

SYSTEMATIC REVIEW IN
OCCUPATIONAL HEALTH PSYCHOLOGY AND COVID-19

Prevalence of anxiety, depression, burnout syndrome, and mental health disorders among healthcare workers during the COVID-19 pandemic: A rapid umbrella review of systematic reviews

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Abstract

Introduction: The Coronavirus-19 (COVID-19) pandemic puts a severe strain on all healthcare systems. This study aimed to describe the prevalence of mental health disorders among healthcare workers (HCWs) during the COVID-19 pandemic.

Methods: An umbrella review of systematic reviews and meta-analyses concerning the prevalence of mental health disorders was conducted on PubMed Central/Medline, Cochrane Library, PROSPERO and Epistemonikos databases. The mental health disorders included anxiety, depression, burnout syndrome (BOS), sleep disorders, and post-traumatic stress disorders (PTSD) among HCWs during the COVID-19 pandemic.

Results: A total of 14 studies met the full inclusion criteria and were included. Among them, there were 8 systematic reviews with meta-analysis, 3 systematic reviews, 1 rapid systematic review, 1 rapid systematic review with meta-analysis, and 1 umbrella review of meta-analyses. The prevalence of mental health disorders was high among HCWs. Anxiety and depression or depressive symptoms were included in 10 reviews, followed by sleep disorders ($n = 5$), BOS ($n = 3$), PTSD ($n = 3$), acute stress ($n = 3$), distress ($n = 3$), and psychotraumatic disorders ($n = 1$) and fear ($n = 1$).

Discussion: The COVID-19 pandemic has had profound effects on the mental health states of HCWs, and resulted in high levels of anxiety, depression, sleep disorders, PTSD, and BOS. Therefore, psychological intervention for HCWs need to be commenced. This will help alleviate long-term distress, prevent chronic PTSD after COVID-19 and future outbreaks.

KEY WORDS: Anxiety; burnout syndrome; COVID-19; depression; healthcare workers; mental health; sleep disorders; post-traumatic stress disorders; occupational health; systematic review.

INTRODUCTION

The Coronavirus-19 (COVID-19) pandemic puts a severe strain on all healthcare systems [1–4]. Anxiety, depression, burnout, and suicide risk among healthcare workers (HCWs) have been considered as critical health issues even before the COVID-19 pandemic [5]. Physician burnout, a work-related syndrome involving emotional exhaustion, depersonalization and a sense of reduced personal accomplishment, was defined as a 'global public health crisis' with negative impacts on individual physicians, patients and healthcare organizations and systems [6]; work-related stress and workplace violence as two important psychosocial risk factors requiring workplace intervention strategies, mainly individual stress management and burnout interventions [7] to be put in place by occupational stakeholders.

Since the onset of the COVID-19 pandemic, HCWs are on the front line in the battle against SARS-CoV-2 and COVID-19 di-

sease and pay the highest price in terms of physical and mental health [8]. Reports from all over the world have shown that HCWs are at high risk of distress and mental health disorders including moral injury [9], anxiety, and depression [10–16]. They are also at an increased risk for insomnia [17], burnout syndrome (BOS) [18], post-traumatic stress disorders (PTSD) [9, 19, 20] and suicide behavioral, these latter being relevant long-term effects of the pandemic [21].

A meta-analysis of 86 studies (75,991 participants) on HCWs caring for patients with severe acute respiratory syndrome, human influenza (H_1N_1), Ebola, Middle East respiratory syndrome, or COVID-19 showed sleeping difficulties (39.8%, 95% CI 27.7% to 52.7%), and burnout (31.8%, 95%CI 13.3% to 53.8%). Furthermore, symptoms of depression (25.7%, 95% CI 18.3% to 33.8%), symptoms of anxiety (25.3%, 95% CI 17.9% to 33.6%), symptoms of PTSD (24.5%, 95% CI 18.1% to 31.4%), mental health issues

TAKE-HOME MESSAGE

This umbrella review of systematic reviews and meta-analyses showed the profound effects of the COVID-19 pandemic on the mental health of HCWs, resulting in high levels of anxiety, depression, sleep disorders, post-traumatic stress disorders, and burnout syndrome. Policymakers should commence interventions for the management of the mental health of HCWs.

Competing interests - none declared.

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(23.1%, 95% CI 15.9% to 31.1%) have been reported. In addition, symptoms of somatization (14.6%, 95% CI 10.6% to 19.1%) have gained high prevalence among HCWs during disease outbreaks [22].

