resilience strategies is essential for long-term burnout prevention. Maintaining a balanced work-life dynamic, engaging in structured physical activity, and ensuring adequate restorative sleep are foundational components of a holistic approach to burnout mitigation (Shanafelt & Noseworthy, 2017). Nutritional interventions, including adherence to an anti-inflammatory diet rich in omega-3 fatty acids, antioxidants, and micronutrients such as magnesium, have been linked to improved stress modulation and emotional regulation. Regular physical exercise has been demonstrated to exert positive effects on neuroendocrine function, reducing cortisol levels, while enhancing dopaminergic and serotonergic neurotransmission, thereby counteracting the deleterious effects of chronic stress (Maslach & Leiter, 2016).

A crucial aspect of early burnout detection is its assessment during periodical medical evaluations conducted by occupational health physicians. The inclusion of a brief, standardised burnout screening tool in routine health assessments could enable early identification of individuals at risk. A validated questionnaire composed of a few targeted questions addressing levels of emotional exhaustion, depersonalisation, and job-related stress could facilitate rapid assessment (Maslach, Jackson, & Leiter, 1997; West et al., 2012). Occupational health physicians should be trained to recognise early warning signs and provide immediate guidance, including referrals to psychological support services when necessary. Implementing a structured approach to burnout screening during the periodical medical check-ups may allow for timely interventions and prevent long-term adverse effects on both clinician health and patient care outcomes (West et al., 2012).

This research bridges the psychological and physical dimensions of burnout, underscoring the importance of interventions that target emotional exhaustion, depersonalisation, and somatic symptoms. Systemic action is essential to improve both clinician well-being and patient care outcomes.

4.2. Limitations

This systematic review has several limitations that should be acknowledged. One key constraint is the language restriction, as only studies published in English were comprised. This may introduce a bias by excluding relevant research conducted in other languages, potentially overlooking important insights from diverse healthcare systems and cultural contexts.

Another limitation is the potential for publication bias, as this review did not include grey literature such as unpublished studies, conference proceedings, or institutional reports. Given that studies with statistically substantial findings are more likely to be published, the exclusion of grey literature may have led to an overrating of burnout prevalence and its associated risk factors.

Furthermore, the collection of studies included in this review presents a challenge in synthesising the results. Different studies employed varied burnout measurement tools, such as the Maslach Burnout Inventory (MBI) (Maslach & Jackson, 1981), Copenhagen Burnout Inventory (CBI) (Kristensen et al., 2005), and other self-reported instruments, leading to inconsistencies in reported prevalence rates. This variability complicates direct comparisons between studies and may affect the standardisation of the findings.

Despite these limitations, this review provides a comprehensive analysis of burnout among healthcare professionals, offering valuable insights into its frequency, contributing factors, and potential interventions. Future research should aim to address these gaps by incorporating multilingual studies, expanding the inclusion of grey literature, and promoting the use of homogeneous burnout assessment tools to enhance comparability across studies.

5. Conclusions

Burnout in healthcare is complex and requires coordinated action—systemic reform, workplace changes, and mental health strategies. Future research should include longitudinal studies to assess the long-term effects of interventions and refine strategies to support healthcare workers' mental and physical health. Also, the following studies should prioritise longitudinal analyses to assess burnout trends over time, ensuring a comprehensive understanding of its progressing impact. Additionally, evaluating the efficacy of various interventions across different healthcare settings will provide valuable insights into best practices for prevention and management. Furthermore, exploring AI and machine learning solutions could offer modern approaches to optimise workload distribution and mitigate stress, ultimately fostering a more sustainable and resilient healthcare workforce.

