Measures to Prevent and Reduce Healthcare Worker Burnout During the COVID-19 Pandemic: A Scoping Review

Patcharin Chaisurin, DClinP, RN[1] (iD) **and Natthawut Yodchai[2]**

Abstract

Introduction: In the COVID-19 era, burnout is a major occupational hazard among healthcare workers. This scoping review intended to investigate the pertinent literature concerning COVID-19 burnout among healthcare workers (HCWs) and the measures to prevent and reduce HCW burnout during the COVID-19 pandemic.

Methods: The databases CINAHL, PubMed, ScienceDirect, and Scopus were systematically searched and screened for relevant papers. Additionally, manual searching was employed to supplement the electronic database results. The researchers examined 21 publications to answer the research question, "What have been the measures to prevent and reduce healthcare worker burnout during the COVID-19 pandemic?" The PRISMA 2020 checklist was used to guide the reporting of this scoping review.

Results: It was found that to diminish healthcare workers' burnout, it is vital to use multilevel, evidence-based approaches. These interventions may include increasing awareness of the risks and preparing for potential occupational stress and burnout; promoting mindfulness and self-care practices to enhance mental well-being; enhancing organizational policies and procedures to address burnout among healthcare workers; and ensuring the availability of optimal mental health services, including the use of digital technologies to address workplace stress and facilitate mental health interventions.

Conclusion: The interventions to prevent and reduce HCW burnout during the COVID-19 pandemic include supporting HCWs individually, improving work environments, and addressing health system factors contributing to burnout complemented by interventions aimed at enhancing work culture.

Keywords

COVID-19 pandemic, healthcare workers, burnout, psychological consequences, prevention measures

Received 29 November 2023; Revised 20 June 2024; accepted 5 July 2024

Introduction

The COVID-19 pandemic is a persistent global health crisis stemming from the coronavirus disease 2019. On January 30, 2020, the World Health Organization (WHO) officially recognized it as a Public Health Emergency of International Concern and just over a month later, classified it as a pandemic (World Health Organization, 2020). Resulting from the extremely contagious SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2), COVID-19 spreads from person to person and has resulted in millions of deaths worldwide, significantly straining healthcare systems (Department of Disease Control, 2021).

Healthcare workers (HCWs) are an extremely valuable resource for combating the COVID-19 pandemic, and in response to COVID-19 outbreaks, were prepared to provide appropriate care for symptomatic COVID-19 patients while minimizing the impact on non-COVID-19 patients (World Health Organization, 2021b). Subsequently, they have been psychologically affected by difficult working conditions, life-threatening situations, shift overload, and disruptions to their work, daily routines, and family life (Denning et al., 2021; Gramaglia et al., 2021). These challenges represent some of the situations encountered by healthcare workers throughout the COVID-19 pandemic, consequently leading to psychological burnout among this population (Gramaglia et al., 2021).

[1]Nursing Division, Faculty of Nursing, Chiang Mai University, Chiang Mai, Thailand
[2]Interdisciplinary Studies College, Payup University, Chiang Mai, Thailand

Corresponding Author:
Patcharin Chaisurin, Faculty of Nursing, Chiang Mai University, Chiang Mai 50200, Thailand.
Email: patcharin.c@cmu.ac.th

Burnout is an occupational risk characterized by emotional exhaustion (EE), depersonalization (DP), and diminished professional achievement (PA) (Rodrigues et al., 2018). Maunder et al. (2021) found that frontline healthcare workers face a heightened risk of burnout compared to individuals in other professions. Moreover, many studies have explored healthcare worker burnout occurring due to the COVID-19 pandemic. A study conducted in Singapore during the pandemic revealed that stress and burnout among healthcare workers increased monthly, by approximately 1.0% and 1.2%, respectively (Teo et al., 2021). In India, nurses working in the emergency department exhibited a moderate to high degree of burnout (Jose et al., 2020). In South Korea, healthcare workers reported higher levels of emotional exhaustion (Koontalay et al., 2021) while in Thailand, healthcare worker burnout was also high (Koontalay et al., 2021; Tunthanathip et al., 2021).

Burnout among HCWs is significant due to its associations with negative consequences for patient care, the healthcare workforce, and healthcare system costs, as well as for HCWs' own care and safety (Leo et al., 2021). Hence, there is an urgent need to address COVID-19 pandemic burnout among this population and develop ways to deal with it based on updated information. Although previous reviews have been conducted regarding this topic, the authors identified the necessity of an updated review. Therefore, this study aimed to uncover the specific measures employed to prevent and reduce HCWs burnout during the pandemic by mapping the related literature and identifying a gap in the research.

Study Aims

The aim of this scoping review included investigating the pertinent evidence regarding COVID-19 burnout among HCWs and the measures to prevent and reduce HCW burnout during the pandemic.

Materials and Methods

Study Design

This scoping review follows Arksey and O'Malley's proposed methodology (Arksey & O'Malley, 2005) which provides a five-step process that includes (1) formulation of a research question, (2) identification of relevant studies, (3) selection of studies, (4) charting of data, and (5) compiling, summarizing, and reporting on the findings. The PRISMA-ScR checklist was used to guide the reporting of each section of this report (Tricco et al., 2018).

Step 1: Identification of the Research Question

The research question, "What have been the measures to prevent and reduce healthcare worker burnout during the

Table 1. PICOT Framework.

PICOT	Search terms	PICOT question
P	Healthcare workers	What have been the measures to prevent and reduce healthcare workers' burnout during the COVID-19 pandemic?
I	Measures	
C	Not applicable	
O	Burnout	
T	During the COVID-19 pandemic	

COVID-19 pandemic?" was formulated and structured using the PICOT (Population, Intervention, Comparison, Outcome, and Time frame) framework. The reason for choosing the PICOT framework is due to its usefulness in framing and breaking down a research question into searchable terms. It generated the terms that shaped the search process of the study to answer the research question (Riva et al., 2012). The search terms included P: healthcare workers, I: measures, C: N/A, O: burnout, and T: during the COVID-19 pandemic, and these were all related to the study's fundamental concepts (see Table 1).

Step 2: Identifying Relevant Studies

Four searches were completed, independently, using the Boolean operator "or," and then these four searches were combined using the Boolean operator "and." The search terms included (1) healthcare workers, healthcare professions, health professions, professional health, professional health care, healthcare staff, nurses, physicians, residents; (2) measures, interventions, programs, strategies, management, addressing; (3) burnout, emotional exhaustion, painful disorders, stress, workloads, suicide; and (4) COVID-19, coronavirus disease, SARS-CoV-2, pandemic, outbreak (see Table 2).

Inclusion and Exclusion Criteria. Articles were chosen for inclusion in the search using the criteria as follows: full texts of articles published in English in issues released from 2019 to June 2023. This time frame was chosen because the COVID-19 pandemic first started in 2019. Additional studies chosen for review included those which examined COVID-19 burnout among HCWs and explored measures aimed at preventing and reducing burnout in alignment with the research question. The study incorporated peer-reviewed, primary research, and scholarly articles. Criteria for exclusion included any text which was a letter, report, conference abstract, dissertation, book chapter, or unpublished manuscript.

