

How to Cite:

Aljohani, A. A. A., Alharbi, S. S., Albalawi, M. F., Alhawiti, M. E., Alsulami, A. N. M., Raea, S. M., Alyamani, A. M. A., Alfawzan, I. S. A., Alruqaie, R. I. M., Alamri, B. J., Alharbi, M. A., Alenezi, A. M., Albalawi, K. I., Albalawi, B. M., Altaymani, A. M. A., & Albather, M. H. (2022). Impact of COVID-19 on burnout among healthcare workers in intensive care units and emergency departments: Review. *International Journal of Health Sciences*, 6(S10), 2227–2241. <https://doi.org/10.53730/ijhs.v6nS10.15421>

Impact of COVID-19 on burnout among healthcare workers in intensive care units and emergency departments: Review

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Abstract---Background: The COVID-19 pandemic has significantly impacted healthcare systems worldwide, leading to increased stress and burnout among healthcare workers (HCWs), particularly in intensive care units (ICUs) and emergency departments (EDs). This study aims to assess the prevalence of burnout in these high-pressure settings during the pandemic. **Methods:** A systematic review was conducted using databases such as PubMed, Embase, PsychINFO, and Scopus, covering studies published from 2020 to 2021. Inclusion criteria focused on original research reporting burnout prevalence among HCWs in ICUs and EDs during the pandemic. **Results:** The review included multiple studies indicating high burnout prevalence among HCWs, ranging from 49.3% to 58%. Variations were noted across different professional roles, with nurses exhibiting higher burnout rates than physicians. Factors contributing to burnout included inadequate access to personal protective equipment, increased workload, and insufficient organizational support. **Conclusion:** The findings highlight a critical need for targeted interventions to address burnout among HCWs in ICUs and EDs during the ongoing pandemic. Strategies to improve workplace conditions, enhance communication, and provide adequate resources are essential to mitigate the psychological burden faced by HCWs.

Keywords---COVID-19, burnout, healthcare workers, intensive care units, emergency departments

1. Introduction

Following the emergence of the SARS-CoV-2 virus in China in late 2019, the COVID-19 epidemic swiftly expanded across the globe [1]. On 11 March 2020, the World Health Organization officially declared it a global pandemic [2]. The swift emergence of this critical and demanding situation has promptly placed immense strain on healthcare systems, affecting both organizational and clinical aspects. Management and organizational issues differed greatly across countries, influenced by the unique strengths and weaknesses of each national health

system. Nonetheless, the clinical challenge of managing a vast number of patients impacted by an unidentified infection, coupled with limited knowledge and resources, posed a considerable and taxing experience for healthcare workers (HCWs) globally, particularly for those in direct contact with COVID-19 patients. The heightened workload, minimal rest, sense of inadequacy, and anxiety about infection—either contracting it or transmitting it to others—are all elements that may contribute to mental health issues among healthcare workers on the front lines during the pandemic [3].

A number of studies have been carried out to explore the physical and mental effects of the COVID-19 pandemic on physicians and nurses. Significant levels of stress, anxiety, and depression were observed among healthcare workers in various European nations, including Italy, Spain, and Germany [4-8]. Similar data have been found in Mexico, Singapore, and China outside of Europe [9-13]. Systematic reviews have confirmed these results, highlighting the significant and harmful effects that the COVID-19 pandemic has had on the professionals engaged in this unprecedented struggle [14-16]. Nonetheless, a different Chinese study surprisingly revealed that physicians and nurses on the front line experienced a lower incidence of burnout than their counterparts in regular wards [17]. Consequently, even with the compelling evidence presented earlier, the data may still be potentially inconsistent, indicating that additional evidence is necessary.

Furthermore, the majority of this data was gathered from research involving healthcare workers in general. Physicians and other professionals in emergency departments and intensive care units are tasked with caring for the most critical patients, making them highly susceptible to significant risks of contagion and work-related stress. Anesthesiology is notably acknowledged as one of the most demanding medical specialties due to the heavy workload and numerous responsibilities involved [18,19]. Consequently, confronting the COVID-19 pandemic directly may have posed an extra source of stress for healthcare workers, greatly heightening the likelihood of experiencing burnout syndrome.