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References

- Arora, M., Diwan, A. D., & Harris, I. A. (2013). Burnout in orthopaedic surgeons: A review. *Journal of Bone and Joint Surgery*, 102(1), 15-23. <http://dx.doi.org/10.1111/ans.12292>
- Bartholomew, A. J., Houk, A. K., Pulcrano, M., Shara, N. M., Kwagyan, J., Jackson, P. G., & Sosin, M. (2018). Meta-analysis of surgeon burnout syndrome and specialty differences. *Journal of Surgical Education*, 75(5), 1256–1263. <https://doi.org/10.1016/j.jsurg.2018.02.003>
- Bianchi, R., Schonfeld, I. S., & Laurent, E. (2015). Burnout–depression overlap: A review. *Clinical Psychology Review*, 36, 28-41. <https://doi.org/10.1016/j.cpr.2015.01.004>
- Chitre, N. M., Moniri, N. H., & Murnane, K. S. (2019). Omega-3 fatty acids as druggable therapeutics for neurodegenerative disorders. *CNS & Neurological Disorders - Drug Targets*, 18(10), 735–749. <https://doi.org/10.2174/1871527318666191114093749>
- Dimsdale, J. E., Creed, F., Escobar, J., Sharpe, M., Wulsin, L., Barsky, A., Lee, S., Irwin, M. R., & Levenson, J. (2013). Somatic symptom disorder: An important change in DSM. *Journal of Psychosomatic Research*, 75(3), 223–228. <https://doi.org/10.1016/j.jpsychores.2013.06.033>
- Dyrbye, L. N., West, C. P., Satele, D., Boone, S., Tan, L., Sloan, J., & Shanafelt, T. D. (2014). Burnout among U.S. medical students, residents, and early career physicians relative to the general U.S. population. *Academic Medicine*, 89(3), 443-451. <https://doi.org/10.1097/acm.0000000000000134>
- Epstein, R. M., & Krasner, M. S. (2013). Physician resilience: What it means, why it matters, and how to promote it. *Academic Medicine*, 88(3), 301-303. <https://doi.org/10.1097/ACM.0b013e318280cff0>
- Garcia, C. L., Abreu, L. C., Ramos, J. L. S., Castro, C. F. D., Smiderle, F. R. N., Santos, J. A. D., & Bezerra, I. M. P. (2019). Influence of burnout on patient safety: Systematic review and meta-analysis. *Medicina (Kaunas)*, 55(9), 553. <https://doi.org/10.3390/medicina55090553>
- Ghahramani, S., Lankarani, K. B., Yousefi, M., Heydari, K., Shahabi, S., & Azmand, S. (2021). A systematic review and meta-analysis of burnout among healthcare workers during COVID-19. *Frontiers in Psychiatry*, 12, 758849. <https://doi.org/10.3389/fpsyt.2021.758849>
- Hiver, C., Villa, A., Bellagamba, G., & Lehucher-Michel, M.-P. (2022). Burnout prevalence among European physicians: A systematic review and meta-analysis. *International Archives of Occupational and Environmental Health*, 95, 259–273. <https://doi.org/10.1007/s00420-021-01782-z>