Searching the Databases for Relevant Studies. The literature search was done using CINAHL, PubMed, ScienceDirect,

Table 2. Search Terms.

PICOT	Keywords
P Healthcare workers	Healthcare workers Healthcare professions Health professions Professional health Professional health care Healthcare staff nurses Physicians Residents
I Measures	Measures Interventions Programs Strategies Management Addressing
C	Not applicable
O Burnout	Burnout Emotional exhaustion Painful disorders Stress Workloads Suicide
T During the COVID-19 pandemic	COVID-19 Coronavirus disease SARS-CoV-2 Pandemic Outbreak

and Scopus. Pre-determined keywords were employed to locate relevant articles addressing measures to prevent and reduce healthcare worker burnout during the COVID-19 pandemic. The Boolean operators "AND" and "OR" were utilized to merge the keywords and construct a targeted search within each database.

As seen in Figure 1, once the most relevant texts were determined, the PRISMA 2020 flowchart informed the subsequent process of study retrieval and screening. Following the search of the four databases, 271 articles were identified in CINAHL, 793 in PubMed, 22 in ScienceDirect, and no articles in Scopus. The researchers reviewed the references cited in these articles, as well as the relevant excluded articles, to identify additional studies. Furthermore, a non-systematic search was conducted in Google Scholar. A total of 1,098 studies (via databases and other methods) were initially retrieved. Then, the screening process was initiated, leaving 154 distinct references for further screening.

Step 3: Study Selection

The remaining 154 studies underwent a thorough full-text examination to assess their alignment with the research question and relevance to the primary review objectives. Out of

these, 21 studies were found to be closely related to the review's objectives, addressing the research question and meeting the inclusion criteria (see Figure 1).

Quality Assessment. The authors selected Hawker's quality assessment tool (Hawker et al., 2002) as the primary tool for critically appraising the quality of papers identified in the search. This tool provides a detailed definition for each criterion and assigns scores as "good," "fair," "poor," or "very poor." In this review, articles that received "good" and "fair" scores were categorized as "1," while articles with "poor" and "very poor" scores were categorized as "2" (see Table 3). The determination of a high or low score for each article is grounded in its relevance to the research questions and the rigor of the methodology employed.

Step 4: Charting of the Data

For this step, relevant data was identified in the chosen articles for the purpose of obtaining the significant insights required to address the research question, as suggested by (Schmidt et al., 2018). Data extraction and charting was done by two researchers. Extracting appropriate data helps to identify relevant variables for answering key review questions. The recorded information encompassed study characteristics, including the authors, sample size, study setting, study country, research design, and measurement tools used. A thematic framework was employed to structure the narrative accounts of the 21 studies, serving as a foundation for collecting, summarizing, and describing the key findings (see Table 3).

Step 5: Collating, Summarizing, and Reporting the Results

Results of the Search. This section presents the evidence obtained through Step 4, illuminating the attributes of the review study, the main findings, and the emergent themes of the 21 selected articles.

Characteristics of the Reviewed Studies. All 21 articles fulfilled the criteria for inclusion and were published between 2020 and 2022. Among these, 14 studies were primary research, while the remaining were secondary research. Regarding primary research, there were three qualitative studies, eight cross-sectional studies, two intervention studies, and one randomized controlled trial. In terms of secondary research, there were three narrative reviews, two rapid reviews, and two scoping reviews. The samples were exclusively comprised of healthcare workers and included physicians, residents, and nurses, which fostered generalizability to other groups of healthcare professionals. Moreover, the reviewed findings encompassed diverse geographical locations, encompassing both advanced and developing healthcare contexts within countries including the United States, the United
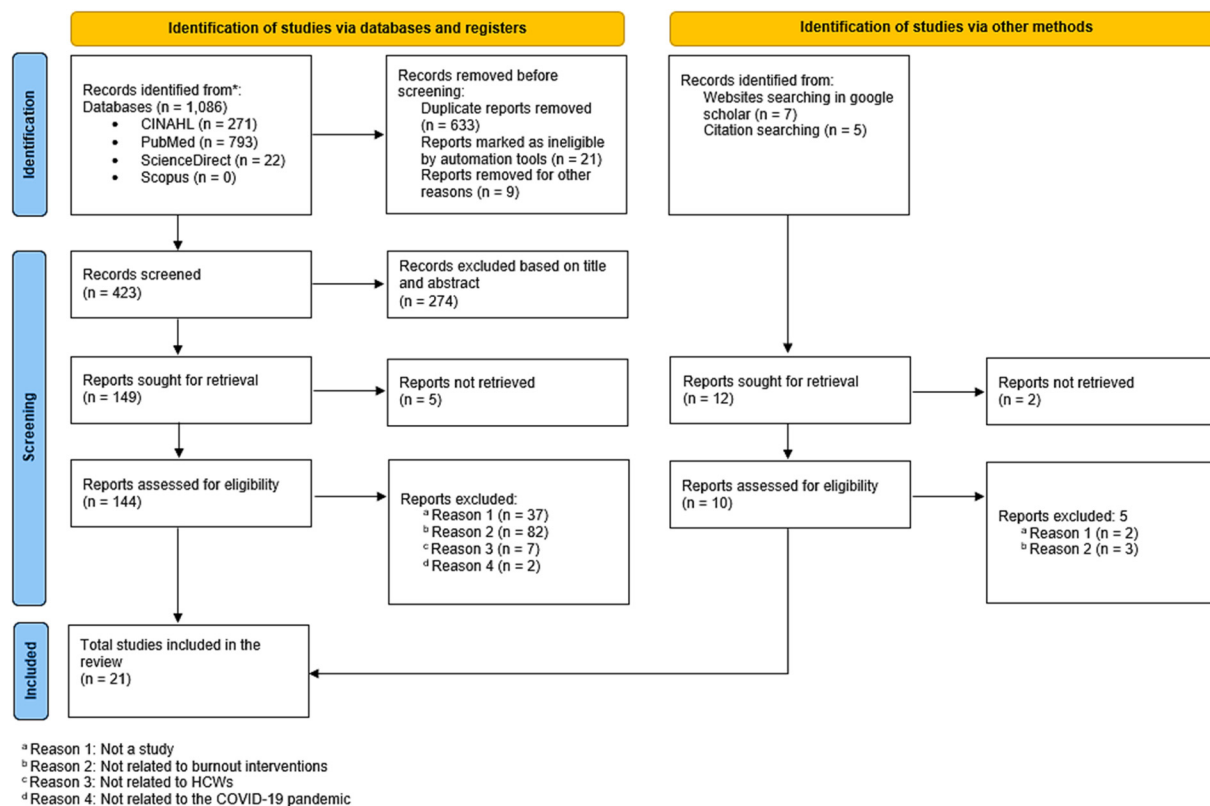
Figure 1. PRISMA 2020 Flowchart of Study Selection. *From:* Page et al. (2021).