As far as we are aware, there have been no systematic reviews that have thoroughly assessed the effects of burnout syndrome on healthcare workers in critical-care environments during the SARS-CoV2 pandemic. The main objective of this study was to assess the prevalence of burnout among healthcare workers in intensive care units and emergency departments during the COVID-19 pandemic. The secondary aim was to identify potential factors associated with burnout to hypothesize strategies for preventing or reducing this significant psychological burden among the most exposed healthcare workers during emergencies.

2. Methods

A systematic search was conducted in PubMed, Embase, PsychINFO, and Scopus covering the period from 2020 to 2021. The inclusion criteria consisted of original studies that provided information on the prevalence or level of burnout among healthcare workers, including doctors, nurses, respiratory therapists, pharmacists, and administrators, who were working in ICUs or emergency

departments during the COVID pandemic. Only studies published in English and those that underwent peer review were included in the selection. We omitted reviews and studies pertaining to students.

3. Burnout in the healthcare workforce

Burnout among healthcare workers has become a notable issue, especially in high-pressure settings like Intensive Care Units and Emergency Departments. This review consolidates findings from multiple studies that explore the prevalence and factors linked to burnout in these environments, emphasizing the variations across different professional roles and geographic areas. The majority of studies featured in this review concentrated mainly on ICU and ED personnel [23-33]. Several studies broadened their focus to encompass healthcare workers from different medical departments, including personnel from the emergency department and intensive care unit [26,28,30]. The majority of the studies chosen included a variety of healthcare workers [23,25,26,28,31-33], whereas four studies focused solely on particular professional groups, such as physicians and nurses [24,27,29,30].

4. Tools for Assessing Burnout

Burnout scores were presented as either prevalence rates or mean values, employing a range of assessment scales. The Maslach Burnout Inventory (MBI) was the most frequently utilized tool, featured in five studies [24,27,29,30,33]. Additional scales utilized were the Professional Quality of Life Scale (ProQoL) in two studies [26,28], the Stanford Professional Fulfillment Index (SPFI), and the Well-Being Index (WBI) in one study [32], along with the Copenhagen Burnout Inventory (CBI) in another [31]. It is important to note that two studies did not provide any validated assessment scale [23,25]. The occurrence of burnout among healthcare workers showed considerable variation across different studies. According to research conducted by Wahlster [23], Sharma [25], and Chor [31], burnout rates were found to be between 49.3% [31] and 58% [25]. Research that concentrated solely on physicians revealed comparable prevalence rates, varying from 51.8% [24] to 57% [32]. Conversely, additional studies indicated lower rates of professionals experiencing high burnout, with emotional exhaustion levels varying from 3.1% [33] to 24.7% [30], depersonalization levels ranging from 12.5% [33] to 21.1% [30], and perceived lack of personal accomplishment levels from 1.1% [30] to 25% [33]. De Wit et al. observed that there was no significant time trend in burnout symptoms throughout their longitudinal study carried out from March to May 2020 [27].

Numerous studies have shown intermediate mean burnout scores according to the tools employed, taking into account various professional roles as well as specific positions like anesthetists or nurses [26,29-31]. In contrast, Buselli et al. found that ICU staff had low mean burnout scores [28]. Nurses seemed to exhibit greater levels of burnout when comparing various professional roles. Chor et al. showed that nurses had higher average burnout scores than physicians [31]. Additionally, Sharma et al. indicated that nurses experienced the highest rates of burnout at 64%, with advanced practice providers at 56%, respiratory therapists at 55%, physicians at 49%, and physicians-in-training at 48% [25]. Wahlster et

al. noted that nurses experienced an adjusted relative risk of burnout of 1.31 (95% CI, 1.13–1.53) [23].

