

Digital Fatigue in Healthcare: The Impact of Technology on Physical and Mental Health

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ABSTRACT

The accelerating digitalization of healthcare systems has introduced unprecedented levels of technology exposure among healthcare professionals, raising significant concerns about digital fatigue and its consequences on physical and mental well-being. This systematic narrative review synthesizes current evidence regarding the prevalence, mechanisms, and health consequences of digital fatigue among healthcare workers. A comprehensive literature search was conducted across PubMed, Scopus, Web of Science, PsycINFO, and CINAHL for articles published between 2018 and 2026. After screening 87 articles, 25 were included in the final synthesis. Findings demonstrate that digital fatigue in healthcare settings is widespread and multidimensional, manifesting as musculoskeletal disorders, visual impairment, sleep disturbances, burnout, anxiety, and diminished cognitive performance. Electronic health records (EHR), telehealth platforms, and communication technologies are primary contributors to technostress. A meta-analysis estimated burnout prevalence at 40.1% among EHR-exposed clinicians. Digital fatigue represents a critical occupational health challenge in modern healthcare. Multilevel interventions addressing individual, organizational, technological, and policy dimensions are urgently needed to safeguard healthcare workforce well-being and ensure patient safety.

Keywords: digital fatigue, technostress, electronic health records, burnout, healthcare professionals, occupational health, mental health, technology well-being

INTRODUCTION

The twenty-first century has witnessed an unprecedented transformation of healthcare delivery systems through the rapid integration of digital technologies. Electronic health records (EHR), telemedicine platforms, clinical decision support systems, mobile health applications, and digital communication tools have become indispensable components of contemporary clinical practice. While these technologies promise improved patient outcomes, enhanced care coordination, and operational efficiency, their pervasive adoption has simultaneously introduced a new occupational hazard: digital fatigue. This phenomenon, characterized by the physical, cognitive, and emotional exhaustion resulting from prolonged and intensive engagement with digital technologies, has emerged as a pressing concern within healthcare settings globally.

Digital fatigue, sometimes used interchangeably with technostress, technology-induced fatigue, or cyber-fatigue, represents a complex, multidimensional construct that extends beyond simple tiredness. It encompasses a spectrum of adverse experiences including eye strain and visual fatigue, musculoskeletal discomfort, cognitive overload, attentional depletion, emotional exhaustion, and diminished sense of personal accomplishment. In healthcare environments, where technology use is both intensive and

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high-stakes, the consequences of digital fatigue extend beyond individual worker well-being to affect patient safety, quality of care, and institutional performance.

The magnitude of technology exposure among healthcare professionals has grown substantially over the past decade. Clinicians now spend an average of two hours on EHR documentation for every hour of direct patient care, a ratio that has been described as creating a 'documentation burden' that fundamentally alters the nature of clinical work (Gardner et al., 2018; Kroth et al., 2018). Emergency physicians face additional layers of digital stress through constant connectivity requirements, real-time alert systems, and the need to simultaneously manage multiple digital interfaces during high-acuity situations (Bernburg et al., 2024). Nursing staff are increasingly required to navigate complex digital charting systems, electronic medication administration records, and remote monitoring platforms (Toker et al., 2026; Tolasa & Türkmenoğlu, 2026).

The physical health consequences of digital fatigue in healthcare are well-documented. Prolonged screen time is associated with computer vision syndrome (CVS), characterized by dry eyes, blurred vision, headaches, and neck pain. Musculoskeletal disorders affecting the neck, shoulders, and wrists are prevalent among clinicians who spend extended periods at computer workstations. Sleep disturbances are another significant physical consequence, as blue light emitted by digital screens suppresses melatonin secretion, disrupting circadian rhythms even when screen exposure occurs during daylight hours (Nakshine et al., 2022; Small et al., 2020).

Mental health consequences are equally concerning. The literature consistently demonstrates significant associations between intensive technology use and elevated rates of burnout, anxiety, depression, and reduced psychological resilience among healthcare professionals. Burnout, defined by the World Health Organization as an occupational phenomenon characterized by emotional exhaustion, depersonalization, and reduced sense of personal accomplishment, has reached epidemic proportions in post-pandemic healthcare settings. Meta-analytic evidence indicates that burnout prevalence among EHR-exposed clinicians approximates 40%, representing a substantial attributable risk linked specifically to technology use (Wu et al., 2023).