Kingdom, Spain, Iran, Canada, Turkey, Brazil, Switzerland, Italy, Australia, Saudi Arabia, Korea, and China. Table 3 provides a summary of the measurements and sample sizes obtained from each study.

Twenty-one articles were chosen to undergo thematic analysis, revealing a range of distinct themes, five of which were utilized for the discussion based on the information retrieved from them. These five themes can be categorized under the broader topics of COVID-19 burnout and the strategies aimed at preventing and reducing COVID-19 burnout among healthcare workers. The first two themes pertain to the impact of COVID-19 burnout on HCWs, while the last three are related to strategies to prevent and reduce COVID-19 burnout among HCWs.

Theme 1: The Effects of COVID-19 Burnout on Healthcare Workers

Most of the studies concentrated on the psychological impact of COVID-19 burnout, specifically stress, anxiety, and depression. Some investigations assessed sleep quality, alcohol consumption, and the risk of suicide ideation. The authors have presented a summary of the articles below.

Effects on Healthcare Workers. Four studies show that healthcare workers had an elevated risk of burnout during the COVID-19 outbreak (Howell, 2021; Li et al., 2022;

Özçevik Subaşi et al., 2021; Zhang et al., 2021), and this has continued to occur after the pandemic (Howell, 2021). A cohort study by Zhang et al. (2021) revealed the prevalence of burnout among 336 nurses. The findings indicated that 87 (25.89%) exhibited high emotional exhaustion levels and 61 (18.15%) experienced high depersonalization levels while 100 (29.76%) reported low levels of personal accomplishment. Burnout's primary direct effect on healthcare workers is to their own health. In a qualitative study conducted in Canada, the research findings revealed a significant association between COVID-19 burnout and its impact on healthcare workers (Limoges et al., 2022). Also, in a qualitative study conducted in Iran, many nurses shared their experiences of depression that they faced during the COVID-19 outbreak. This included the sadness of losing colleagues, and the fear associated with the infection and transmission of COVID-19 (Irandoost et al., 2022). According to a cross-sectional national survey of 259 emergency physicians in the United States, the situation of burnout among physicians was getting worse over 6 months when compared with the situation pre-COVID-19, and daily alcohol use nearly doubled over the same period. Eighty-five percent of participants reported some negative impacts of COVID-19 on their mental health such as anxiety, depression, insomnia, and PTSD (Dehon et al., 2021). Alarmingly, in another study, healthcare workers, including nurses, doctors, paramedics, and a medical student, reported thoughts of suicide due to

Table 3. Characteristics of the Reviewed Studies.

Author(s)	Sample size and setting	Country of study	Study design	Measurement tool	Main findings	Quality 1 = high 2 = low
Borges Saidel et al. (2020)	36 Spanish hospitals	Spain	A descriptive cross-sectional study	Online survey in Google forms	Develop a targeted mental health intervention program for healthcare professionals to enhance emotion regulation skills and prevent mental disorders. These programs should include training in the use of PPE, identification of emotionally at-risk professionals before the outbreak, strengthening communication within the medical team, and providing emotional support through digital platforms.	1
Dehon et al. (2021)	517 Emergency physicians (EPs)	United States	A cross-sectional national survey	An electronic survey	During the COVID-19 outbreak, emergency physicians report high levels of psychological distress. Individuals who employ avoidant coping strategies often experience depression, anxiety, insomnia, and PTSD. In contrast, coping strategies involving humor and a positive mindset prove to be effective.	2
Heath et al. (2020)	–	Australia	A narrative review	Reviewing the existing literature	Increasing the resilience of healthcare workers during and after the COVID-19 outbreak involves a variety of individual and organizational strategies, some of which include reallocating support staff and adjusting revenue distribution. Extensive planning and negotiations are required. Rapid implementations include the Battle Buddies mindfulness intervention and employee feedback sessions	1
Howell (2021)	–	United States	A narrative review	Reviewing the existing literature	This article suggests a comprehensive approach to enhance resilience and well-being among healthcare professionals at both the individual and organizational levels.	1

Table 3. Continued.

Author(s)	Sample size and setting	Country of study	Study design	Measurement tool	Main findings	Quality 1 = high 2 = low
					Individual-focused interventions include self-care measures, work-life balance, and resilience-building techniques. Interpersonal interventions focus on support systems, social connections, team-building, and conflict-management skills. Organizational interventions involve training on burnout recognition, access to wellness resources, designated revitalization areas, stigma reduction, workload evaluation, staff recognition, and the promotion of healthy work environments through positive relationships and effective communication.	
Irandoost et al. (2022)	30 Nurses working in COVID-19 wards in Tehran hospitals	Iran	A qualitative conventional content analysis	Semi-structured interviews	These findings show that adaptation strategies for work conditions include adequate protective equipment, a suitable work environment, and more social and financial support. In addition, more attention should be paid to nurses' physical and mental health, and considering appropriate communication mechanisms for nurses to communicate with their families and patients' families.	1
Limoges et al. (2022)	HCPs participated in interviews (N = 30) and answered open-ended questionnaires (N = 88)	Canada	A qualitative study	One-to-one semi-structured interviews and online open-ended questionnaires	This article highlights the necessity for a policy development, implementation, and evaluation cycle at governmental and institutional levels. Key recommendations include developing clear communication channels and support for HCPs regarding policy changes, involving HCPs in policy processes, integrating clinical innovation and HCP education to mitigate negative impacts, creating systematic approaches to gather data	2

Table 3. Continued.

Author(s)	Sample size and setting	Country of study	Study design	Measurement tool	Main findings	Quality 1 = high 2 = low
					on HCPs' intentions to leave, and incorporating lessons from previous outbreaks into educational programs for leaders and policy advisors.	
López-del-Hoyo et al. (2022)	180 Healthcare workers	Spain	A stepped-wedge cluster randomized trial design	Internet-delivered program (MINDxYOU)	The program comprises various modules that facilitate the cultivation of mindfulness, acceptance, and compassion—integral components of the intervention. Additionally, a concluding module guides participants in applying these skills to key facets of a healthy lifestyle (i.e., diet, sleep, exercise, socialization). This study could make a significant contribution to the promotion of online psychotherapy for reducing the stress of healthcare workers.	1
Özçevik Subaşı et al. (2021)	444 Healthcare workers	Turkey	A descriptive cross-sectional study	Online questionnaires	This article suggests that HCWs may have experienced higher levels of anxiety during the pandemic than previous studies indicated. To address this, psychological support groups organized by ministries of health can be effective, including regular online meetings. Seeking social support was identified as the most common coping method. The article recommends hospitals conduct regular viral and antibody tests for HCWs to promptly address potential COVID-19 infections. Additionally, the government is advised to provide living places for HCWs concerned about infecting their families. It suggests restricting HCWs aged 40 and above or those with chronic diseases from working in clinics with COVID-19 patients.	1

(continued)

Table 3. Continued.