HCWs are amongst the high-risk group to acquire the COVID-19 infection [3, 23]. The first studies on COVID-19 showed that risk factors for emotional distress and poor mental health among HCWs were excessive workloads. Other factors that could have placed HCWs at an increased risk for COVID-19 include shortages of healthcare personnel and protective equipments, lack of disaster training, working in hospitals overwhelmed by COVID-19 cases, and lack of effective treatments [9]. Ethical dilemmas in decision-making due to limited medical resources, the high risk of contagion and the fear of becoming infected or spread infection to their relatives, witnessing patients' deaths, separation from families and stigmatization by their communities [9, 24, 25], could have also exposed HCWs to unprecedented psychological distress amid the COVID-19 pandemic. A systematic review on factors of psychological impacts among HCWs showed that being a member of the nursing profession, working on the front line with direct contact with COVID-19 patients and in the hardest-hit areas were associated with higher psychological distress. On the contrary, having family support, having sufficient local medical resources, having highly efficient health systems and effective prevention and control measures as well as accurate health information, and taking precautionary measures were considered protective factors against psychological distress [26]. Common mental health disorders are expected to increase during the post-pandemic era because of the long-term effects of the pandemic, the restrictive measures such as social distancing and quarantine and the socio-economic effects for both the general population and HCWs [27].

In this rapid overview of the literature, we discussed the impact of COVID-19 on mental health of HCWs, and evidence-based interventions that should be put in place by

policymakers and occupational stakeholders to address mental health challenges faced by HCWs during and after the COVID-19 outbreak.

METHODS

Search strategy

From May 30 to June 02, 2021, using the 'systematic review' filter, a search was conducted on PubMed Central and Medline with combinations of the following keywords and synonyms in conjunction with the controlled vocabulary of the database: 'healthcare', 'burnout', 'mental health', 'COVID-19', and 'SARS-CoV-2'. Papers published from database inception to June 02, 2021, were also considered for inclusion. The search strategy aimed to identify all systematic reviews, meta-analyses, and other research syntheses. Specific repositories of systematic reviews such as the JBI Database of Systematic Reviews and Implementation Reports, the Cochrane Library, Pedro, OT Seeker, PROSPERO, and federated search engines such as TRIP, DARE and Epistemonikos were also checked. Only systematic reviews, that were published in English were included. We included systematic reviews that contained a quantitative analysis of the results, and investigated the prevalence of anxiety, depression, burnout syndrome, post-traumatic stress disorders, sleep disorders, and other mental health outcomes in HCWs during the ongoing COVID-19 pandemic. Reference sections of the identified papers were also checked for additional studies.

Search selection

Due to the nature of the studies and the high degree of heterogeneity between studies, we were unable to undertake a formal analysis. Therefore, we opted for a narrative approach with a qualitative description of the main findings of the studies. Two authors (FC, GF) independently inspected all English language citations from the search to identify relevant titles and abstracts. We obtained the full reports of the papers for more detailed inspection, before deciding whether the pa-

per met the review criteria. We resolved any disagreement with a third author (OI).

RESULTS

Description of the included studies

The literature search yielded 75 published references. After review of the title, abstract, and full text, a total of 14 studies met the full inclusion criteria and were included (see Figure 1). As shown in Table 1, we included 8 systematic reviews with meta-analysis, 3 systematic reviews, 1 rapid systematic review, 1 rapid systematic review with meta-analysis, and 1 umbrella review of meta-analyses. Prevalence of mental health disorders was high among HCWS. Anxiety and depression or depressive symptoms were included in 10 reviews, followed by sleep disorders ($n = 5$), BOS ($n = 3$), PTSD ($n = 3$), acute stress ($n = 3$), distress ($n = 3$), and psychotraumatic disorders ($n = 1$) and fear ($n = 1$).

Prevalence of mental health disorders among HCWs during the COVID-19 pandemic: 2020 year

A rapid systematic review [28] showed that twenty-nine studies reported prevalence of

mental health disorders. For anxiety ($n = 22$ studies), the percentage of healthcare workers with anxiety ranged from 9% to 90% with a median of 24%. For depression ($n = 19$), the percentage with depression ranged from 5% to 51%, with a median of 21%. For sleep problems ($n = 6$), the percentage with sleeping problems ranged from 34% to 65%, with a median of 37%. For distress ($n = 13$ studies), the percentage with distress ranged from 7% to 97%, with a median of 37%. Only one study of this review [41] reported prevalence of somatic symptoms, including decreased appetite or indigestion (59%) and fatigue (55%). In this review, quality of the evidence using the GRADE approach is low due to bias, large heterogeneity, and imprecision [28].