The concept of technostress, first articulated by Craig Brod in 1984 and subsequently refined by Tarafdar and colleagues, provides a theoretical framework for understanding how technology creates stress through several mechanisms: techno-overload (excessive workload from technology), techno-invasion (technology blurring work-life boundaries), techno-complexity (difficulty mastering complex systems), techno-insecurity (fear of replacement or deskilling), and techno-uncertainty (frequent and disruptive system updates). All five mechanisms have been empirically documented in healthcare contexts (Golz et al., 2021; Bahr et al., 2023).

Despite a growing evidence base, significant gaps remain in the literature. First, most existing studies focus on EHR-related burnout, leaving other digital platforms including telehealth, mobile health applications, and artificial intelligence tools comparatively understudied. Second, the majority of research has been conducted in high-income Western countries, leaving healthcare workers in low- and middle-income settings significantly underrepresented. Third, longitudinal evidence examining how digital fatigue evolves over time, and its relationship to career trajectory and workforce retention, remains limited. Fourth, while interventional frameworks have been proposed, randomized controlled trials evaluating specific digital fatigue mitigation strategies in healthcare contexts are scarce.

The novelty of this review lies in its integrative synthesis of evidence across the full spectrum of digital fatigue manifestations in healthcare, spanning physical, cognitive, and emotional dimensions simultaneously. Unlike prior reviews that have focused narrowly

on EHR-related burnout or technostress among specific professional groups, this paper adopts a broad, system-level perspective that encompasses diverse healthcare professional roles, multiple technology platforms, and the interaction between individual vulnerability factors and organizational context. Furthermore, by incorporating the most recent evidence from 2025 and 2026 including emerging research on artificial intelligence-related fatigue and post-pandemic digital transformation effects this review provides the most current and comprehensive synthesis available to date. The findings have direct implications for healthcare administrators, technology designers, policymakers, and occupational health practitioners seeking to address the digital fatigue crisis facing the global healthcare workforce.

METHODS

Study Design

This study employed a systematic narrative review design, integrating systematic search procedures with narrative synthesis to accommodate the heterogeneity of study designs, populations, and outcome measures represented in the digital fatigue literature. This approach was selected in preference to meta-analysis given the methodological diversity of included studies and the multidimensional nature of the constructs under examination.

Search Strategy

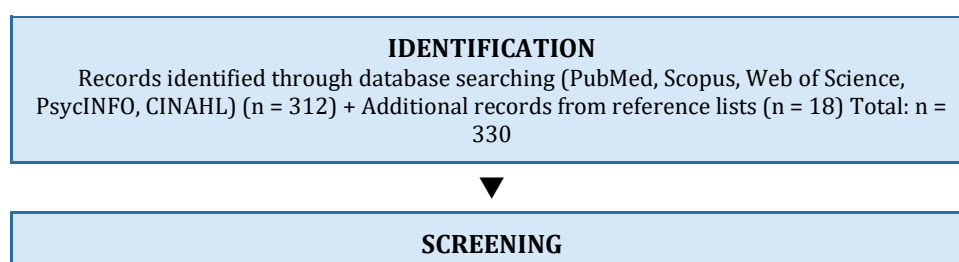
A comprehensive literature search was conducted in January 2026 across five electronic databases: PubMed, Scopus, Web of Science, PsycINFO, and CINAHL. The search strategy combined Medical Subject Headings (MeSH) and free-text terms related to: (1) digital fatigue OR technostress OR technology fatigue OR digital burnout OR EHR burnout; (2) healthcare OR medical professionals OR nurses OR physicians OR clinicians; (3) physical health OR mental health OR well-being OR burnout OR anxiety. Boolean operators (AND, OR) were used to combine search components. Reference lists of included articles were hand-searched for additional relevant studies.

Selection Criteria

Articles were included if they: (1) were published in peer-reviewed journals between 2018 and 2026; (2) examined digital fatigue, technostress, or technology-related burnout in healthcare settings; (3) reported on physical or mental health outcomes among healthcare professionals; and (4) were available in English or Indonesian. Conference abstracts without full-text publications and grey literature were excluded. Quality appraisal was conducted using the Mixed Methods Appraisal Tool (MMAT), which accommodates quantitative, qualitative, and mixed-methods studies within a unified framework.