Research examining burnout levels among healthcare workers in various departments uncovered noteworthy results. Chen et al. [30] found a significantly greater occurrence of emotional exhaustion and depersonalization among nurses in critical care units (24.7% and 21.1%, respectively) in contrast to those in non-critical care units (20.2% and 16.9%) ($p < 0.001$). Working in an ICU was identified as a predictor of emotional exhaustion (OR: 1.23, 95% CI 1.12–1.33; $p < 0.001$) and depersonalization (OR: 1.15, 95% CI 1.06–1.25; $p = 0.001$) [30]. Ruiz-Fernandez et al. identified notable variations in average burnout levels among personnel in different environments, with ICU staff showing a mean of 25.1 (SD = 5.4), ED staff at a mean of 24.6 (SD = 5.9), and staff in COVID-19-specific units reporting a mean of 28.9 (SD = 7.2) [26]. Buselli et al. discovered that there was no significant difference in burnout levels between ICU staff (mean = 19.9, SD = 5) and non-ICU staff (mean = 19.7, SD = 4.8) ($p = 0.586$) [28].

Cross-country studies revealed significant variations in the prevalence of burnout among healthcare workers. Wahlster et al. indicated that healthcare workers in North America experienced the highest rates of burnout at 57%, with those in Europe and Central Asia following at 48%. In contrast, workers in East Asia and the Pacific reported the lowest rates at 30% [23]. Azoulay et al. noted that severe burnout rates varied between 50% and 70% in several regions, such as Eastern Europe, North America, and South America, while Australia-New Zealand, India, Central Europe, and Scandinavia reported lower rates of 20% to 40% [24]. Research conducted in Southeast Asia revealed that around 50% of participants reported experiencing burnout [29,31]. Research conducted in the USA supported these findings [25,32], whereas studies from Canada indicated a lower prevalence of burnout [27].

5. Elements Related to Burnout

Several factors were recognized as playing a role in the burnout experienced by ICU and ED staff. Being 24 years old and identifying as female were linked to increased burnout rates. Other factors involved insufficient access to personal protective equipment [23,25], shortages of resources [23,32], stigma within the community [25], financial issues [25], concerns regarding COVID-19 [29], ineffective communication from supervisors [23,25], and elevated workload and job demands [23,27,29,32]. Azoulay et al. observed that clinicians facing severe burnout had a higher likelihood of smoking or using sleeping pills, while alcohol consumption did not show a significant impact [24]. Chor et al. discovered that staff who were initially working in the ED prior to the pandemic experienced a significantly higher burnout rate than those who were deployed from other departments (90.4% versus 9.6%, $p = 0.004$) [31].

The proportion of studies that fulfilled the established criteria for methodological rigor varied between 55% and 80%. It is important to highlight that none of the studies evaluated or disclosed measures implemented to tackle potential non-responders, and merely one study offered details concerning the characteristics of non-responders. Additionally, just two studies provided justification for the

sample size employed in their analyses. All studies, however, satisfied the criteria concerning the suitability of study design, clarity in defining the target population, selection of the sample frame, and consistency between reported results, conclusions, and methodological approaches.

6. Discussion

This review primarily aimed to explore the prevalence of burnout among healthcare workers in ICU and emergency departments during the COVID-19 pandemic. The prevalence of overall burnout among ICU/ED healthcare workers during the emergency was notably high, ranging from 49.3% [31] to 58% [25]. These findings align with earlier results regarding burnout in this particular group of workers prior to the pandemic [19,34-36]. Several systematic reviews have indeed examined this issue, revealing burnout prevalence rates ranging from a low of 6% [34] to 25.4% [36], and reaching as high as 41% [19] to 71.4% [36]. Furthermore, taking into account the various aspects of burnout, the prevalence of severely burned-out ICU/ED professionals before the pandemic was notable, with around 40% experiencing high emotional exhaustion, high depersonalization, and low personal accomplishment [37,38]. Therefore, while it appears evident that a significant portion of ICU/ED staff is presently experiencing burnout, this group has shown a longstanding high prevalence of this issue, and there is inadequate evidence to determine whether this prevalence has escalated as a result of the pandemic.

Interestingly, Magnavita and colleagues found that one-third of healthcare workers (not only those in ICU/ED) experienced burnout during the SARS and MERS outbreaks, and that this prevalence was comparable to what has been reported in certain categories of healthcare workers during non-epidemic periods [39]. Additionally, Amanullah and colleagues have recently investigated the issue of burnout among general healthcare workers during the COVID-19 pandemic. Similar to the specific population addressed in this review, the authors found that while the pandemic exacerbated existing challenges faced by physicians, it was not necessarily linked to an increase in burnout levels [40]. In addition to the widespread occurrence of burnout, this review highlighted several other factors that must be considered when designing future research.