In a systematic review with meta-analysis by Pappa et al [29], anxiety was estimated in 12 studies with a pooled prevalence of 23.21% (95% CI 17.7% to 29.1%, $I^2 = 99\%$). Depression was assessed in 10 out of 13 studies with a pooled prevalence of 22.8% (95% CI 15.1% to 31.5%, $I^2 = 99.62\%$). Insomnia prevalence was estimated in 5 of the 13 retrieved studies calculating a pooled prevalence as 34.3% (95% CI 27.4% to 41.5%, $I^2 = 98\%$).

In the systematic review of 11 cross-sectional

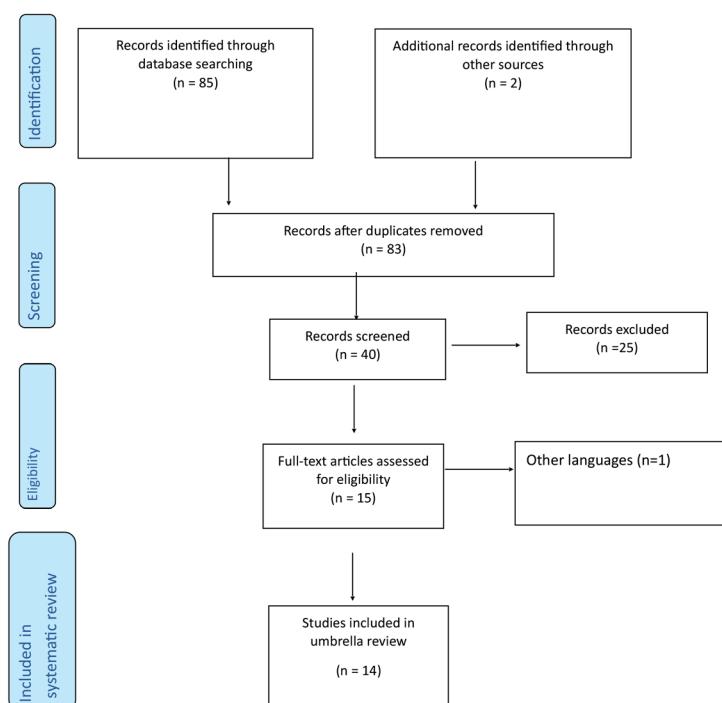


Figure 1. Flowchart for identification of studies included in the umbrella review ($n = 14$).

Table 1. Studies reporting prevalence of mental health disorders among HCWs during the COVID-19 pandemic ($n = 14$).