Author(s)	Sample size and setting	Country of study	Study design	Measurement tool	Main findings	Quality 1 = high 2 = low
Rieckert et al. (2021)	73 Articles	Netherlands	Scoping review supplemented with expert interviews to validate the findings	PubMed, Embase, PsycINFO, CINAHL, bioRxiv and medRxiv	The study recommends to (1) enhance resilience through information provision and various forms of psychosocial support, (2) address tasks and responsibilities by considering the intensity and weight, and (3) adjust work patterns and conditions during outbreaks.	1
Bany Hamdan et al. (2021)	342 Healthcare professionals		A cross-sectional study online survey	Online questionnaire	This study reveals increased stress levels among healthcare workers during the COVID-19 outbreak. Coping strategies include preventive measures such as hand hygiene, relaxation, and exercise, as well as participating in online communities and maintaining social connections through texting or calling with family and friends.	1
Benzakour et al. (2022)	25 Healthcare workers	Switzerland	A retrospective quantitative analysis of socio-demographic and clinical data, in addition to psychiatric scale scores for the main potential psychiatric risks and post hoc qualitative analysis of written interviews.	PDI, PDEQ, PCL-5, HADS, MBI-HSS to look for main psychiatric situations	This study indicated that some participants required psychiatric follow-ups after CovidPsy care, but the majority of HCWs consulted found it sufficient. Indeed, 72.22% of HCWs showed significant clinical improvement, indicating that CovidPsy interventions served as early and preventive measures for psychiatric issues.	2
Blanc et al. (2021)		Canada	A rapid review	Reviewing the existing literature	Populations globally frequently rely on the support of loved-ones, close relationships, outdoor activities, physical well-being, and spirituality as coping mechanisms for COVID-19-related distress. There has also been an observed rise in the sense of meaning and purpose since the onset of the pandemic.	2
David et al. (2022)	31 Studies	USA	A narrative review	Medline/PubMed, Cochrane Library, and Embase	The study found that most programs supporting HCWs mental health commonly included initiatives such as increased basic need resources,	1

(continued)

Table 3. Continued.

Author(s)	Sample size and setting	Country of study	Study design	Measurement tool	Main findings	Quality 1 = high 2 = low
					workplace training and indirectly improve emotional health, and expanded psychological support programs.	
Giordano et al. (2022)	17 Leaders and 62 members of their staffs	Italy	An interventional study	R2 resilience program	The R2 resilience program stands as a promising intervention tailored for healthcare professionals operating in emergency settings. The design aims to augment the robust qualities and resources essential for effectively managing elevated stress levels.	1
Park and Jung (2021)	200 Nurses	Korea	A cross-sectional survey	Self-report questionnaire survey	This study confirmed that resilience as an individual control mechanism reduces job stress levels. There is a necessity to enhance individual resilience and bolster nursing professionalism among long-term care hospital nurses during the COVID-19 pandemic. This involves implementing intervention programs and proposing policies aimed at effectively managing job-related stress.	1
Romano et al. (2022)	66 Participants on Emotional Wellness, 51 participants on Spiritual Wellness, 80 participants completed the Intellectual Wellness session, 40 participants completed the Social Wellness session, and 30 participants completed the Physical Wellness session	Canada	A qualitative content analysis	Workshop evaluation	The results showed that the Emotional wellness workshop covered self-care, resilience through small changes, and cultivating self-compassion. The Physical wellness workshop emphasized dedicated exercise, daily stretching, and prioritizing self-care. The Spiritual wellness workshop advised taking breaks for calming the mind, through breathing or short meditations. The Social wellness workshop stressed the importance of initiating and maintaining connections with others. Emotional intelligence can reduce fear and worry, enhancing resilience during and after the COVID-19 pandemic.	1

Table 3. Continued.

Author(s)	Sample size and setting	Country of study	Study design	Measurement tool	Main findings	Quality 1 = high 2 = low
Viswanathan et al. (2020)	40 Attending physicians, 40 residents, and 50 nurses	USA	An interventional study	Individual and group meetings	The utilization of support groups and individual mental health care through video conferencing for frontline clinicians during the COVID-19 pandemic serves as a useful model. Other centers are encouraged to adopt this approach to provide emotional support to frontline clinical workers during the ongoing global crisis.	1
Zhang et al. (2021)	336 Nurses	China	A cross-sectional survey	Not mentioned	The findings disclosed that 6.85% of nurses experienced burnout. Among the 336 respondents, 87 (25.89%) reported a high level of emotional exhaustion, 61 (18.15%) exhibited a high level of depersonalization, and 100 (29.76%) demonstrated a low level of personal accomplishment. Preventing burnout entails providing increased support from both families and supervisors, emphasizing health monitoring and personal protection, and establishing a rational system for human resource allocation and shift management. Specific training on infection control and self-protection, mental health guidance, and stress-coping techniques must be implemented.	1
Leo et al. (2021)		Italy	A review of the existing literature	MEDLINE/PubMed, ISI Web of Knowledge, Scopus, and Google Scholar	Individual level such as physical activity, balanced diet, good sleep hygiene, family support, small group discussions, etc. Organizational level such as blame-free environments, multi-disciplinary psychosocial support teams, safe areas for quick withdrawal from stress,	1

(continued)

Table 3. Continued.

Author(s)	Sample size and setting	Country of study	Study design	Measurement tool	Main findings	Quality 1 = high 2 = low
					adequate time planning, and social support, etc. Cultural level such as involvement of healthcare workers in developing, implementing, testing, and evaluating measures against burnout.	
Li et al. (2022)	25 Studies	Canada	A scoping review aims to (a) assess the relationship between EMR use and burnout and (b) explore interventions to reduce EMR-related burnout	MEDLINE (Ovid), CINAHL, and SCOPUS	Electronic medical record-related burnout among HCPs included factors such as message and alert load, time spent on EMRs, organizational support, EMR functionality, usability, and overall EMR use. However, there is currently no intervention that has proven successful in mitigating burnout symptoms associated with the use of EMRs.	2
Jahan et al. (2021)	26 Worldwide HCW COVID-19-related suicide cases	Bangladesh	A retrospective study	Google News	The most frequently cited reasons for suicide were COVID-19 infection, followed by work-related stress and fear associated with the risk of COVID-19 infection/transmission.	2

COVID-19 infection, work-related stress, and fear related to COVID-19 infection/transmission (Jahan et al., 2021).

Effects on Organization and Healthcare Systems. An indirect effect of healthcare workers suffering from COVID-19 burnout could be diminished safety and quality of care for patients. As indicated by Leo et al. (2021), burnout among healthcare workers may result in a decrease in care quality regarding guideline adherence, medical errors, poor communication, and patient outcomes and safety. A similar finding was also reported in a study by Howell (2021) in which healthcare workers' burnout was associated with increased odds of reporting negative quality of care and patient outcomes, in addition to having financial consequences for institutions due to decreased productivity and workers leaving their workplaces and professions resulting in the organizational costs of replacing them (Howell, 2021).

