

MENTAL HEALTH DISORDERS AMONG HEALTHCARE WORKERS AFTER THE COVID-19 PANDEMIC

Mariangela Giummarresi ¹, Mario Fiorito ¹, Salvatore Cocuzza ², Antonino Maniaci ³, Jerome R Lechien ^{4,5,6,7}, Salvatore Lavalle ³, Luigi La Via ^{1*}

1. Azienda Ospedaliera Universitaria Policlinico "G. Rodolico-San Marco", Catania, Italy
2. Department of Medical and Surgical Sciences and Advanced Technologies "GF Ingrassia" ENT Section, University of Catania, Catania, Italy;
3. Faculty of Medicine and Surgery, University of Enna "Kore", Enna, Italy
4. Department of Otolaryngology, Elsan Hospital, Paris, France.
5. Department of Otolaryngology-Head & Neck Surgery, Foch Hospital, School of Medicine, UFR Simone Veil, Université Versailles Saint-Quentin-en-Yvelines (Paris Saclay University), Paris, France.
6. Division of Laryngology and Bronchoesophagology, Department of Otolaryngology Head Neck Surgery, EpiCURA Hospital, UMONS Research Institute for Health Sciences and Technology, Faculty of Medicine, University of Mons (UMons), Mons, Belgium.
7. Department of Otolaryngology-Head & Neck Surgery, CHU Saint-Pierre (CHU de Bruxelles), Brussels, Belgium.

ARTICLE INFO

Article history:

Received 27 May 2024

Accepted 05 Oct 2024

Published 30 Dec 2024

Keywords:

PTSD, anxiety, depression, distress, health, Sars Cov-2.

ABSTRACT

The COVID-19 pandemic had a great impact on the mental health of healthcare workers (HCW) worldwide. Studies have reported a high prevalence of anxiety, depression, insomnia, and post-traumatic stress disorder among HCWs, with frontline workers experiencing higher rates of mental health issues. This comprehensive review focuses on the prevalence of mental health problems among HCWs in the aftermath of the pandemic, discussing contributing factors and examining interventions. Factors leading to this increased prevalence include increased workload, high levels of stress, lack of personal protective equipment, stigmatization, and pre-existing mental health disorders. Initiatives to improve the mental health of HCWs may include providing psychosocial support, strengthening organizational backing, offering appropriate training and education, implementing flexible work schedules, conducting mental health screenings, and encouraging self-care practices. Further research is needed to understand long-term outcomes, factors influencing resilience, vulnerability and the impact on HCWs in different settings.

© EuroMediterranean Biomedical Journal 2024

1. Introduction

Coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was first identified in late December 2019 in the city of Wuhan, China (1). Severe cases of COVID-19 usually present with acute respiratory distress syndrome (ARDS), but the infection may also be multisystemic (2), thus impacting cardiovascular function (3, 4), coagulation (5), gastrointestinal activity (2), immunomodulation (6, 7) and other districts (8-11).

The onset of the COVID-19 pandemic, and the speed of its diffusion on the world's population (with now >700 million people infected and 6.9 million deaths in 233 countries), has put a strain on the mental health of healthcare workers (HCWs) globally (12, 13).

As key players on the crisis front line, HCWs grappled with several challenges. These emphasized the complexities of an environment already highly susceptible to mental stress (14).

* Corresponding author: Luigi La Via, luigilavia7@gmail.com

DOI: 10.3269/1970-5492.2024.19.15

All rights reserved. ISSN: 2279-7165 - Available on-line at www.embj.org

Various studies indicated that during the early stages of the pandemic, working in such high-stress environments resulted in HCWs experiencing emotions of threat, uncertainty, and fatigue (13, 15). These challenges were exacerbated by the high risk of infection, insufficient protective equipment, inconsistent communications, and a significant increase in workload (16-19). It is therefore not surprising that in line with findings on previous epidemics (20, 21), a number of early reviews have documented a wide range of mental health issues among hospital HCWs during the pandemic.