Authors and year	Type of review	Number of studies included	Main findings
Muller et al, 2020 [28]	Rapid systematic review	29 studies (anxiety =22; depression = 19; sleep problems = 6; distress = 13; somatic problems = 1)	Prevalence of anxiety: 9% to 90%, depression: 5% to 51%, sleep problems: 34% to 65%, and distress: 7% to 97%.
Pappa et al, 2020 [29]	Systematic review with meta-analysis	13 studies (anxiety =12; depression = 10; insomnia =5)	Pooled prevalence of anxiety: 23.2% (95% CI 17.77% to 29.1%, $I^2 = 99\%$), depression: 22.8% (95% CI 15.1% to 31.5%, $I^2 = 99.62\%$),
Vizheh et al, 2020 [30]	Systematic review	11 studies	Prevalence of anxiety: 24.1% to 44.6%, moderate and severe depression: 2.1% to 50.4%.
Salari et al, 2020 [31]	Systematic review with meta-analysis	29 studies (anxiety = 23 studies; depression = 21 studies; stress = 9 studies) on a total of 22,380 front-line HCWs.	Prevalence of depression: 24.3% (95% CI 18.2%–31.6%), anxiety: 25.8% (95% CI 20.5%–31.9%), stress: 45% (95% CI 24.3%–67.5%)
Sanghera et al, 2020 [32]	Systematic review with meta-analysis	44 studies on 69,499 hospital-based HCWs.	Prevalence of depression: 13.5% to 44.7%, anxiety: 12.3% to 35.6%, acute stress reaction: 5.2% to 32.9%, post-traumatic stress disorders: 7.4% to 37.4%, insomnia: 33.8% to 36.1%, occupational burnout 3.1% to 43.0%.
Serrano-Ripoll et al, 2020 [33]	Rapid systematic review with meta-analysis	117 studies	Pooled prevalence of acute stress disorder: 40% (95% CI 39% to 41%), anxiety: 30% (30% to 31%), burnout: 28% (26% to 31%), depression: 24% (24% to 25%), post-traumatic stress disorders: 13% (13% to 14%).
Allan et al, 2020 [34]	Systematic review with meta-analysis	19 studies on 8,550 HCWs	Pooled prevalence of PTSD: 11.9% (95% CI 8.4% to 15.8%), anxiety: 12.3% (95% CI 10.5% to 14.1%), depression: 20.2% (95% CI 9.5% to 33.7%).
Santabarbara, 2021 [35]	Systematic review with meta-analysis	71 studies	Pooled prevalence of anxiety: 25% (95% CI 21% to 29%). Pooled prevalence of anxiety in nurses: 27% (95% CI 20% to 34%), in medical doctors: 17% (95% CI: 12% to 22%), in frontline HCWs: 43% (95% CI 25% to 62%).
Sahibi et al, 2021 [36]	Umbrella review of meta-analyses	7 meta-analyses including 108 studies on 433,800 HCWs	Prevalence of pooled anxiety: 24.9% (95% CI 21.8% to 28%, $I^2 = 0.0\%$, $P = 0.804$), depression: 24.8% (95% CI 21.4% to 28.2%, $I^2 = 0.0\%$, $P = 0.897$).
Marvaldi et al, 2021 [37]	Systematic review with meta-analysis	70 studies including 101,017 HCWs	Pooled prevalence of sleep disorders: 44.0% (95% CI 24.5% to 64.4%), psychotraumatic disorders: 31.4% (95% CI 17.5% to 47.3%), depression/depressive symptoms: 31.1% (95% CI 25.7% to 36.8%), acute stress: 56.5% (95% CI 29.9% to 82.3%).
Danet Danet, 2021 [38]	Systematic review	12 studies on Western frontline healthcare professionals	Prevalence of distress: 37% to 78%, anxiety: 20% to 72%, depression: 25% to 65%, sleep disorders: 8% to 72%.
Xia et al, 2021 [39]	Systematic review with meta-analysis	17 studies on 12,682 Chinese HWs	Pooled prevalence of sleep disturbances: 45.1% (95% CI 37.2% to 53.1%).

Authors and year	Type of review	Number of studies included	Main findings
Thatimontrichai et al, 2021 [40]	Systematic review	30 studies on prevalence of mental health disorders	Pooled prevalence of depression: 27.2%, anxiety: 25.9%, insomnia: 35.0%, fear: 77.1%. Comparing with non-Chinese HCP, Chinese HCP had a higher anxiety (25.9% vs 12.5%), similar depression (27.8% vs 23.0%), and lower fear (70.6% vs 91.2%) rates during COVID-19 pandemic.
Galanis et al, 2021 [41]	Systematic review with meta-analysis	16 studies including 18,935 nurses	Pooled prevalence of emotional exhaustion: 34.1%, depersonalization: 12.6% and lack of personal accomplishment: 5.2%.

studies included by Vizheh [30], the prevalence of anxiety reported by health care workers ranged from 24.1% to 44.6%, while moderate and severe depression were expressed from 2.1% to 50.4% of HCWs.

The systematic review with meta-analysis by Salari et al [31] on 29 studies with a total sample size of 22,380 front-line HCWs, showed a prevalence of depression ($n = 21$ studies) as 24.3% (95% CI 18.2% to 31.6%), of anxiety ($n = 23$ studies) as 25.8% (95% CI 20.5% to 31.9%), and prevalence of stress ($n = 9$ studies) as 45% (95% CI 24.3% to 67.5%).

A systematic review [32] on the impact of psychological distress on hospital-based HCWs, included 44 articles and 69,499 subjects. This review showed prevalence of depression ranging from 13.5% to 44.7%, anxiety 12.3%-35.6%; acute stress reaction 5.2%-32.9%; post-traumatic stress disorder 7.4%-37.4%; insomnia 33.8%-36.1%; and occupational burnout 3.1%-43.0%.

A rapid systematic review with meta-analysis of 117 studies by Serrano-Ripoll [33] showed a pooled prevalence was higher for acute stress disorder as 40% (95%CI 39% to 41%), followed by anxiety as 30% (95% CI 30% to 31%), burnout as 28% (95% CI 26% to 31%), depression as 24% (95% CI 24% to 25%), and PTSD as 13% (95% CI 13% to 14%).