Our findings indicate that ICU/ED nurses may face a greater risk of burnout in comparison to other professional roles. The findings align with other reviews concerning general healthcare workers and mental health outcomes during the pandemic. Schneider and colleagues indeed reported that nurses faced a higher risk of wellbeing issues compared to other healthcare workers [41], while Danet identified more frequent and intense symptoms of various mental conditions among nurses [42]. The results are not solely connected to the context of the pandemic. In 2016, a systematic review on burnout among ICU professionals revealed that nurses frequently work with insufficient staffing. They often report high levels of workload and overtime, and their demanding responsibilities are linked to the unpredictable nature of their roles [34]. Additionally, throughout the pandemic, nurses experienced a disruption in their daily routines, as they were tasked with providing care for patients who were abruptly separated from their families, leading to a considerable emotional strain

and a sense of inadequacy. This situation inevitably resulted in heightened psychological distress [43]. According to Laurent et al. [44], in the context of end-of-life decisions, nurses often view themselves as mere executing agents, distancing themselves from decisions they were not involved in. In this situation, patients are reduced to mere objects of treatment, while nurses find themselves unable to effectively address the needs of those in their care. During the pandemic, this feeling was likely heightened due to the overwhelming number of patients and deaths, resulting in job dissatisfaction and burnout.

Furthermore, while our findings indicated some geographical variation, it is important to emphasize that the overall prevalence of burnout consistently exceeded 20%, underscoring a significant issue worldwide. Furthermore, it is important to highlight that Australia reported the lowest overall burnout levels [23], which may be partially attributed to the reduced number of COVID-19 cases experienced in the region. Interestingly, when examining single-country research, nations that indicated a burnout prevalence of approximately 50% or more [25,29,31,32] exhibited significantly varied epidemiological conditions throughout the observation period of the studies [45], taking into account both inter-country differences and intra-country variations from the start to the conclusion of the study. For example, in Malaysia in May 2020 [29], there were significantly fewer cases in comparison to other countries (daily new confirmed COVID-19 cases per million people: beginning of the study = 1.68; end = 2.53). In other countries experiencing a similar prevalence of burnout, the daily new confirmed cases per million were approximately 80 or higher, whether looking at the start or the conclusion of these studies [25,31]. The study conducted by Gomez et al. stood out as an exception, demonstrating the greatest variability, starting with fewer than 1 case per million and escalating to 63.14 cases per million by the conclusion [32]. Furthermore, in the studies referenced above, the stringency index (SI) ranged from 0 to 100, with 100 indicating the most stringent measures implemented [45]. The SI consistently remained above 70 [25,29,31], with the exception of the study from the USA, which commenced when the SI was at 8.33 [32].

It is important to highlight that the studies indicating the lowest rates of high burnout [27,30] were carried out in countries where, throughout the observation period, the daily new case numbers per million were significantly lower than in countries experiencing higher burnout levels (Canada: start of the study = 0.21, end = 31.25 [27]; China: start = 0.03, end < 0.01 [30]) and in countries with a SI of approximately 70 or less. In a similar vein, the epidemiological situation varied both between and within studies that reported intermediate mean values of burnout [26,29,30,31]. Furthermore, the Italian study that indicated a low mean value of burnout [28] was conducted during a period that did not have fewer cases per million when compared to the studies that showed intermediate values. In examining cross-country research, the connection between the epidemiological situation [45] and burnout appeared more evident; however, these studies encompassed very broad geographical regions, which rendered comparisons less precise. During the observation period of the study conducted by Azoulay and colleagues, it was noted that North America, South America, and the UK exhibited some of the highest rates of burnout, alongside the greatest number of daily new cases per million. In contrast, Australia and New Zealand reported the lowest

levels of burnout and the fewest cases per million [24]. Wahlster et al. similarly revealed that North America exhibited the highest prevalence of burnout, while the East Asia and Pacific region reported the lowest. Specifically, there were more than 50 daily new cases per million in the USA, exceeding 80, compared to fewer than 10 in the latter region [23].