In fact, existing research has demonstrated a high prevalence of anxiety, depression, insomnia, and post-traumatic stress disorder (PTSD) among HCWs, with frontline workers being particularly susceptible to these mental health problems (22). Moreover, the experiences of HCWs during the pandemic have been linked to increased psychological distress, burnout, and reduced quality of life (23). It is essential to acknowledge the long-term implications of mental health problems among HCWs, as these may not only affect the well-being of the individuals involved but also impact the quality of care provided to patients. In addition, understanding the mental health consequences of the pandemic on HCWs is crucial for developing effective interventions and fostering resilience among this population (24). This comprehensive narrative review aimed to provide an overview of mental health problems experienced by HCWs during and after the COVID-19 pandemic, identify contributing factors, and explore potential interventions.

2. Material and methods

A comprehensive review of the literature was performed on Pubmed and Medline in order to find studies on the prevalence of mental health-related issues that may occur in HCWs in the context of a pandemic and in post-pandemic conditions and proposed strategies to cope with them. Due to the extensive nature of this topic, with a wide range of mental health issues, a systematic review was not feasible. The authors also focused on factors contributing to mental health problems among HCWs and future possible strategies and directions for further research. Beyond conducting an extensive literature search, we also reviewed the references of the included publications to ensure the capture of all pertinent articles.

3. Results

Epidemiology of mental health problems among HCWs

Several studies conducted during the COVID-19 pandemic have reported a high prevalence of mental health disorders, such as anxiety, depression, insomnia, and post-traumatic stress disorder (PTSD), among HCWs (25-27). A systematic review and meta-analysis conducted by Pappa et al. (22) reported that the prevalence of anxiety, depression, and insomnia among HCWs was 23.2%, 22.8%, and 38.9%, respectively. Another meta-analysis by Salari et al. (28) found that the pooled prevalence of anxiety and depression among HCWs during the COVID-19 pandemic was 23.9% and 24.3%, respectively. Moreover, the prevalence of mental health problems has been reported to be higher among frontline HCWs who have been in direct contact with COVID-19 patients compared to non-frontline HCWs (15). A study by Lai et al. (29) found that the prevalence of mental health problems among frontline nurses was higher than among other healthcare professionals, with 50.4% of nurses reporting symptoms of depression, 44.6% experiencing anxiety, and 36.1% suffering from insomnia.

The prevalence of PTSD among HCWs has also been found to be higher during the COVID-19 pandemic compared to before the pandemic. A study conducted in Italy by Carmassi et al. (19) reported that as many as 49.4% of the HCWs surveyed experienced PTSD symptoms during the pandemic. These findings highlight the significant psychological burden experienced by HCWs during the COVID-19 pandemic.

A meta-analysis conducted by Saragih I.D. et al. (12) selected 38 studies from 2020, from different countries around the world, for a total of 53,784 participants involved in all the studies distributed among the professions: 27.9% were doctors, 43.7% were nurses and 7.0% were allied HCWs. Again, the range of mental health problems among HCWs in the studies was as follows: depression, 8%-95%; anxiety, 3%-97%; distress, 3%-76%; and post-traumatic stress disorder, 3%-84%. Numbers differ from the study conducted by Salari et al. in 2020(28) as compared to the latter; the analysis suggested that the aggregate prevalence of post-traumatic stress disorder, anxiety, depression, and distress among HCWs during the COVID-19 pandemic (49%, 40%, 37%, and 37%, respectively), meaning higher percentages, suggests a worsening of the situation as the pandemic continued to spread.

Anxiety

In particular, anxiety seems to be the disorder with the greatest increase, as well as the most present in the various categories (30). Anxiety among HCWs during COVID-19 was related to many factors, especially for those directly involved in the care of suspected or confirmed patients with COVID-19, including worry about becoming infected while caring for these patients and the possibility of spreading the infection to their family, uncertainty regarding whether the organization they work for would support or care for their personal or familial needs if they became infected with COVID-19 (30), and a lack of confidence in the ability to cope with stress (31). HCWs also reported experiencing stigma from society, changes to their regular job duties, and working overtime as additional circumstances that add to the feeling of anxiety (32). Finally, anxiety among HCWs depends on individual, environmental, and social factors. Consequently, they might also experience weakened confidence in healthcare providers.