- HaGani, N., Yagil, D., & Cohen, M. (2022). Burnout among oncologists and oncology nurses: A systematic review and meta-analysis. *Health Psychology, 41*(1), 53–64. <https://doi.org/10.1037/hea0001155>
- Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry, 4*(1), 33–47. [https://doi.org/10.1016/0163-8343\(82\)90026-3](https://doi.org/10.1016/0163-8343(82)90026-3)
- Koutsimani, P., Montgomery, A., & Georganta, K. (2019). The relationship between burnout, depression, and anxiety: A systematic review and meta-analysis. *Frontiers in Psychology, 10*, 284. <https://doi.org/10.3389/fpsyg.2019.00284>
- Kristensen, T. S., Borritz, M., Villadsen, E., & Christensen, K. B. (2005). The Copenhagen burnout inventory: A new tool for the assessment of burnout. *Work & Stress, 19*(3), 192–207. <https://doi.org/10.1080/02678370500297720>
- Li, L. Z., Yang, P., Singer, S. J., Pfeffer, J., Mathur, M. B., & Shanafelt, T. (2024). Nurse burnout and patient safety, satisfaction, and quality of care: A systematic review and meta-analysis. *JAMA Network Open, 7*(11), e2443059. <https://doi.org/10.1001/jamanetworkopen.2024.43059>
- Macaron, M. M., Segun-Omosehin, O. A., Matar, R. H., Beran, A., Nakanishi, H., Than, C. A., & Abulseoud, O. A. (2023). A systematic review and meta-analysis on burnout in physicians during the COVID-19 pandemic: A hidden healthcare crisis. *Frontiers in Psychiatry, 13*, 1071397. <https://doi.org/10.3389/fpsyg.2022.1071397>
- Madsen, I. E., Lange, T., Borritz, M., & Rugulies, R. (2015). Burnout as a risk factor for antidepressant treatment: A repeated measures time-to-event analysis of 2,936 Danish human service workers. *Journal of Psychiatric Research, 65*, 47–52. <https://doi.org/10.1016/j.jpsychires.2015.04.004>
- Maslach, C., & Jackson, S. E. (1981). The measurement of experienced burnout. *Journal of Occupational Behaviour, 2*(2), 99–113. <https://doi.org/10.1002/job.4030020205>
- Maslach, C., Jackson, S. E., & Leiter, M. P. (1997). Maslach Burnout Inventory Manual. *Palo Alto, CA: Consulting Psychologists Press.*
- Maslach, C., & Leiter, M. P. (2016). Understanding the burnout experience: Recent research and its implications for psychiatry. *World Psychiatry, 15*(2), 103–111. <https://doi.org/10.1002/wps.20311>
- Melamed, S., Shirom, A., Toker, S., Berliner, S., & Shapira, I. (2006). Burnout and risk of cardiovascular disease: Evidence, possible causal paths, and promising research directions. *Psychological Bulletin, 132*(3), 327–353. <https://doi.org/10.1037/0033-2909.132.3.327>
- McKinley, N., McCain, R. S., Convie, L., Clarke, M., Dempster, M., Campbell, W. J., & Kirk, S. J. (2020). Resilience, burnout and coping mechanisms in UK doctors: A cross-sectional study. *BMJ Open, 10*(1), e031765. <https://doi.org/10.1136/bmjopen-2019-031765>
- Moscu, C. A., Marina, V., Anghele, M., Anghele, A. D., & Dragomir, L. (2022a). Did personality type influence burnout syndrome manifestations during the COVID-19 pandemic? *International Journal of General Medicine*. <https://doi.org/10.2147/IJGM.S353405>
- Moscu, C.-A., Marina, V., Dragomir, L., Anghele, A.-D., & Anghele, M. (2022b). The impact of burnout syndrome on job satisfaction among emergency department nurses of emergency clinical county hospital “Sfântul Apostol Andrei” of Galati, Romania. *Medicina*. <https://doi.org/10.3390/medicina58111516>
- Murali, K., Makker, V., Lynch, J., & Banerjee, S. (2018). From burnout to resilience: An update for oncologists. *American Society of Clinical Oncology Educational Book, 38*, 1–9. https://doi.org/10.1200/EDBK_201023
- Nagarajan, R., Ramachandran, P., Dilipkumar, R., & Kaur, P. (2024). Global estimate of burnout among the public health workforce: A systematic review and meta-analysis. *Human Resources for Health, 22*, 30. <https://doi.org/10.1186/s12960-024-00917-w>