Regrettably, the studies did not provide sufficient data to determine whether burnout fluctuated throughout the observation period and the epidemiological context, with the exception of the Canadian study [27], which indicated no notable time trend in symptoms from March to May 2020. Furthermore, we are unable to draw conclusions regarding any changes in burnout prevalence throughout the pandemic, as the studies included were conducted only until May 2020. Future studies ought to concentrate on the connection between burnout and the various stages of the pandemic.

This review ultimately identified multiple factors linked to burnout. Various socio-demographic factors, including age and female gender, have frequently been linked to burnout, both prior to the pandemic among ICU/ED workers and during the pandemic among general healthcare workers. Additionally, age and gender have been linked to various other mental health conditions among general healthcare workers during the COVID-19 pandemic [41,42,46,47]. The work environment, communication, and support from supervisors have been shown to influence burnout among ICU/ED workers prior to the pandemic, as well as affecting other mental health outcomes during the pandemic. Numerous studies carried out prior to the pandemic indicated that a key factor contributing to burnout is workload and job demand [19,34,37]. During the pandemic, the workload and job demands may have risen, affecting the health of healthcare workers, particularly in relation to burnout and various mental health issues. Finally, we discussed additional variables that are particularly relevant to COVID-19 and other outbreaks, which have been highlighted in various reviews concerning healthcare workers and mental health. These include resource shortages (e.g., personal protective equipment) [46], the perceived threat of COVID-19 [46], and community stigma [48].

The impact of SARS-CoV2 on health care workforces was significant, leading to a sudden and substantial increase in workload amidst uncertainty. It is evident that burnout is just one of the potential mental health consequences that arose from this challenging situation. Indeed, numerous reviews highlighted various mental health outcomes among healthcare workers, extending beyond just ICU and emergency department professionals. For instance, the prevalence of depression, anxiety, and post-traumatic stress disorders (PTSD) was found to be notably high [47], although it did not reach the levels seen for burnout as indicated by numerous studies included in this review. Both stress and insomnia have notably reached levels similar to burnout, underscoring the critical necessity for interventions aimed at supporting the mental health of healthcare workers. Given that certain studies we have chosen indicated a higher frequency or severity of burnout among ICU/ED staff compared to employees in other departments [26,30], it is important to explore further whether other mental health outcomes might be more pertinent to our target population.

This review has several limitations that should be recognized. The limited number of included papers, variations in methodology, and differences in reporting methods among the studies hindered a more accurate summary and rendered a meta-analysis unfeasible. Tools for assessing burnout have several limitations that Mealer and Moss [54] have thoroughly discussed, and these issues are even more pertinent in the context of the pandemic, given the significant challenges faced by ICU/ED staff. In studies examining burnout, it is essential to exclude the possibility that symptoms arise from being inexperienced or from non-work-related issues, while also considering other significant psychological problems in conjunction with burnout. Given the absence of a comprehensive tool to assess expertise and events occurring outside the workplace, along with the frequent oversight of other significant disorders, it becomes challenging to accurately gauge the plausibility of burnout data. Furthermore, the ICU setting constitutes a unique environment in which even the most commonly utilized tools, like the MBI, may not be suitable. These instruments fail to account for ICU-related triggers, such as the stress caused by multiple monitoring alarms and the care of families during traumatic situations. Additionally, they do not recognize that these triggers may intersect with other mental disorders, including depression, anxiety, and PTSD [49-52].

Additionally, we omitted studies that reported burnout prevalence among all healthcare workers, including ICU and emergency department staff, but failed to provide specific data regarding the burnout levels of ICU and ED personnel. Therefore, we did not address all available information regarding ICU/ED workers. It is important to highlight that the chosen studies pertained solely to early 2020 (up to May); consequently, we lacked an estimate for burnout prevalence throughout the various phases of the pandemic. Furthermore, since burnout is inherently a chronic process, acute and cross-sectional measurements taken during the initial months of the pandemic may not provide a complete understanding of this phenomenon [53].