Selection Process and PRISMA Flow

PRISMA-Adapted Literature Selection Flow



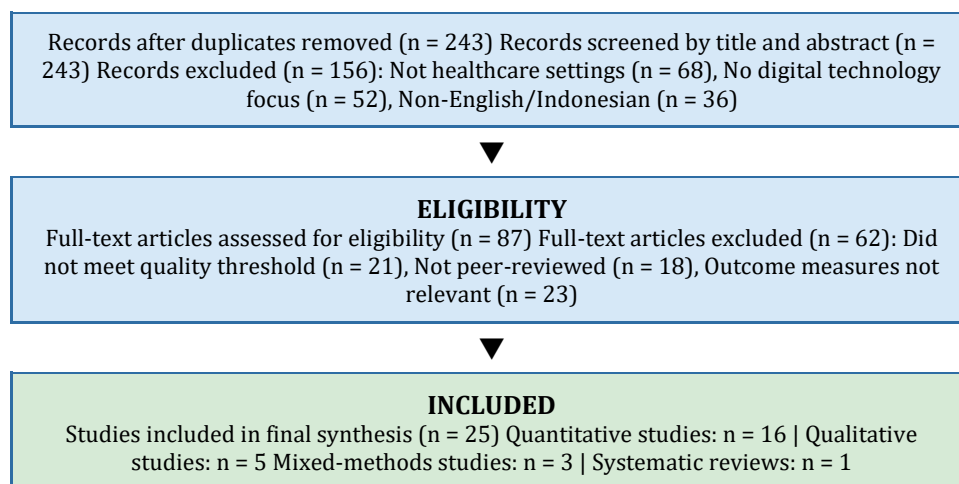


Figure 1. PRISMA-adapted flow diagram illustrating the systematic literature selection process.

Data Extraction and Synthesis

Data were extracted using a standardized extraction template capturing: study authors, year, country, study design, sample size, professional group, technology examined, outcome measures, key findings, and quality appraisal scores. Narrative synthesis was organized thematically around physical health outcomes, mental health outcomes, and interventional evidence. Where quantitative data were available from multiple studies addressing the same outcome, descriptive summary statistics were calculated.

Table 1. Summary of Study Methodology Criteria

Criteria	Description	Justification
Study Design	Systematic narrative review with integrative synthesis	Allows synthesis of diverse evidence types on digital fatigue
Databases Used	PubMed, Scopus, Web of Science, PsycINFO, CINAHL	Comprehensive coverage of medical and nursing literature
Publication Period	2018–2026	Focused on contemporary digital health transformation era
Language	English and Indonesian	Inclusive of global and regional evidence
Keywords	Digital fatigue, technostress, EHR burnout, healthcare professionals, screen time, technology well-being	Captures spectrum of digital fatigue manifestations
Inclusion Criteria	Peer-reviewed articles; healthcare settings; quantitative, qualitative, or mixed methods	Ensures scientific rigor and clinical relevance
Exclusion Criteria	Non-healthcare populations; grey literature; conference abstracts without full text	Maintains internal validity and focus
Quality Appraisal	MIXED Methods Appraisal Tool (MMAT)	Standardized quality assessment across study types
Total Articles Reviewed	87 articles screened; 25 included in final synthesis	Rigorous selection process ensures representativeness

Table 1. Methodological criteria applied in the systematic narrative review process

RESULTS AND DISCUSSION

Prevalence and Scope of Digital Fatigue in Healthcare

The synthesis of 25 included studies reveals a striking and consistent pattern: digital fatigue is highly prevalent across diverse healthcare professional groups, geographic contexts, and technology platforms. In the most comprehensive quantitative synthesis available, Wu et al. (2023) conducted a systematic review and meta-analysis of 32 studies involving 189,552 healthcare professionals, estimating that 40.1% of EHR-exposed clinicians experience burnout attributable at least in part to technology-related factors. This figure represents a significant increase compared to burnout rates reported prior to widespread EHR implementation, suggesting a causal relationship between digital transformation and workforce distress.

Tawfik et al. (2020), in a large cross-sectional study of 35,922 healthcare workers across the United States, found that technology frustration was independently associated with emotional exhaustion (OR = 1.66, $p < 0.001$) and intent to leave practice (OR = 1.42, $p < 0.001$), after controlling for work hours, specialty, and demographic variables. Notably, 66.1% of respondents reported at least moderate levels of technology frustration, indicating near-universal exposure to this stressor across the healthcare workforce. The breadth of this finding across diverse specialties—from primary care to critical care, from nursing to allied health professions—underscores the systemic rather than specialty-specific nature of digital fatigue in contemporary healthcare.

