Rapid systematic review of psychological symptoms in health care workers COVID-19

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Abstract

Background: Worldwide, health care professionals are facing unprecedented stress levels due to the continuing COVID-19 pandemic.

Methods: A rapid systematic review of peer-reviewed studies examining psychological symptoms in HCW working during COVID-19 pandemic in early 2020. 13,999 participants were included.

Results: After 3408 studies were screened for inclusion, 10 were included in the final analysis. About half of HCW presented with possible PTSD (i.e. scored above a clinical cutoff).

Limitations: An update of the search should be conducted.

Conclusions: These initial studies suggest a high rate of possible PTSD diagnosis in frontline HCW.

Keywords: rapid systematic review, PTSD, depression, anxiety, health care workers (HCW), COVID-19

Notes on Contributors

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Introduction

It was well known that HCW are often exposed to stressful and adverse events including daily contact with death and trauma, particularly during epidemics (Chong et al., 2004; Goulia, Mantas, Dimitroula, Mantis, & Hyphantis, 2010). However, with introduction of the novel COVID-19 pandemic, which is characterized by higher rates of contagiousness and lethality than previous epidemics, many HCW are experiencing unprecedented levels of stress (Chen et al., 2020; Kang et al., 2020; Mahase, 2020). Previous research on the experience of HCW during epidemics has revealed significant stressors that may impact mental health including lack of resources and organizational preparedness, ongoing threat to their personal safety and daily witnessing multiple, difficult or traumatic deaths (Shimma, Nogueira-Martins, & Nogueira-Martins, 2010; Styra et al., 2008). These are key factors that may contribute to HCW risk of acute symptoms of distress, such as burn out, as well as long term risk of stress-related disorders such as post-traumatic stress disorder (PTSD) or prolonged grief disorder (PGD).

Previous research has shown that frontline workers and first responders are at increased risk for the development of PTSD (Carmassi et al., 2018). During the SARS epidemic in 2002 HCW showed increased symptoms of PTSD including recurrent intrusive thoughts, difficulty sleeping and hyperarousal (Conversano, Marchi, & Miniati, 2020; P. Wu et al., 2009). Additionally, HCW are at risk of losing close colleagues, friends or infecting loved ones (Selman et al., 2020; Wallace, Wladkowski, Gibson, & White, 2020). The loss of close friends and colleagues may increase the risk of developing PGD. To date quantitative studies on possible PGD in frontline HCW are lacking however there have been several studies exploring grief in palliative care staff (Boerner, Burack, Jopp, & Mock, 2015; Lobb et al., 2010; Shimoinaba, O'Connor, Lee, & Greaves, 2009). Boerner et al., (2015) found that professionals in palliative care experienced that same core symptoms of grief as family

caregivers, including feeling unprepared for the death and difficultly accepting the loss. Previous qualitative studies exploring HCW psychological responses following epidemics of SARS in 2004 and HIV in 2010 have found that grief is a significant and distressing experience for HCW following an epidemic (Robertson, Hershenfield, Grace, & Stewart, 2004; Shimma et al., 2010). So far, there has not been a literature review of HCW mental health symptoms following the recent COVID-19 outbreak. The current study is a rapid systematic review examining the symptoms of stress-related disorders, particularly PGD and PTSD, as well as depression, anxiety and insomnia in frontline HCW during the COVID-19 outbreak

Method

Inclusion criteria

The following inclusion criteria were developed for this review, following PICOS/POS guidelines from Cochrane reviews (Higgins & Green, 2011):

- Participants: adults +18, health care workers working in primary care facilities (e.g., hospitals) during the first wave (January 2020 to April 2020) COVID-19 pandemic

- Outcome: measure of grief and related mental health outcome such as PGD, PTSD, insomnia, depression and anxiety measured during or after the COVID-19 outbreak

- Study design: published in a peer reviewed journal, qualitative and quantitative data, written in English or Chinese

Search strategy

Searches were conducted in MEDLINE and Web of science core collection. A combination of search terms were used including a combination of search 1: (grief OR grieving OR

bereavement OR bereaved OR "traumatic bereavement" OR "traumatic grief" OR mourning), search 2 (Stigma OR Discrimination OR Isolation OR Rejection OR Anger OR Stress OR "Mental Health" OR "coping strategies" OR "Resilience") and search 3 psych* and (epidemic OR pandemic OR quarantine OR "disease outbreak"). Limiters included year (1980-present) and excluded review articles. Search date was originally conducted 06.04.2020. This was updated on 01.05.2020. The full search strategy can be found in the Appendix 1.

Study quality

The quality of the studies was assessed based on three domains deemed to be relevant to the purpose of the current review: study design, data collection/methodology, analysis/interpretation of the results. This quality assessment tool has been used in previous systematic reviews on mental health and infectious disease outbreaks (Brooks et al., 2015; Brooks, Dunn, Amlôt, Rubin, & Greenberg, 2018).