Theme 2: Measures to Prevent and Reduce Healthcare Worker Burnout

According to the review, interventions to prevent or reduce burnout among healthcare workers are divided into three levels: (i) the individual and interpersonal level, (ii) the organizational level, and (iii) the work culture level. The following section illustrates the interventions on each level.

Interventions on the Individual and Interpersonal Level. Seven articles identified various individual-level interventions designed to combat burnout among HCWs. Most of the articles suggested to enhance individual resilience which is defined as the capacity to withstand adversity and rebound from challenging life events through proactive anticipation and preparation (Giordano et al., 2022; Heath et al., 2020; Howell, 2021; Park & Jung, 2021; Rieckert et al., 2021; Romano et al., 2022). To promote resilience, HCWs should be trained in stress-reduction techniques or relaxation techniques, such as guided imagery, breathing exercises, meditation, yoga, and mindfulness training, because these techniques can help individuals regulate their emotions, thoughts, and behaviors, as well as enhance resilience and recovery (Howell, 2021; Romano et al., 2022). In addition, they should learn coping strategies such as planning and positive reframing (Dehon et al., 2021) which can help them in dealing with stressful and challenging situations (Dehon et al., 2021; Howell, 2021). Enhancing self-care and strengthening traits were also recommended such as physical activity, a balanced diet, and good sleep hygiene (Bany Hamdan et al., 2021; Howell, 2021; Romano et al., 2022).

Regarding interpersonal interventions, support systems could play a vital role in addressing burnout among healthcare workers (Howell, 2021; Romano et al., 2022). These systems include forming a psychosocial support team, encouraging peer support from loved ones, and sharing and

celebrating successes (Özçevik Subaşi et al., 2021; Rieckert et al., 2021). An example intervention could involve creating professional connectedness by using small group discussions to exchange emotional professional experiences that center on the positive aspects or success stories, while also bolstering a sense of purpose. This can help HCWs find meaning in work and joy amidst chaos (Blanc et al., 2021; Heath et al., 2020).

Interventions on the Organizational Level. Based on the review of the articles, various strategies can be utilized by an organization to prevent and reduce HCWs' COVID-19 burnout. An important strategy is the deployment of managers or organizational leaders as role models as well as the review and evaluation of the division of labor and planning (Howell, 2021). Managers must ensure sufficient staffing levels by continuously evaluating workloads, which includes mitigation of data entry and administrative burdens (Howell, 2021; Maunder et al., 2021). Furthermore, it is crucial to consider augmenting the support staff, either by increasing their numbers or reallocating them, as suggested in prior studies (Heath et al., 2020). This could involve deploying staff to areas where they may require additional training (Maunder et al., 2021). It may be possible to redeploy nursing staff from areas such as the operating room to COVID-19 units to provide assistance. Redeployed nursing staff can offer fundamental care, fill in during shift breaks, dispense medication, and take vital signs (World Health Organization, 2021a).

Moreover, ensuring HCWs, especially those on the frontlines, have adequate materials, and training, and supervising them in the proper use of personal protective equipment (PPE) is imperative. This can significantly enhance their feelings of safety, confidence, and control (Borges Saidel et al., 2020; David et al., 2022; Irandoost et al., 2022; Rieckert et al., 2021).

Furthermore, managers should enhance clinical work schedules, which involve restrictions such as limiting shift durations to a maximum of 12 h for lighter tasks and 8–10 h for shifts with more demanding responsibilities (with an 8-h recommendation for evening and night shifts). It is important to cap the duration of frontline assignments at 6–8 weeks and alternate these with non-frontline shifts. In addition, it is advisable to intersperse a sequence of shifts with scheduled days off. For instance, after HCWs have worked multiple 8–10-h shifts, managers should schedule them at least 1–2 days off. Vacation planning should be part of the strategy, even during an outbreak, and healthcare workers should not be contacted with work-related information and/or questions when they are not on duty (Rieckert et al., 2021).

Organizational managers should foster the inclusion of all HCWs in management decisions by promoting open communication among professionals in the workplace. This can be achieved by allocating time for non-binding discussions to address both positive and negative aspects of situations (Borges Saidel et al., 2020; Heath et al., 2020; Howell, 2021; Limoges et al., 2022). Additionally, it is essential to establish a multidisciplinary psychosocial support team for

HCWs, which includes peer support, psychologists, spiritual counselors, social professionals, and occupational health and safety professionals (Borges Saidel et al., 2020; David et al., 2022). It would be beneficial to provide HCWs with access to a telephone hotline or a platform connecting them with members of a psychosocial support team, should they require someone to talk to (Borges Saidel et al., 2020; David et al., 2022; Rieckert et al., 2021; Viswanathan et al., 2020). Effective communication should incorporate natural coping strategies such as acceptance, active coping, and positive framing (Howell, 2021).

Additionally, it is advantageous to proactively identify HCWs who are at a heightened risk of experiencing physical and mental health issues (Benzakour et al., 2022; Irandoost et al., 2022). Organizations can implement regular viral and antibody testing for HCWs, a proactive approach that enables swift identification and treatment of potential COVID-19 infections among HCWs (Özçevik Subaşi et al., 2021). In cases of acute complaints, it is advisable to provide interventions, based on evidence, and follow a formal diagnosis and treatment process done by professionals not affiliated with the present work context (Irandoost et al., 2022). Moreover, specialized attention and social services, including support for child or pet care, as well as elderly care, should be extended to frontline workers or those in quarantine. Such measures can help reduce feelings of emotional and occupational exhaustion (Irandoost et al., 2022; Rieckert et al., 2021). Furthermore, organizations should establish a resting facility to offer HCWs the option to swiftly step away or take a break from emotionally taxing situations, while also providing the opportunity to take a shower at the workplace (Howell, 2021). It is also recommended to offer accommodations for individuals who are concerned about potentially transmitting the infection to their families during the pandemic (Özçevik Subaşi et al., 2021) as well as time, space, and an opportunity to allow them the opportunity to engage in physical exercise or partake in relaxing activities, such as workouts, for instance serving as an effective means to alleviate stress (Rieckert et al., 2021). In addition, the use of online psychotherapy (mindfulness, acceptance, and compassion) for reducing healthcare workers' stress is also recommended (López-del-Hoyo et al., 2022).

Finally, in order to lessen work-induced pressures that can contribute to burnout, organizations should endorse the concept of co-production, involving patients in sharing feedback regarding service quality and organizational aspects (Leo et al., 2021).