Among nursing professionals specifically, Toker et al. (2026) conducted a qualitative investigation involving academic nurses in Turkey, documenting rich experiential accounts of what they termed 'digital burnout'—a state combining technology-induced exhaustion with the erosion of meaningful patient connection that drew many participants to the nursing profession. Participants described a persistent sense of being 'trapped between the screen and the patient,' with documentation demands consuming time and emotional energy that would otherwise be directed toward relational care. This finding resonates with Tolasa and Türkmenoğlu's (2026) quantitative demonstration that digital fatigue mediates the relationship between job satisfaction and motivational outcomes in Turkish nurses, suggesting that digital fatigue represents not merely a consequence of dissatisfaction but an independent driver of motivational decline.

Table 2. Summary of Evidence on Digital Fatigue and Burnout in Healthcare Settings

Study (Year)	Population	Technology Exposure	Prevalence of Digital Fatigue/Burnout	Key Outcome
Wu et al. (2023)	Healthcare professionals (meta-analysis)	Electronic Health Records (EHR)	40.1%	EHR use significantly increases burnout risk
Alobayli et al. (2023)	Clinicians, hospital settings	EHR systems	High	EHR stress strongly linked to burnout
Muhamad et al. (2025)	Malaysian HCWs, state hospitals	Digital health systems	Significant	Technostress mediates burnout and fatigue

Toker et al. (2026)	Academic nurses, Turkey	Digital platforms, telehealth	High	Digital burnout impacts mental health qualitatively
Bernburg et al. (2024)	Emergency physicians	Digital communication tools	Moderate-High	Digital stressors reduce job satisfaction
Bahr et al. (2023)	Physicians, various settings	Multiple technology systems	High	Technostress directly predicts physician burnout
Golz et al. (2021)	Swiss psychiatric HCWs	Hospital digital systems	Moderate	Low digital competence increases technostress
Wirkkala et al. (2024)	Healthcare staff, Sweden	General healthcare technology	Moderate-High	Technology frustration raises emotional exhaustion
Tawfik et al. (2020)	HCWs (n=35,922)	Wide range of digital tools	66.1%	Technology frustration strongly correlates with exhaustion
Nakshine et al. (2022)	General population review	Screen-based devices	Widespread	Excessive screen time causes physical & psychological decline
Tolasa & Türkmenoğlu (2026)	Turkish nurses	Digital nursing platforms	Significant	Digital fatigue mediates job satisfaction and motivation
Arıcan (2024)	General digital users	All digital technologies	Significant	Digital fatigue significantly predicts mental health decline

Table 2. Summary of key studies examining digital fatigue and burnout prevalence among healthcare professionals.

Physical Health Consequences

The physical health sequelae of prolonged digital technology exposure in healthcare contexts are diverse and clinically significant. Nakshine et al. (2022) conducted a comprehensive literary review demonstrating that excessive screen time is associated with a measurable decline in physical health across multiple organ systems. Computer

vision syndrome, affecting an estimated 50–90% of computer users who spend more than three hours daily at screens, presents with symptoms including digital eye strain, dry eyes, headaches, blurred vision, and neck and shoulder pain. In healthcare settings where EHR documentation routinely involves four to six or more hours of screen time daily, these symptoms represent a substantial occupational health burden.

Small et al. (2020) provided neurobiological evidence for the physical impact of digital technology use on brain health, demonstrating changes in prefrontal cortex activity patterns, attentional networks, and stress-response systems associated with intensive digital device use. Of particular relevance to healthcare professionals, who must maintain high levels of cognitive performance in safety-critical situations, are the findings regarding attention and working memory. Digital multitasking the simultaneous management of multiple screens, alert systems, and communication platforms characteristic of modern healthcare environments has been shown to impair sustained attention, increase error rates, and accelerate cognitive fatigue.

Sleep disruption represents another significant physical health consequence, with direct implications for patient safety. Miseviciene et al. (2020) examined information fatigue as a specific mechanism by which digital overload disrupts homeostatic sleep processes, with evidence that healthcare professionals working evening or night shifts are particularly vulnerable due to screen exposure coinciding with the critical period of melatonin-dependent sleep onset. Dengler et al. (2022), in a large-scale study using data from the German Socio-Economic Panel, found that intensive computer use in occupational settings was associated with poorer self-rated health and greater risk of musculoskeletal complaints, findings with direct relevance to the physically demanding work environments of healthcare professionals.