Depression

The average prevalence of depression in HCWs from 30 studies was 36% (33). Current evidence suggests that HCWs fear getting infected and this leads to occurrence of depression.

Their fear of becoming the source of infection and spreading it to their families or loved ones also resulted in excessive stress (28). It was explained that HCWs are more likely to develop depressive symptoms when they work in a high-risk environment and when they are directly involved in the COVID-19 patients' daily care (34). In particular, it is clear that nurses are more predisposed to developing depression, due to the very nature of their job, which places them in closer contact with patients than other operators.

Distress

Front-line HCWs were found to experience severe distress, according to the findings from Italy (35). Not only being on the front line, but also the increase in work demands, changing work environments, and new conditions as bulky equipment predisposing to inadequacy and destabilization of the mood of HCWs, resulting in distress and emotional-breakdowns associated with the high workloads correlated to the increasing number of patients infected with COVID-19 (36).

Post-Traumatic Stress Disorder (PTSD)

Of all mental disorders, PTSD appears to be the most serious, at least in terms of duration. In fact, while anxiety, depression, and discomfort will hopefully decrease as the pandemic wanes, PTSD will persist as it is the most frequent long-term disorder (37). Those who develop post-traumatic stress disorder symptoms are profoundly affected by other conditions, including severe anxiety and depression (38). Anger, anxiety, fear, and depression might occur at the peak of mental health suffering during an outbreak.

In a recently published review on 458,754 HCWs (39), authors tried to differentiate the impact in terms of mental health, also on different professions, with the aim of identifying groups at greatest risk of developing mental health problems. Prevalence rates were stratified by physicians, nurses, allied health, support staff, and healthcare students, which varied considerably. There were significantly higher odds of probable mental health disorders in women, those working in high-risk units, and those providing direct care. Results show that the pooled prevalence rates of depression were similar among nurses (28.0 %, 95 % confidence interval - CI: 24.5 %–31.7 %) and support staff (30.2 %, 95 % CI: 24.3 %–36.5 %), which was higher than physicians (25.3 %, 95 % CI: 21.8 %–29.0 %, $p < 0.0001$), allied health (23.5 %, 95 % CI: 17.9 %–39.5 %, $p < 0.0001$) and non-medical staff (22.9 %, 95 % CI: 17.4 %–28.9 %, $p < 0.0001$), but was lower than healthcare students (35.7 %, 95 % CI: 3.1 %–78.9 %, $p < 0.0001$). Two recent studies reported prevalence rates of probable mental health disorders before and one month after COVID-19 outbreaks in their local area (18, 40). In the study by Cai et al. (18), they investigated two separate samples of nurses ($n-T1=709$, $n-T2=621$) recruited from the same sample frame at two different time points. Their results show that the prevalence of depression, anxiety, and PTSD had a significant decrease after the outbreaks, but insomnia remained similar to baseline rates. Doulias et al. (40) had similar results in their repeated measures study ($n-T1: 93$, $n-T2: 103$) with regard to the prevalence of depression and anxiety, showing a large decrease in prevalence rates of both outcomes.

Factors Contributing to Mental Health Problems Among HCWs

Several studies have delved into the reasons behind the amplified occurrence of mental health issues among HCWs throughout the COVID-19 pandemic. A myriad of factors has been found to contribute to this concerning trend. One such factor is the increased workload and elongated working hours that HCWs have had to contend with (13). Due to the surging demand for healthcare services amid the pandemic, HCWs have had to work extra hours, leading to physical exhaustion, sleep deprivation, and thereby escalating the risk of mental health problems (23). Adding to the mental strain is the high level of stress associated with the pandemic (20).