The systematic review with meta-analysis by Allan et al [34] on 19 studies, comprising 8,550 HCWs, showed a pooled estimate of

PTSD for the period 12 months onwards as 11.9% (95% CI 8.4% to 15.8%) of anxiety as 12.3% (95% CI 10.5% to 14.1%), and a pooled estimate for depression in the acute phase as 20.2% (95% CI 9.5% to 33.7%).

Prevalence of mental health disorders among HCWs during the COVID-19 pandemic: 2021 year

A meta-analysis on anxiety levels of studies on HCWs published in Medline (2021), including 71 studies, showed a pooled prevalence of anxiety in HCWs was 25% (95% CI 21% to 29%), 27% in nurses (95% CI 20% to 34%), 17% in medical doctors (95% CI 12% to 22%) and 43% in frontline healthcare workers (95% CI 25% to 62%) [35].

An umbrella review of meta-analyses showed an overall prevalence of anxiety and depression among healthcare workers during the COVID-19 pandemic as 24.9% (95% CI 21.8% to 28.0, $I^2 = 0.0\%$, $P = 0.804$) and 24.8% (95% CI 21.4% to 28.2%, $I^2 = 0.0\%$, $P = 0.897$), respectively [36].

The systematic review with meta-analysis of 70 studies (101,017 participants) showed a pooled prevalence of sleep disorders as 44.0% (95% CI 24,5% to 64,4%), of psychotraumatic disorders as 31,4% (95% CI 17,5% to 47,3%), of depression and depressive symptoms as 31,1% (95 % CI 25,7% to 36,8%), of acute stress the pooled prevalence was 56,5% (95 % CI 29,9% to 82,3%) [37].

The systematic review by Danet & Danet [38] showed that in the first line of assistance the psychological impact was greater than among other health professionals. In this review of 12 cross-sectional articles on the psychological impact of COVID-19 pandemic in Western frontline HCWs, the authors showed percentages of stress among healthcare personnel ranging from 37% to 78%, with a more frequent interval between 40% and 50%, and 54% among frontline personnel. Anxiety symptoms affected participating HCWs in varying percentages, from 20% to 72% in the Italian area with the highest prevalence of COVID-19. In this review, women, nurses, and frontline HCWs were reported as the most affected HCWs by anxiety. Symptoms of depression ranged from 25% and 31% in Italy, to 64% and 65% in United Kingdom and Turkey, respectively. Sleep disorders were observed in 8% and 55% of the total samples in Italy, 29% in Spain and up to 72% in the UK, with frontline workers showing greater sleep disturbance. About BOS, in Italy, all HCWs reported high (32%) and medium (36%) levels of emotional exhaustion and depersonalization (12% high and 14% moderate), with higher burnout among frontline personnel who had a greater workload and were younger.

A meta-analysis aimed to explore the prevalence of sleep disturbances and sleep quality in Chinese HCWs during the COVID-19 pandemic. A total of 17 studies involving 12,682 Chinese HCWs were included in the meta-analysis. The pooled prevalence of sleep disturbances in Chinese HCWs was 45.1% (95% CI 37.2% to 53.1%) [39].

In Asia, the pooled mean of depression, anxiety, insomnia, and fear rates in Asian HCP were 27.2%, 25.9%, 35.0%, and 77.1%. Comparing with non-Chinese HCP, Chinese HCP had a higher anxiety (25.9% vs 12.5%), similar depression (27.8% vs 23.0%), and lower fear (70.6% vs 91.2%) rates during COVID-19 pandemic [40].

Finally, a systematic review with meta-analysis of 16 cross-sectional studies on BOS among nurses during the COVID-19 pan-

demic showed that the overall prevalence of emotional exhaustion was 34.1%, of depersonalization was 12.6% and of lack of personal accomplishment was 15.2% [42].

DISCUSSION

This study reported novel findings regarding the occurrence of mental health challenges among HCWs during the COVID-19 pandemic. HCWs underwent many experiences such as increased workload and reduced resting schedule which predisposed them to high levels of stress. As a result, burnout was inevitable among many HCWs, especially among nurses [42]. Myriads of evidence from cross-sectional studies reported that increased workload and burnout were especially pronounced among frontline HCWs who volunteered as members of the COVID-19 outbreak response team [43-48]. As a result of these unprecedented stressful circumstances, the prevalence of anxiety increased among many HCWs. The increasing rates of COVID-19 infection among HCWs predisposed many HCWs to depression and insomnia owing to the fear of having recently maintained contact with confirmed COVID-19 cases among their colleagues. Reports obtained from frontline HCWs during the SARS and Ebola outbreaks demonstrate that frontline HCWs suffer significant risks for burnout, anxiety, and PTSD [49, 50]. The novelty of the COVID-19 pandemic and the nomenclature it gained especially at the onset in 2020, a death sentence for all infected persons, made many HCWs to live in perpetual fear of their separation from their relatives [50, 51]. It is therefore required that HCWs are provided with safe and secure atmospheres that promote their psychological health to enhance adequate service delivery during the COVID-19 pandemic and future events of disease outbreak.