Interventions on Work Culture. Transforming the workplace culture is important and can be achieved by challenging the endurance stereotype and acknowledging human limitations across physical, cognitive, and emotional dimensions (Leo et al., 2021). Özçevik, Akça, Şimşek, et al. recommended that healthcare workers (HCWs) over the age of 40 and those with chronic illnesses should avoid working in clinics

where COVID-19 patients are treated (Özçevik Subaşi et al., 2021). In addition, organizations should provide a platform for communication, such as digital communication platforms (e.g., WhatsApp, Line, Messenger) or regular online meetings between the management of an organization and its employees for sharing of information and ideas (Leo et al., 2021; Özçevik Subaşi et al., 2021; Rieckert et al., 2021). Communication should foster a blame-free atmosphere for reporting incidents and addressing ethical or emergency concerns, such as exposure to blood or respiratory system fluids, as well as cases involving violence. Moreover, it is advisable to include nursing staff in the decision-making processes, as this particular group is frequently overlooked (Leo et al., 2021; Rieckert et al., 2021).

Discussion

This scoping review has outlined the impact of COVID-19 burnout on healthcare workers (HCWs) and the strategies for preventing or reducing COVID-19 burnout among HCWs. The findings revealed that COVID-19-related burnout impacts healthcare workers, healthcare organizations, and healthcare systems. Meanwhile, the strategies aimed at preventing and reducing burnout among HCWs were categorized into three levels: individual and interpersonal, organizational, and work culture.

The results revealed consistent reports of burnout in HCWs as a result of COVID-19 (Howell, 2021; Li et al., 2022; Özçevik Subaşi et al., 2021; Zhang et al., 2021). Numerous studies have substantiated the existence of significant burnout concerning patient care, alongside the fear associated with COVID-19 infection and transmission (Dehon et al., 2021; Irandoost et al., 2022; Jahan et al., 2021). The effects of COVID-19 burnout among HCWs are associated with mental health conditions, including stress, anxiety, depression, and poor sleep quality, as well as suicidal ideation (Dehon et al., 2021; Irandoost et al., 2022; Jahan et al., 2021; Limoges et al., 2022). Furthermore, HCWs suffering from COVID-19 burnout could affect the quality of patient care and patient outcomes and have caused financial consequences in institutions (Howell, 2021; Leo et al., 2021). Most of the articles shared a common conceptualization of burnout as an occupational phenomenon resulting from exposure to work-related stressors, and consisting of many emotional reactions such as stress, anxiety, depression, dampened emotions, and social life, perhaps contributing to lack of work efficacy.

Given the relative novelty of this crisis, there were heterogeneous measures that have been suggested to prevent or reduce burnout among HCWs. Those measures/interventions can be grouped into three levels including interventions at the individual and interpersonal level, the organizational level, and the work culture level. Individually, HCWs should enhance their personal resilience as well as be made aware of the associated risks and prepare for potential occupational

stress and burnout, as suggested in previous studies (Giordano et al., 2022; Heath et al., 2020; Howell, 2021; Park & Jung, 2021; Rieckert et al., 2021; Romano et al., 2022). This heightened awareness can contribute to reducing the stigma surrounding mental health conditions such as burnout (Sultana et al., 2020). At the organizational level, HCWs should be given a voice, and be safeguarded, well-prepared, and supported by their organizations. This is not only essential for the well-being of HCWs themselves but also crucial to ensure their continued effectiveness in their roles (Heath et al., 2020; Howell, 2021; Maunder et al., 2021). In addition to individual and organizational level interventions, approaches to prevent and reduce healthcare worker burnout should also include interventions to foster a supportive work culture such as recognizing human limitations, adopting a blame-free environment for sharing, and incorporating nursing staff in decision-making procedures (Leo et al., 2021; Özçevik Subaşi et al., 2021; Rieckert et al., 2021). To adequately address the burnout issue among HCWs, interventions at all levels are needed as suggested by Zhang et al. (2021), Howell (2021), and Leo et al. (2021). However, their studies do not constitute interventions (a narrative review and cross-sectional study), so they might insufficiently describe the effectiveness of interventions.

However, no published studies have collected data on the roles of professionals in preventing and reducing healthcare worker burnout. Apart from organizational leaders or managers, talking about and treating healthcare worker burnout should be the responsibility of everyone on the corporate ladder and include aspects such as mental health, infection control, and occupational health professionals. While infection control professionals might play a major role in minimizing healthcare-acquired infections and occupational illness including burnout (Diamond, 2021), mental health professionals play a key support role in supporting the well-being of healthcare workers (Parmar, 2021), and occupational health professionals play an important role in providing occupational health services (Paton, 2022).

Drawing from the narrative review of the literature, the researchers posit the essential roles of professionals in the prevention and reduction of healthcare worker burnout, as summarized in Table 4.

Limitations

This scoping review had limitations in terms of the search strategies which were designed to target publications that primarily addressed burnout among HCWs. Moreover, the reviewed studies on burnout interventions have been heterogeneous, focusing on different groups in diverse settings and reporting on a plethora of interventions. However, there is insufficient information at present to provide clear guidance for future studies, interventions, or policy directions. Additionally, research on the impacts of COVID-19-related burnout and the development of strategies to prevent and reduce COVID-19 burnout among HCWs is rapidly advancing. Consequently, updated reviews will be imperative in the upcoming months. Furthermore, every outbreak possesses unique dimensions, and cultural responses vary. These factors should be considered when interpreting the results.

Implications for Practice

Consequently, studies exclusively examining aspects such as physical protection, infection, and transmission rates within this specific group may not have been included in the search results. Future research should consider an evaluation of the psychological burden that HCWs experience due to the practical and physiological dimensions of diseases.

Conclusion

The COVID-19 pandemic has occurred and shows no signs of stopping soon, and burnout has been a major concern for HCWs. Sustained HCW burnout will likely contribute to understaffing or shortage of healthcare workers, and that

Table 4. Roles of Professionals in Preventing and Reducing Healthcare Worker Burnout.

Mental health professionals	Infection control professionals	Occupational health professionals
HCWs's perceptions of the inherent nature of their work increase their vulnerability to burnout (Parmar, 2021)	Minimize healthcare-acquired infections and occupational illness, including burnout (Diamond, 2021)	Deliver occupational health services in accordance with applicable regulations (Occupational Safety & Health Administration, 2022)
Help workers learn to thrive despite living in a broken system (Parmar, 2021)	Engage in direct communication with nursing staff concerning topics such as personal protective equipment (PPE), virus transmission, and implementing best practices to mitigate the risk of infection (World Health Organization, 2021a)	Empower workers with the necessary knowledge, tools, and confidence to return to work quickly, prioritize both physical and mental health, and minimize presenteeism and staff turnover (Paton, 2022)
Emphasize the importance of identifying personalized coping skills or stress-reduction techniques, tailored to each individual (Parmar, 2021) which can significantly assist healthcare workers in effectively managing stressful and challenging situations (Heath et al., 2020)	Establish direct communication with nursing staff to enhance transparency and alleviate fear (World Health Organization, 2021a)	Help to stop exhausted health professionals from burning out and leaving the profession earlier than planned (Paton, 2022)

could fuel increased burnout for retained staff. Meanwhile, a shortage of healthcare workers could be associated with the organizational cost of replacing them, resulting in the urgent need for interventions to address burnout among healthcare workers. Interventions that support individual healthcare workers, enhance working conditions, and address systemic factors contributing to burnout, when combined with initiatives aimed at fostering a healthier work culture, are pivotal in the prevention and mitigation of healthcare worker burnout.