HCWs are constantly under the fear of contracting the virus themselves or inadvertently transmitting it to their loved ones, including medical students and residents (41). Not to mention, the emotional toll it takes to deal with critically ill patients and the ethical dilemmas posed by the need to allocate scarce resources. A significant stressor has been the lack of Personal Protective Equipment (PPE) (36). Particularly in the early phases of the pandemic, the shortage of PPE has heightened the risk of infection for HCWs, adding to their levels of anxiety and stress. Moreover, HCWs have been subjected to stigmatization and social isolation due to their potential exposure to the virus. This has had a deleterious effect on their mental health and overall well-being.

Lastly, pre-existing mental health problems have also played a role. Those HCWs who have a history of mental health issues have been found to be more susceptible to experiencing an exacerbation of their symptoms during the COVID-19 pandemic (42).

Interventions and Support for HCWs

The high prevalence of mental health issues among HCWs necessitates the development and implementation of interventions and support systems aimed at their psychological well-being. Various strategies have been put forth to address this concern. One such strategy is the provision of psychosocial support (25, 43). By offering psychological first aid, counseling services, and peer support groups, HCWs can be better equipped to deal with the stress and emotional challenges that come with their roles during a pandemic (44, 45). Institutional support plays a crucial role as well. Healthcare organizations can ease stress and anxiety by ensuring an adequate supply of PPE, creating rest areas and facilities for HCWs, and facilitating communication between HCWs and their families (24). Another avenue of support is through training and education. By teaching HCWs stress management techniques, coping strategies, and self-care practices, they can gain the tools necessary to better manage their mental health during these trying times (45). Moreover, implementing flexible work schedules and allowing time off can also help in reducing burnout and mitigating the negative impact of prolonged working hours on their mental health. In addition, regular mental health screenings and monitoring can aid in identifying HCWs at risk of developing mental health problems, thereby facilitating early intervention. Promoting self-care is another important strategy (42). Encouraging HCWs to engage in self-care activities such as exercise, ensuring adequate sleep, and maintaining social connections can significantly improve their mental well-being. Lastly, the concept of "stress response" as a positive challenge should be introduced (28). The idea is to conceptually separate stress from stress responses, suggesting that stress responses can be optimized regardless of the intensity of the stressful experience. This optimization is achieved by adopting a positive valuation of stress, or a perception that stress can be beneficial. From an epidemiological perspective, a positive attitude towards stress and resilience can contribute positively to mental health as this attitude fundamentally influences how individuals respond to stressful experiences. Increasing evidence shows that individuals with a "stress-is-enhancing" mindset experience fewer negative outcomes in stressful situations, such as reduced anxiety, lower perceived distress, and depressive symptoms (45). They also enjoy positive outcomes such as lower anxiety, greater positive affect, improved health, and higher life satisfaction. A comprehensive flowchart including all the possible interventions to use in order to face mental health disorders in HCWs is provided as Figure 1.