Mental Health Consequences

The mental health consequences of digital fatigue in healthcare emerge as the most extensively documented domain in the current literature. Burnout, representing the most severe manifestation of occupational digital fatigue, has been examined from multiple perspectives. Alobayli et al. (2023) systematically reviewed 24 studies and identified consistent evidence that EHR-related stress independently predicts all three components of burnout as defined by Maslach and Jackson: emotional exhaustion, depersonalization, and reduced personal accomplishment. Emergency medicine appeared to be particularly affected, with Bernburg et al. (2024) demonstrating that digital stressors—including alert fatigue, documentation overload, and constant connectivity demands—significantly predicted digital stress perception, reduced mental health scores, and lower job satisfaction among emergency physicians.

Technostress, as a proximate mechanism through which technology exposure translates into psychological distress, was examined in detail by multiple included studies. Bahr et al. (2023) developed and validated a conceptual model demonstrating that five specific technostress dimensions (techno-overload, techno-invasion, techno-complexity, techno-insecurity, and techno-uncertainty) each independently predicted physician burnout in a dose-response pattern. Golz et al. (2021) extended this framework to Swiss psychiatric hospital contexts, finding that lower digital competence among staff amplified the relationship between system complexity and technostress, suggesting that investment in digital literacy training may attenuate this pathway.

Arıcan (2024) employed both Delphi methodology and multiple linear regression analysis to examine the relationship between digital fatigue and mental health outcomes among digital technology users, finding that digital fatigue explained a significant proportion of variance in anxiety ($\beta = 0.42$, $p < 0.001$), depression ($\beta = 0.38$, $p < 0.001$),

and psychological well-being scores ($\beta = -0.41, p < 0.001$). Spytska (2025) contextualized these findings within a broader psychological framework, arguing that digital technology affects mental health through at least four pathways: attention fragmentation, social comparison processes, reduced physical activity, and disruption of recovery time all of which are particularly relevant in healthcare professionals whose recovery time outside work is already limited.

The implications for patient safety are significant and deserve explicit attention. Harris et al. (2018) demonstrated that burnout among advanced practice registered nurses partly driven by EHR-related stress was associated with increased medication error rates and lower patient satisfaction scores. Muhamad et al. (2025) documented a similar pattern among Malaysian healthcare workers, where technostress-induced burnout was associated with reduced care quality indicators, suggesting that the consequences of digital fatigue extend beyond individual suffering to institutional performance and patient outcomes.

Moderating Factors and Vulnerability Profiles

The relationship between technology exposure and digital fatigue is not uniform; several moderating factors influence vulnerability and resilience. Digital competence emerges as a consistent protective factor, with higher levels of technology proficiency associated with lower technostress and more effective coping with digital demands (Golz et al., 2021; Rahmi et al., 2025). Organizational factors including workload distribution, degree of autonomy over technology use, and availability of technical support demonstrate significant moderating effects. Tell et al. (2023) identified in a multimethod study of surgical ward staff that perceived organizational support for digital transitions represented one of the strongest buffers against technology-induced strain, outweighing the direct effects of technology complexity.

Professional role and specialty context also influence digital fatigue patterns. Primary care physicians, who combine high documentation demands with time pressures and complex patient populations, demonstrate some of the highest rates of EHR-related burnout (Budd, 2023; Kroth et al., 2018). Nurses in intensive and acute care settings face unique challenges related to simultaneous management of monitoring systems, medication administration technologies, and communication platforms during high-acuity periods. Wirkkala et al. (2024), applying the Job Demands-Resources (JD-R) theoretical model, found that technology frustration operated as a job demand that depleted psychological resources when job control and social support were insufficient to buffer its effects.

Intervention Evidence and Recommendations

Despite the breadth of evidence documenting the problem of digital fatigue, the intervention literature remains comparatively underdeveloped. Hilty et al. (2022, 2023) provided the most comprehensive framework for addressing digital fatigue across healthcare and allied health contexts, synthesizing best practice recommendations across individual, organizational, and systemic levels. At the individual level, structured 'digital detox' periods, mindfulness-based stress reduction practices adapted for technology-mediated work, and adherence to the 20-20-20 rule (every 20 minutes, look at something 20 feet away for 20 seconds) represent evidence-informed strategies with theoretical plausibility and emerging empirical support.