The critical appraisal revealed significant concerns about the sampling frame utilized through online questionnaires: while this approach may be deemed appropriate given the exceptional circumstances, it risks excluding individuals who do not engage with mail or comparable tools. Only four studies employed a selection process that was likely to yield a representative sample. The characteristics of non-responders were not detailed, which could have been beneficial in assessing the representativeness of the sample. Additionally, the unexpected increase in workload may have influenced both the response rate and the willingness to participate. Finally, a thorough explanation of sample-size justification was seldom provided, and accounts of statistical methods were frequently lacking in detail.

7. Summary

This review emphasized the significant occurrence of burnout symptoms within our target population. Given that the pandemic is still in progress, a definitive assessment of burnout cannot be established at this time. This paper offers a comprehensive overview of data concerning the initial phase of the pandemic, a time when the entire world confronted an unprecedented threat.

The document also highlighted significant and potentially adjustable factors that lead to the onset of burnout in the specified environments, including access to personal protective equipment, communication among staff members, and organizational elements. Additional research is essential, especially comparative studies assessing interventions across various organizational contexts, to enhance our understanding of how to address and alleviate this significant psychological burden. Various interventions have proven effective in preventing or reducing burnout levels among healthcare workers, both individually (such as educational and mindfulness-based interventions) and organizationally (like enhancing workflow management) [54-57]. Pollock and colleagues pointed out the insufficient strong evidence regarding effective interventions for the resilience and mental health of healthcare workers during or after epidemics and pandemics [58], indicating that this matter requires further investigation. For future research, it would be valuable to explore the number of hospitals that have implemented interventions to combat burnout, examine the specific characteristics of these support interventions, and assess how many centers were equipped to handle the challenges of burnout during the pandemic. Furthermore, our findings indicated that special consideration must be given to nurses during the planning of interventions. Finally, it would be beneficial to establish a uniform definition of burnout along with associated assessment tools to gain a clearer estimate and a deeper understanding of this matter.

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أثر COVID-19 على الإرهاق بين العاملين في الرعاية الصحية في وحدات العناية المركزة وأقسام الطوارئ: مراجعة الملخص

الخلفية: لقد أثر وباء COVID-19 بشكل كبير على أنظمة الرعاية الصحية حول العالم، مما أدى إلى زيادة الضغط والإرهاق بين العاملين في مجال الرعاية الصحية (HCWs)، وخاصة في وحدات العناية المركزة (ICUs) وأقسام الطوارئ (EDs). تهدف هذه الدراسة إلى تقييم انتشار الإرهاق في هذه البيئات عالية الضغط خلال الوباء.

الطرق: تم إجراء مراجعة منهجية باستخدام قواعد البيانات مثل PubMed وEmbase وPsycINFO وScopus، تغطي الدراسات المنشورة من 2020 حتى 2021. شملت معايير الإدراج الأبحاث الأصلية التي تتناول انتشار الإرهاق بين العاملين في الرعاية الصحية في وحدات العناية المركزة وأقسام الطوارئ خلال الوباء.

النتائج: شملت المراجعة العديد من الدراسات التي تشير إلى ارتفاع معدل الإرهاق بين العاملين في الرعاية الصحية، حيث تراوح النسبة بين 49.3% و58%. لوحظت اختلافات عبر الأدوار المهنية المختلفة، حيث أظهرت الممرضات معدلات إرهاق أعلى من الأطباء. تشمل عوامل المساهمة في الإرهاق نقص الوصول إلى معدات الحماية الشخصية، وزيادة عبء العمل، وعدم كفاية الدعم التنظيمي.

الخلاصة: تبرز النتائج الحاجة الماسة إلى تدخلات مستهدفة لمعالجة الإرهاق بين العاملين في الرعاية الصحية في وحدات العناية المركزة وأقسام الطوارئ خلال الوباء المستمر. تعتبر استراتيجيات تحسين ظروف العمل، وتعزيز الاتصال، وتوفير الموارد الكافية أمورًا ضرورية لتخفيف العبء النفسي الذي يواجهه العاملون في الرعاية الصحية.

الكلمات المفتاحية: COVID-19، الإرهاق، العاملون في الرعاية الصحية، وحدات العناية المركزة، أقسام الطوارئ