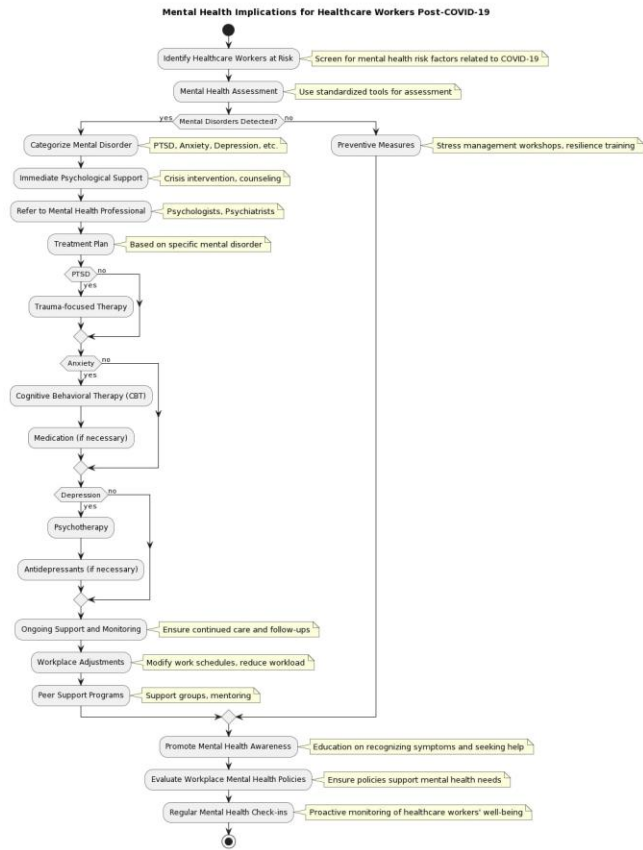


Figure 1. Comprehensive flowchart on the possible interventions to face mental health disorders in HCWs.

4. Discussion

Future Research and Challenges

Existing literature offers valuable insights into the pervasiveness of mental health issues among HCWs during the COVID-19 pandemic, yet several areas require further exploration. One such area is the long-term mental health outcomes. Most current studies have zeroed in on the immediate mental health impact of the pandemic on HCWs. Hence, longitudinal studies are necessary to examine the enduring effects of the pandemic on HCWs' mental health. Understanding factors that influence resilience and vulnerability also warrants more attention. Future research should delve into factors that contribute to resilience or vulnerability to mental health problems among HCWs, such as individual coping strategies, social support, and organizational factors. The effectiveness of interventions is another critical area for study. Rigorous evaluation is needed to gauge the effectiveness of interventions designed to foster mental health and well-being among HCWs during and after the COVID-19 pandemic.

Lastly, a more global perspective needs to be adopted. Much of the current literature on the mental health of HCWs during the COVID-19 pandemic is sourced from high-income countries. More research is necessary to understand the pandemic's impact on the mental health of HCWs in low- and middle-income countries. In our review, we underscore the immense toll the pandemic has taken on the overall health

and mental well-being of HCWs. In fact, HCWs at the frontline continue to care for COVID-19 patients, many of whom succumb to the disease despite their best efforts. This impacts HCWs' professional level, overall morale and determination. Many HCWs face these challenges in dire conditions, where lack of resources, pay, or access to basic personal protective equipment adds to the pressures while they're simultaneously trying to save lives. Despite these adverse conditions, these frontline workers continue to provide care round the clock to the best of their ability. Our findings show that more than a quarter of the healthcare workforce experienced mental health problems during the COVID-19 pandemic. To address this critical issue at this crucial time, global leaders and stakeholders should develop resources for the healthcare workforce to address their mental health problems. Screening for mental health problems among HCWs and providing necessary referrals could also be beneficial.

The COVID-19 pandemic had a profound impact on the mental health of HCWs worldwide. The high prevalence of anxiety, depression, insomnia, and PTSD among HCWs highlights the need for interventions and support systems to address their psychological well-being. We showed that the most prevalent mental health disorder experienced by HCWs was post-traumatic stress disorder, followed by anxiety, depression, and distress. The global population has a responsibility to heal their healers, establishing a resilient workforce environment, and respecting their totality. Strong recommendations are aimed at governments, policy-makers, and relevant stakeholders to pay close attention to and address the mental health burdens of HCWs. In addition, findings from this study have provided an updated and more precise estimate of the overall estimated prevalence of mental health issues being experienced by hospital HCWs during COVID-19, which has remained high even with newer studies, additional countries, a substantially larger sample size and the addition of clinically significant thresholds. Given these findings and the ongoing nature of the COVID-19 pandemic, it is evident that support is imminently needed to prevent, reduce, and treat these clinically significant symptoms of mental health disorders found in hospital HCWs working during COVID-19. Future research should focus on understanding the long-term mental health outcomes of the pandemic, identifying factors that influence resilience and vulnerability, evaluating the effectiveness of interventions, and examining the impact of the pandemic on HCWs in diverse settings.