Authorship Statement

All authors have agreed on the final version and meet the authorship criteria according to the latest guidelines of the International Committee of Medical Journal Editors.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

ORCID iD

Patcharin Chaisurin (iD) https://orcid.org/0000-0001-6463-588X

References

Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology*, *8*(1), 19–32. https://doi.org/10.1080/1364557032000119616

Bany Hamdan, A., Alharbi, L., Alghamdi, S., Wani, T., Alqahtani, A., & Alharbi, M. (2021). Stress reactions and coping strategy among healthcare professionals during COVID-19 outbreak. *Psychiatria Danubina*, *33*(Suppl 13), 372–378.

Benzakour, L., Langlois, G., Marini, V., Groz, A., Chiabotto, C., Apetrei, D., Corneau, B., & Bondolfi, G. (2022). Implementation of a psychiatric consultation for healthcare workers during first wave of COVID-19 outbreak. *International Journal of Environmental Research & Public Health*, *19*(8), 4780. https://doi.org/10.3390/ijerph19084780

Blanc, J., Briggs, A. Q., Seixas, A. A., Reid, M., Jean-Louis, G., & Pandi-Perumal, S. R. (2021). Addressing psychological resilience during the coronavirus disease 2019 pandemic: A rapid review. *Current Opinion in Psychiatry*, *34*(1), 29–35. https://doi.org/10.1097/yco.0000000000000665

Borges Saidel, M. G., Melo Lima, M. H., Gomes Campos, C. J., Douat Loyola, C. M., Esperidião, E., & Rodriques, J. (2020). Mental health interventions for health professionals in the context of the coronavirus pandemic. *Revista Enfermagem UERJ*, *28*, 1–6. https://doi.org/10.12957/reuerj.2020.49923

David, E., DePierro, J. M., Marin, D. B., Sharma, V., Charney, D. S., & Katz, C. L. (2022). COVID-19 pandemic support programs for healthcare workers and implications for occupational mental health: A narrative review. *Psychiatric Quarterly*, *93*(1), 227–247. https://doi.org/10.1007/s11126-021-09952-5

Dehon, E., Zachrison, K. S., Peltzer-Jones, J., Tabatabai, R. R., Clair, E., Puskarich, M. A., Ondeyka, A., Dixon-Gordon, K., Walter, L. A., Situ-LaCasse, E. H., & Fix, M. L. (2021). Sources of distress and coping strategies among emergency physicians during COVID-19. *Western Journal of Emergency Medicine: Integrating Emergency Care with Population Health*, *22*(6), 1240–1252. https://doi.org/10.5811/westjem.2021.9.53406

Denning, M., Goh, E. T., Tan, B., Kanneganti, A., Almonte, M., Scott, A., Martin, G., Clarke, J., Sounderajah, V., & Markar, S. J. P. O. (2021). Determinants of burnout and other aspects of psychological well-being in healthcare workers during the COVID-19 pandemic: A multinational cross-sectional study. *PLos One*, *16*(4), e0238666. https://doi.org/10.1371/journal.pone.0238666

Department of Disease Control. (2021). *Corona virus disease (COVID-19): Thailand* situation. Retrieved December 6, 2021, from https://ddc.moph.go.th/viralpneumonia/eng/index.php

Diamond, F. (2021). COVID-19 surges stress infection preventionists to the breaking point. *Infection Control Today*, *25*(9). Retrieved December 6, 2021, from https://www.infectioncontroltoday.com/view/covid-19-surges-stress-infection-preventionists-to-the-breaking-point

Giordano, F., Cipolla, A., & Ungar, M. (2022). Building resilience for healthcare professionals working in an Italian red zone during the COVID-19 outbreak: A pilot study. *Stress and Health*, *38*(2), 234–248. https://doi.org/10.1002/smi.3085

Gramaglia, C., Marangon, D., Azzolina, D., Guerriero, C., Lorenzini, L., Probo, M., et al. (2021). The mental health impact of 2019-nCOVID on healthcare workers from North-Eastern Piedmont, Italy. Focus on burnout. *Frontiers in Public Health*, *9*, 667379. https://doi.org/10.3389/fpubh.2021.667379

Hawker, S., Payne, S., Kerr, C., Hardey, M., & Powell, J. (2002). Appraising the evidence: Reviewing disparate data systematically. *Qualitative Health Research*, *12*(9), 1284–1299. https://doi.org/10.1177/1049732302238251

Heath, C., Sommerfield, A., & von Ungern-Sternberg, B. S. (2020). Resilience strategies to manage psychological distress among healthcare workers during the COVID-19 pandemic: A narrative review. *Anaesthesia*, *75*(10), 1364–1371. https://doi.org/10.1111/anae.15180

Howell, B. A. M. (2021). Battling burnout at the frontlines of health care amid COVID-19. *AACN Advanced Critical Care*, *32*(2), 195–203. https://doi.org/10.4037/aacnacc2021454

Irandoost, S. F., Yoosefi Lebni, J., Safari, H., Khorami, F., Ahmadi, S., Soofizad, G., & Ebadi Fard Azar, F. (2022). Explaining the challenges and adaptation strategies of nurses in caring for patients with COVID-19: A qualitative study in Iran. *BMC Nursing*, *21*(1), 1–16. https://doi.org/10.1186/s12912-022-00937-8

Jahan, I., Ullah, I., Griffiths, M. D., & Mamun, M. A. (2021). COVID-19 suicide and its causative factors among the healthcare professionals: Case study evidence from press reports. *Perspectives in Psychiatric Care*, *57*(4), 1707–1711. https://doi.org/10.1111/ppc.12739

Jose, S., Dhandapani, M., & Cyriac, M. C. (2020). Burnout and resilience among frontline nurses during COVID-19 pandemic:

A cross-sectional study in the emergency department of a tertiary care center, North India. *Indian Journal of Critical Care Medicine: Peer-Reviewed, Official Publication of Indian Society of Critical Care Medicine*, 24(11), 1081. https://doi.org/10.5005/jp-journals-10071-23667

Koontalay, A., Suksatan, W., Prabsangob, K., & Sadang, J. M. (2021). Healthcare workers' burdens during the COVID-19 pandemic: A qualitative systematic review. *Journal of Multidisciplinary Healthcare*, 14, 3015–3025. https://doi.org/10.2147/JMDH.S330041

Leo, C. G., Sabina, S., Tumolo, M. R., Bodini, A., Ponzini, G., Sabato, E., & Mincarone, P. (2021). Burnout among healthcare workers in the COVID 19 era: A review of the existing literature. *Frontiers in Public Health*, 9, 750529. https://doi.org/10.3389/fpubh.2021.750529