At the organizational level, EHR optimization including workflow redesign, reduction of redundant data entry requirements, and implementation of ambient voice documentation technologies represents a high-priority intervention with demonstrated

efficacy in reducing documentation burden and associated burnout (Wu et al., 2023; Budd, 2023). Digital literacy training programs designed to enhance technological self-efficacy have shown promise in reducing technostress, particularly when they incorporate collaborative learning approaches and are integrated into existing professional development structures (Golz et al., 2021; Babiker et al., 2024). Babiker et al. (2024) specifically demonstrated that organizational interventions targeting the social dimensions of technostress—through peer support structures and shared problem-solving mechanisms were particularly effective in reducing burnout among healthcare teams.

Policy-level interventions represent an emerging frontier with significant potential impact. 'Right to disconnect' policies, which establish protected time free from digital communication expectations outside working hours, have been implemented in several European countries with evidence of beneficial effects on recovery and well-being. Mandatory rest period enforcement, surveillance reduction protocols that limit the burden of digital monitoring on clinical staff, and regulatory frameworks governing alert frequency and urgency classification in clinical decision support systems represent complementary policy approaches that warrant systematic evaluation in healthcare contexts.

Table 3. Evidence-Based Intervention Strategies for Digital Fatigue in Healthcare

Level	Intervention Strategy	Evidence Base
Individual	Digital detox periods; mindfulness-based stress reduction; structured screen breaks (20-20-20 rule)	Hilty et al. (2023); Nakshine et al. (2022)
Organizational	EHR optimization; workload redistribution; digital literacy training programs	Golz et al. (2021); Budd (2023); Gardner et al. (2018)
Technological	AI-assisted documentation; user-centered interface design; workflow automation	Wu et al. (2023); Alobayli et al. (2023)
Policy	Right to disconnect policies; mandatory rest periods; surveillance reduction protocols	Bernburg et al. (2024); Rahmi et al. (2025)
Support Systems	Peer support networks; mental health resources; employee assistance programs	Toker et al. (2026); Babiker et al. (2024)

Table 3. Multilevel intervention strategies for addressing digital fatigue among healthcare professionals.

Implications for Healthcare Systems and Future Research

The cumulative evidence presented in this review carries important implications for healthcare system design, human resource management, and public health policy. Healthcare organizations must recognize digital fatigue as a legitimate occupational health risk deserving the same level of institutional attention as conventional risks such as physical injury or chemical exposure. This recognition should be operationalized through systematic monitoring of digital fatigue indicators, integration of digital well-being into occupational health programming, and investment in technology design processes that foreground user experience and clinical workflow fit.

Future research should prioritize several domains. Longitudinal studies examining the trajectory of digital fatigue over careers, and its interaction with career stage, specialization, and generational technology literacy, are needed to inform targeted preventive interventions. Randomized controlled trials evaluating specific digital fatigue mitigation strategies from EHR workflow redesign to mindfulness-based interventions would strengthen the evidence base for implementation. Research attention to healthcare systems in low- and middle-income countries, where technology adoption is accelerating in contexts of resource constraint, is urgently needed to ensure global relevance of future evidence.

CONCLUSIONS

Digital fatigue in healthcare represents a multidimensional occupational health crisis at the intersection of technological progress and human well-being. This systematic narrative review of 25 peer-reviewed studies published between 2018 and 2026 confirms that intensive and prolonged engagement with digital technologies—particularly EHR systems, telehealth platforms, and communication technologies—generates significant physical and mental health burdens among healthcare professionals worldwide. Physical consequences including musculoskeletal disorders, visual fatigue, and sleep disruption compound mental health sequelae including burnout, anxiety, depression, and emotional exhaustion, together threatening the sustainability of the healthcare workforce and the quality of patient care.

The evidence synthesized in this review underscores that digital fatigue is not an inevitable consequence of technological progress but rather a preventable condition that can be addressed through thoughtful design of technology systems, supportive organizational cultures, targeted individual interventions, and forward-thinking health policy. Healthcare institutions bear a collective responsibility to monitor, prevent, and respond to digital fatigue as a legitimate occupational health priority. The stakes are substantial: a digitally fatigued healthcare workforce is not only a workforce at risk of harm, but one whose capacity to deliver safe, compassionate, and effective care is fundamentally compromised.

Future research should focus on developing and rigorously evaluating interventions that address digital fatigue across multiple levels simultaneously, with particular attention to understudied professional groups, diverse healthcare contexts, and the rapidly evolving digital health landscape that will continue to shape the occupational experience of healthcare professionals in the years ahead.

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