5. Conclusions

Governments and policy-makers should effectively respond to the mental health burdens faced by HCWs by prioritizing mental health as an integral part of overall healthcare and emergency response planning. Adequate funding and resource allocation for mental health services, including intervention programs and research, would be crucial. Legislation and clear policies protecting the mental health of HCWs, preventing discrimination, and mandating regular mental health check-ups are thus necessary. Governments should also foster collaboration with professional healthcare organizations and labor unions to develop supportive strategies. Offering education and training programs can enhance HCWs' skills in stress management and mental health maintenance. Ensuring easy access to mental health services, through on-site provisions, telehealth options, and health insurance coverage, is vital. Lastly, regular monitoring and assessment of HCWs' mental health can facilitate early interventions. In essence, an all-encompassing, multi-faceted approach is required to address the mental health burdens of HCWs.

Funding: This research received no external funding

Institutional Review Board Statement: Not applicable

Data Availability Statement: Not applicable

Conflicts of interests: The authors declare no conflict of interest

References

- Sharma A, Ahmad Farouk I. COVID-19: A Review on the Novel Coronavirus Disease Evolution, Transmission, Detection, Control and Prevention. *Nature*. 2021;13(2).
- Elrobaa IH, New KJ. COVID-19: Pulmonary and Extra Pulmonary Manifestations. *Frontiers in public health*. 2021;9:711616.
- Huang S, Vignon P, Mekontso-Dessap A, Tran S, Prat G, Chew M, et al. Echocardiography findings in COVID-19 patients admitted to intensive care units: a multi-national observational study (the ECHO-COVID study). *Intensive care medicine*. 2022;48(6):667-78.
- Huang S, Vieillard-Baron A, Evrard B. Echocardiography phenotypes of right ventricular involvement in COVID-19 ARDS patients and ICU mortality: post-hoc (exploratory) analysis of repeated data from the ECHO-COVID study. *Viruses*. 2023;49(8):946-56.
- Wool GD, Miller JL. The Impact of COVID-19 Disease on Platelets and Coagulation. *Pathobiology : journal of immunopathology, molecular and cellular biology*. 2021;88(1):15-27.
- Novak N, Peng W, Naegeli MC, Galvan C, Kolm-Djamei I, Brügggen C, et al. SARS-CoV-2, COVID-19, skin and immunology - What do we know so far? 2021;76(3):698-713.
- Sanfilippo F, Martucci G, La Via L, Cuttone G, Dimarco G, Pulizzi C, et al. Hemoperfusion and blood purification strategies in patients with COVID-19: A systematic review. *Artificial organs*. 2021;45(12):1466-76.
- Lechien JR, Hsieh JW, Ayad T, Fakhry N, Hans S, Chiesa-Estomba CM, et al. Gustatory dysfunctions in COVID-19. *European archives of oto-rhino-laryngology : official journal of the European Federation of Oto-Rhino-Laryngological Societies (EUFOS) : affiliated with the German Society for Oto-Rhino-Laryngology - Head and Neck Surgery*. 2020;277(8):2397-8.
- Ozben T, Oliva G, Kaleci S, Iannella R, Tomasi A, Iannella G. Impact of COVID-19 pandemic on the incidence of otitis media with effusion in adults and children: a multicenter study. *J Clin Lab Anal*. 2022;279(5):2383-9.