Li, C., Parpia, C., Sriharan, A., & Keefe, D. T. (2022). Electronic medical record-related burnout in healthcare providers: A scoping review of outcomes and interventions. *BMJ OPEN*, 12(8), e060865. https://doi.org/10.1136/bmjopen-2022-060865

Limoges, J., Mclean, J., Anzola, D., & Kolla, N. J. (2022). Effects of the COVID-19 pandemic on healthcare providers: Policy implications for pandemic recovery. *Healthcare Policy*, 17(3), 49–64. https://doi.org/10.12927/hcpol.2022.26728

López-del-Hoyo, Y., Fernández-Martínez, S., Pérez-Aranda, A., Barceló-Soler, A., Guzman-Parra, J., Varela-Moreno, E., Campos, D., Monreal-Bartolomé, A., Beltrán-Ruiz, M., Moreno-Küstner, B., Mayoral-Cleries, F., & García-Campayo, J. (2022). Effectiveness and implementation of an online intervention (MINDxYOU) for reducing stress and promote mental health among healthcare workers in Spain: A study protocol for a stepped-wedge cluster randomized trial. *BMC Nursing*, 21(1), 1–12. https://doi.org/10.1186/s12912-022-01089-5

Maunder, R. G., Heeney, N. D., Strudwick, G., Danielle Shin, H., O'Neill, B., & Young, N. (2021). Burnout in hospital-based healthcare workers during COVID-19. *Science Briefs of the Ontario COVID-19 Science Advisory Table*, 2(46), 1–24. https://doi.org/10.47326/ocsat.2021.02.46.1.0

Occupational Safety & Health Administration. (2022). *Occupational health professionals*. https://www.osha.gov/occupational-health-professionals

Özçevik Subaşı, D., Akça Sümengen, A., Şimşek, E., & Ocakçı, A. F. (2021). Healthcare workers' anxieties and coping strategies during the COVID-19 pandemic in Turkey. *Perspectives in Psychiatric Care*, 57(4), 1820–1828. https://doi.org/10.1111/ppc.12755

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., & Brennan, S. E. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. https://doi.org/10.1136/bmj.n71

Park, B. M., & Jung, J. (2021). Effects of the resilience of nurses in long-term care hospitals during on job stress COVID-19 pandemic: Mediating effects of nursing professionalism. *International Journal of Environmental Research and Public Health*, 18(19), 10327. https://doi.org/10.3390/ijerph181910327

Parmar, R. (2021). *Navigating COVID-19's lessons on burnout*. https://www.psychiatrictimes.com/view/navigating-covid-19s-lessons-on-burnout

Paton, N. (2022). *Occupational health must be at heart of NHS post-Covid recovery, says SOM*. https://www.personneltoday.com/hr/occupational-health-must-be-at-heart-of-nhs-post-covid-recovery-says-som/

Rieckert, A., Schuit, E., Bleijenberg, N., Ten Cate, D., de Lange, W., de Man-van Ginkel, J. M., Mathijssen, E., Smit, L. C., Stalpers, D., Schoonhoven, L., Veldhuizen, J. D., & Trappenburg, J. C. (2021). How can we build and maintain the resilience of our health care professionals during COVID-19? Recommendations based on a scoping review. *BMJ OPEN*, 11(1), e043718. https://doi.org/10.1136/bmjopen-2020-043718

Riva, J. J., Malik, K. M., Burnie, S. J., Endicott, A. R., & Busse, J. W. (2012). What is your research question? An introduction to the PICOT format for clinicians. *The Journal of the Canadian Chiropractic Association*, 56(3), 167–171.

Rodrigues, H., Cobucci, R., Oliveira, A., Cabral, J. V., Medeiros, L., Gurgel, K., & Gonçalves, A. K. (2018). Burnout syndrome among medical residents: A systematic review and meta-analysis. *PLoS One*, 13(11), e0206840. https://doi.org/10.1371/journal.pone.0206840

Romano, D., Weiser, N., Santiago, C., Sinclair, C., Beswick, S., Espiritu, R., & Bellicoso, D. (2022). An organizational approach to improve staff resiliency and wellness during the COVID-19 pandemic. *Journal of Medical Imaging and Radiation Sciences*, 53(4s), S93–S99. https://doi.org/10.1016/j.jmir.2022.06.011

Schmidt, B.-M., Colvin, C. J., Hohlfeld, A., & Leon, N. (2018). Defining and conceptualising data harmonisation: A scoping review protocol. *Systematic Reviews*, 7(1), 1–6. https://doi.org/10.1186/s13643-018-0890-7

Sultana, A., Sharma, R., Hossain, M. M., Bhattacharya, S., & Purohit, N. (2020). Burnout among healthcare providers during COVID-19: Challenges and evidence-based interventions. *Indian Journal of Medical Ethics*, 5(4), 308–311. https://doi.org/10.20529/IJME.2020.73

Teo, I., Chay, J., Cheung, Y. B., Sung, S. C., Tewani, K. G., Yeo, L. F., & Tan, H. K. (2021). Healthcare worker stress, anxiety and burnout during the COVID-19 pandemic in Singapore: A 6-month multi-centre prospective study. *PLoS One*, 16(10), e0258866. https://doi.org/10.1371/journal.pone.0258866

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D., Horsley, T., & Weeks, L. (2018). PRISMA Extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine*, 169(7), 467–473. https://doi.org/10.7326/M18-0850

Tunthanathip, S., Laheem, K., Buayom, P., Khwanthong, V., & Osotpromma, C. (2021). Lockdown stress and burnout of public health personnel during the coronavirus disease 2019 outbreak in Southern Thailand. *Nursing and Midwifery Studies*, 10(3), 181–187. https://doi.org/10.4103/nms.nms_92_20

Viswanathan, R., Myers, M. F., & Fanous, A. H. (2020). Support groups and individual mental health care via video conferencing for frontline clinicians during the COVID-19 pandemic. *Psychosomatics*, 61(5), 538–543. https://doi.org/10.1016/j.psym.2020.06.014

World Health Organization. (2020). *WHO Director-General's opening remarks at the media briefing on COVID-19–11 March 2020*. https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-member-states-information-session-on-covid-19—11-march-2021

World Health Organization. (2021a). *Coronavirus disease (COVID-19) outbreak: Right, roles and responsibilities of health workers, including key considerations for occupational safety and health*. https://

www.who.int/docs/default-source/coronaviruse/who-rights-roles-respon-hw-covid-19.pdf?sfvrsn=bcabd401_0

World Health Organization. (2021b). *COVID-19 - WHO Thailand situation reports*. https://www.who.int/thailand/emergencies/novel-coronavirus-2019/situation-reports

Zhang, L., Chai, L., Zhao, Y., Wang, L., Sun, W., Lu, L., Lu, H., & Zhang, J. (2021). Burnout in nurses during the COVID-19 pandemic in China: New challenges for public health. *Bioscience Trends*, *15*(2), 129–131. https://doi.org/10.5582/bst.2021.01099