From this study, we found that a higher pooled prevalence of anxiety among nurses compared to doctors. The reason for this observed result is not far-fetched. Nurses are closer to patients than doctors because they work on the ward where patients are managed. Also,

nurses relate directly with caregivers or family members of patients and are always present to monitor progress in the health of their patients. A cross-sectional study conducted among HCWs in China revealed that a higher proportion of nursing staff faced greater risks of mental health problems compared to other cadres of HCWs [52]. Nurses have a prominent role in facilitating communication and collaboration between patients, patients' relatives, and the healthcare team, our findings therefore stress the need for the establishment of a social network support especially for nurses among other HCWs.

Although 2020 signaled unexpected peaks in COVID-19 case and death reports than 2021, this study found no difference in the experience of mental health challenges among HCWs. This finding highlights the need for national and local healthcare agencies to place premium on psychological and mental health status of HCWs. It should be noted that HCWs are not sufficiently capable of managing their individual health while caring for other ill persons [49]. Therefore, opportunities such as teleconsultation should be initiated and sustained to promote mental health outcomes among HCWs. These measures should be available for use at all periods; before, during, and after any event of public health importance.

From this study, we identified that Chinese HCWs had higher levels of anxiety and similar levels of depression compared to HCWs from other countries. COVID-19 emerged from Wuhan city in China, and China had the highest COVID-19-related records before 11th March 2020 when COVID-19 was declared a pandemic after it had been transmitted across international borders [54]. This study however noted lower levels of fear among Chinese HCWs compared to HCWs in other countries. Because China experienced COVID-19 ahead of other countries in the World, one could suggest that Chinese HCWs commenced management measures for the novel outbreak ahead of other HCWs. During this period, many countries had not implemented COVID-19 containment me-

asures either for HCWs or the general population. Therefore, the rapid transmission of COVID-19 caught many countries unaware, and caused panic among many individuals, including HCWs. In addition, stress management strategies were commenced rather late in many countries. This finding therefore elucidates the need to take proactive measures to ensure that the mental health state of HCWs is kept at optimal levels even before an index case of a public health threat is recorded in each country.

Study limitations

Our search for this study was conducted on PubMed Central and Medline. We could have missed a few articles from other databases. However, we conducted a robust and quantitative analysis of the results. This study contains only systematic reviews, that were published in English, a few articles published in other languages that could have contributed to our findings were missed. A high degree of heterogeneity was found between the studies that we reviewed; hence we were unable to undertake a formal analysis. Despite the limitations, our study contributed to the understanding of the prevalence of anxiety, depression, burnout syndrome, post-traumatic stress disorders, sleep disorders, and other mental health outcomes among HCWs during the ongoing COVID-19 pandemic.

CONCLUSION

The COVID-19 pandemic has had profound effects on the mental health states of HCWs, and resulted in high levels of anxiety, depression, PTSD, and BOS. To address BOS among HCWs, recruitment of volunteers, such as individuals undergoing medical and residency trainings, would help reduce workload. Frontline HCWs and nurses were at higher risks for these mental health challenges during the COVID-19 pandemic. Therefore, psychological interventions for HCWs need to be commenced. This will help alleviate long-term distress, prevent chronic PTSD after COVID-19 and future outbreaks [53–56].

In addition, establishment of social network support especially for nurses and frontline HCWs would reduce the pressure placed on HCWs during the COVID-19 pandemic. For instance, the recruitment of more staff, and the provision of a range of psychosocial services such as teleconsultation, training of professionals on the risk factors and symptoms of anxiety, stress, PTSD, and distress are quintessential. In addition, social activities such as sharing one's experience with colleagues and family members would help

reduce sub-threshold syndromes before they evolve to complex conditions. Higher level of commitment of national and local healthcare agencies as well as administrators in each health facility is needed to achieve healthy mental state of HCWs during the COVID-19 pandemic. Overall, all implemented measures should not be limited to outbreak periods, rather, they should be sustained all time long to ensure optimal health outcomes among HCWs.

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