- Lechien JR, Saussez S, Vaira LA, Hans S. Post-COVID-19 Dysphonia may have Several Origins. *Indian journal of otolaryngology and head and neck surgery : official publication of the Association of Otolaryngologists of India*. 2022;74(Suppl 2):3202-3.
- Vaira LA, Hopkins C, Petrocelli M, Lechien JR, Cutrupi S, Salzano G, et al. Efficacy of corticosteroid therapy in the treatment of long- lasting olfactory disorders in COVID-19 patients. *Rhinology*. 2021;59(1):21-5.
- Saragih ID, Tonapa SI, Saragih IS, Advani S, Batubara SO, Suarilah I, et al. Global prevalence of mental health problems among healthcare workers during the Covid-19 pandemic: A systematic review and meta-analysis. *International journal of nursing studies*. 2021;121:104002.
- La Via L, Sangiorgio G, Stefani S, Marino A, Nunnari G, Cocuzza S, et al. The Global Burden of Sepsis and Septic Shock. *Epidemiologia (Basel)*. 2024;5(3):456-478.
- Digby R, Winton-Brown T. Hospital staff well-being during the first wave of COVID-19: Staff perspectives. 2021;30(2):440-50.
- Chew NWS, Lee GKH, Tan BYQ, Jing M, Goh Y, Ngiam NJH, et al. A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain, behavior, and immunity*. 2020;88:559-65.
- Lowe S, Joo JY. Nurses' barriers to caring for patients with COVID-19: a qualitative systematic review. *PLoS One*. 2021;68(2):202-13.
- Hennein R. A hybrid inductive-abductive analysis of health workers' experiences and wellbeing during the COVID-19 pandemic in the United States. *International journal of mental health nursing*. 2020;15(10):e0240646.
- Cai Z, Cui Q, Liu Z, Li J, Gong X, Liu J, et al. Nurses endured high risks of psychological problems under the epidemic of COVID-19 in a longitudinal study in Wuhan China. *Journal of psychiatric research*. 2020;131:132-7.
- Carmassi C, Foghi C, Dell'Oste V, Cordone A, Bertelloni CA, Bui E, et al. PTSD symptoms in healthcare workers facing the three coronavirus outbreaks: What can we expect after the COVID-19 pandemic. *International nursing review*. 2020;292:113312.
- Preti E, Di Mattei V, Perego G, Ferrari F, Mazzetti M, Taranto P, et al. The Psychological Impact of Epidemic and Pandemic Outbreaks on Healthcare Workers: Rapid Review of the Evidence. *Current psychiatry reports*. 2020;22(8):43.
- Carmassi C, Korkmaz S, Kazgan A, Çekiç S, Tartar AS, Balcı HN, et al. The anxiety levels, quality of sleep and life and problem-solving skills in healthcare workers employed in COVID-19 services. *Int J Environ Res Public Health*. 2020;80:131-6.
- Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsis E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain, behavior, and immunity*. 2020;88:901-7.
- Dhumal G, Nimkar S, Mave V, Gupta A, Cox SR, Gupte N, et al. Professional Quality of Life and Mental Health Outcomes among Health Care Workers Exposed to Sars-Cov-2 (Covid-19). *Brain and behavior*. 2020;17(17).
- Finstad GL, Giorgi G, Lulli LG, Pandolfi C, Foti G. Resilience, Coping Strategies and Posttraumatic Growth in the Workplace Following COVID-19: A Narrative Review on the Positive Aspects of Trauma. 2021;18(18).