- Pai Cole, S. (2019). Burnout prevention and resilience training for critical care trainees. *International Anesthesiology Clinics*, 57(2), 118-131. <https://doi.org/10.1097/AIA.0000000000000230>
- Papazian, L., Hraiech, S., Loundou, A., Herridge, M. S., & Boyer, L. (2023). High-level burnout in physicians and nurses working in adult ICUs: A systematic review and meta-analysis. *Intensive Care Medicine*, 49, 387–400. <https://doi.org/10.1007/s00134-023-07025-8>
- Patel, R. S., Sekhri, S., Bhimanadham, N. N., Imran, S., & Hossain, S. (2019). A review on strategies to manage physician burnout. *Cureus*, 12(6), e8965. <https://doi.org/10.7759/cureus.4805>
- Quesada-Puga, C., Izquierdo-Espin, F. J., Membrive-Jiménez, M. J., Aguayo-Estremera, R., Cañadas-De La Fuente, G. A., Romero-Béjar, J. L., & Gómez-Urquiza, J. L. (2024). Job satisfaction and burnout syndrome among intensive-care unit nurses: A systematic review and meta-analysis. *Intensive and Critical Care Nursing*, 82, 103660. <https://doi.org/10.1016/j.iccn.2024.103660>
- Regehr, C., Glancy, D., Pitts, A., & LeBlanc, V. R. (2014). Interventions to reduce the consequences of stress in physicians: A review and meta-analysis. *Journal of Nervous and Mental Disease*, 202(5), 353–359. <https://doi.org/10.1097/NMD.0000000000000130>
- Rizza, S., Coppeta, L., Grelli, S., Ferrazza, G., Chiocchi, M., Vanni, G., Bonomo, O. C., Bellia, A., Andreoni, M., Magrini, A., & Federici, M. (2021). High body mass index and night shift work are associated with COVID-19 in health care workers. *Journal of Endocrinological Investigation*, 44(5), 1097–1101. <https://doi.org/10.1007/s40618-020-01397-0>
- Rotenstein, L. S., Torre, M., Ramos, M. A., Rosales, R. C., Guille, C., Sen, S., & Mata, D. A. (2018). Prevalence of burnout among physicians: A systematic review. *JAMA*, 320(11), 1131–1150. <https://doi.org/10.1001/jama.2018.12777>
- Salvagioni, D. A. J., Melanda, F. N., Mesas, A. E., González, A. D., Gabani, F. L., & Andrade, S. M. (2017). Physical, psychological and occupational consequences of job burnout: A systematic review of prospective studies. *PLoS One*, 12(10), e0185781. <https://doi.org/10.1371/journal.pone.0185781>
- Schonfeld, I. S., & Bianchi, R. (2016). Burnout and depression: Two entities or one? *Journal of Clinical Psychology*, 72(1), 22-37. <https://doi.org/10.1002/jclp.22229>
- Shanafelt, T. D., & Noseworthy, J. H. (2017). Executive leadership and physician well-being: Nine organizational strategies to promote engagement and reduce burnout. *Mayo Clinic Proceedings*, 92(1), 129-146. <https://doi.org/10.1016/j.mayocp.2016.10.004>
- Shanafelt, T. D., West, C. P., Sinsky, C., Trockel, M., Tutty, M., Satele, D., & Dyrbye, L. N. (2019). Changes in burnout and satisfaction with work-life integration in physicians and the general US working population between 2011 and 2017. *Mayo Clinic Proceedings*, 94(9), 1681-1694. <https://doi.org/10.1016/j.mayocp.2018.10.023>
- Shanafelt, T. D., West, C. P., Dyrbye, L. N., Trockel, M., Tutty, M., Wang, H., Carlasare, L. E., & Sinsky, C. (2022). Changes in burnout and satisfaction with work-life integration in physicians during the first 2 years of the COVID-19 pandemic. *Mayo Clinic Proceedings*, 97(12), 2248–2258. <https://doi.org/10.1016/j.mayocp.2022.09.002>
- Van Dam, A. (2016). Subgroup analysis in burnout: Relations between fatigue, anxiety, and depression. *Frontiers in Psychology*, 7, 90. <https://doi.org/10.3389/fpsyg.2016.00090>
- Weigl, M., & Schneider, A. (2017). Associations of work characteristics, employee strain and self-perceived quality of care in emergency departments: A cross-sectional study. *International Emergency Nursing*, 30, 20–24. <https://doi.org/10.1016/j.ienj.2016.07.002>
- West, C. P., Dyrbye, L. N., Satele, D. V., Sloan, J. A., & Shanafelt, T. D. (2012). Concurrent validity of single-item measures of emotional exhaustion and depersonalization in burnout assessment. *Journal of General Internal Medicine*, 33(5), 539-541. <https://doi.org/10.1007/s11606-012-2015-7>

West, C. P., Dyrbye, L. N., & Shanafelt, T. D. (2018). Physician burnout: Contributors, consequences, and solutions. *Journal of Internal Medicine*, 280(1), 34-47. <https://doi.org/10.1111/joim.12752>