25. Greenberg N, Docherty M, Gnanapragasam S, Wessely S. Managing mental health challenges faced by healthcare workers during covid-19 pandemic. *BMJ (Clinical research ed)*. 2020;368:m1211.
26. Vindegaard N, Benros ME. COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. *Brain, behavior, and immunity*. 2020;89:531-42.
27. Spoorthy MS, Pratapa SK, Mahant S. Mental health problems faced by healthcare workers due to the COVID-19 pandemic-A review. *Asian journal of psychiatry*. 2020;51:102119.
28. Salari N, Khazaie H, Hosseinian-Far A, Khaledi-Paveh B, Kazemini M, Mohammadi M. The prevalence of stress, anxiety and depression within front-line healthcare workers caring for COVID-19 patients: a systematic review and meta-regression. 2020;18(1):100.
29. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA Netw Open*. 2020;3(3):e203976.
30. Shanafelt T, Ripp J, Trockel M. Understanding and Addressing Sources of Anxiety Among Health Care Professionals During the COVID-19 Pandemic. *JAMA : the journal of the American Medical Association*. 2020;323(21):2133-4.
31. La Via L, Santonocito C, Bartolotta N, Lanzafame B, Morgana A, Continella C, et al. α -2 agonists vs. fentanyl as adjuvants for spinal anesthesia in elective cesarean section: a meta-analysis. *Minerva Anestesiol*. 2023;89(5):445-454.
32. Yenesew N, Temtmie Z, Tolosie K, Khanal P. Mental health impacts among health workers during COVID-19 in a low resource setting: a cross-sectional survey from Nepal. *Psychology research and behavior management*. 2020;16(1):89.
33. Li Y, Scherer N. Prevalence of depression, anxiety and post-traumatic stress disorder in health care workers during the COVID-19 pandemic: A systematic review and meta-analysis. 2021;16(3):e0246454.
34. Di Tella M, Romeo A. Mental health of healthcare workers during the COVID-19 pandemic in Italy. *Globalization and health*. 2020;26(6):1583-7.
35. Benfante A, Castelli L, Moccia L, Janiri D, Pepe M, Dattoli L, et al. Affective temperament, attachment style, and the psychological impact of the COVID-19 outbreak: an early report on the Italian general population. *Journal of evaluation in clinical practice*. 2020;87:75-9.
36. Shohaimi S, Daneshkhah A, Eskandari S, Liu Q, Luo D, Haase JE, et al. The experiences of health-care providers during the COVID-19 crisis in China: a qualitative study. *Human resources for health*. 2020;8(6):e790-e8.
37. Robertson E, Hershenfield K, Grace SL, Stewart DE. The psychosocial effects of being quarantined following exposure to SARS: a qualitative study of Toronto health care workers. *Canadian journal of psychiatry Revue canadienne de psychiatrie*. 2004;49(6):403-7.
38. Johnson SU, Ebrahimi OV, Hoffart A. PTSD symptoms among health workers and public service providers during the COVID-19 outbreak. *PLoS One*. 2020;15(10):e0241032.
39. Lee BEC, Ling M, Boyd L, Olsson C, Sheen J. The prevalence of probable mental health disorders among hospital healthcare workers during COVID-19: A systematic review and meta-analysis. *Journal of affective disorders*. 2023;330:329-45.
40. Doulias T, Thrikandiyur AA, Titus N, Soundararasha K, Coxon A, Amaranthidis E, et al. Junior doctors' wellbeing at peak and post-peak pandemic: a repeated cross-sectional study. *Annals of the Royal College of Surgeons of England*. 2023;105(1):43-51.
41. Bonaccorso N, Tripoli G, Vella I, et al. Psychological distress and suicidal ideation in Sicilian Medical Students: The SMS-ME project. *J Affect Disord Rep*. 2024 Jul;17:100834. doi: <https://doi.org/10.1016/j.jadr.2024.100834>.
42. De Kock JH, Latham HA, Cowden RG. The mental health of healthcare workers during the COVID-19 pandemic: a narrative review. *Int J Environ Res Public Health*. 2022;35(5):311-6.
43. Søvold LE, Naslund JA, Kousoulis AA, Saxena S, Qoronfleh MW, Grobler C, et al. Prioritizing the Mental Health and Well-Being of Healthcare Workers: An Urgent Global Public Health Priority. *Frontiers in public health*. 2021;9:679397.
44. Lavallo S, Masiello E, Iannella G, Magliulo G, Pace A, Lechien JR, et al. Unraveling the Complexities of Oxidative Stress and Inflammation Biomarkers in Obstructive Sleep Apnea Syndrome: A Comprehensive Review. *Life (Basel)*. 2024;14(4):425.
45. Jamieson JP, Crum AJ. Optimizing stress responses with reappraisal and mindset interventions: an integrated model. 2018;31(3):245-61.