2.3 Data extraction

Using excel spreadsheets, the following data was extracted author, title, date of publication, year of publication, country, participant type, study design, sample size, aims, outcome measures, quantitative results, qualitative key findings. Form A (see Appendix 2) was used to extract the data from the studies. This was conducted by HZ, OK, TGO, HM, RS and rated by a second coder (CK).
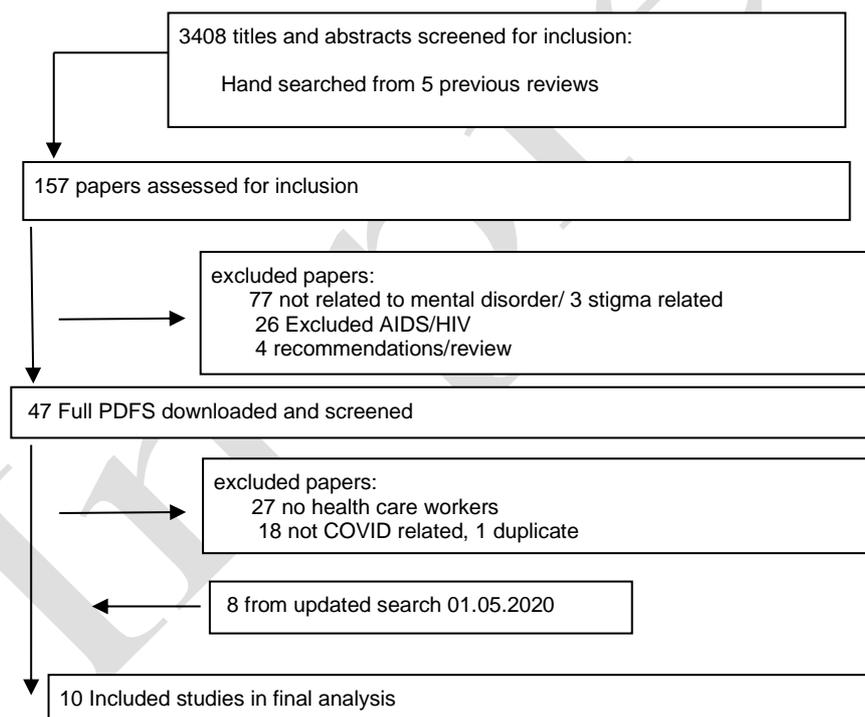
2.4 Analysis

Descriptive statistics were used (e.g., percentage, mean score) to assess the rates of mental health disorders in the quantitative studies. Narrative synthesis was used to extract main findings from the qualitative data. Relevant qualitative data was coded together under main themes.

Results

Study selection

Search lists in Web of science and MEDLINE were downloaded to an excel file by HZ. HZ, OK, TGO, HM, RS independently screened the abstracts and titles of 3408 papers, removed duplicates and titles that were not relevant. CK conducted a second screening of the remaining 157. CK reviewed the downloaded PDFs of 47 articles and screened for papers including data on COVID-19 and HCW mental health. From the updated search on 01.05.2020 a total of 10 papers met the inclusion criteria (see Figure 1). One article was included in the Chinese language, screening and data extracted was completed by HZ.

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│ 3408 titles and abstracts screened for inclusion:   │
│      Hand searched from 5 previous reviews          │
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│ 157 papers assessed for inclusion                   │
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   ───> │ excluded papers:                                    │
        │    77 not related to mental disorder/ 3 stigma related│
        │    26 Excluded AIDS/HIV                              │
        │    4 recommendations/review                          │
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│ 47 Full PDFS downloaded and screened                │
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   ───> │ excluded papers:                                    │
        │    27 no health care workers                        │
        │    18 not COVID related, 1 duplicate                │
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   <─── │ 8 from updated search 01.05.2020                    │
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│ 10 Included studies in final analysis               │
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Figure 1 Flow chart of search strategy and study selection

See Table 1 for an overview of the included studies. The quality of each paper was assessed as the percentage of the total items fulfilling the quality criteria. Overall the study quality was high, ranging from 86 to 100% of items fulfilled with an average rating of 92.5%. See Table

2. Nine papers used a quantitative methodology and 1 paper used qualitative methods. Nine studies were conducted in China and one in Singapore and India. All of the assessments took place between January and April 2020. One study (Sun et al., 2020) conducted interviews at two time points although the time between assessments was not specified. Sample sizes of the studies ranged from 20 (qualitative study) to 4268 for a total of 13,999 participants. All of the studies were conducted during the time of the COVID-19 pandemic between January and April 2020.

Types of mental health instruments

In terms of instruments used to assess mental health disorders, 7 studies used validated questionnaires translated into the language of the population sampled. Measures of PTSD included: Impact of events scale revised (IES-R; n=3; (Horowitz, Wilner, & Alvarez, 1979) , the PTSD self-rating scale (PTSD-SS) (n=1) (Davidson et al., 1997), and the vicarious trauma questionnaire (n=1) (Chew et al., 2020; Huang, Han, Luo, Ren, & Zhou, 2020; Lai et al., 2020; Li et al., 2020; Zhang et al., 2020). One measure of depression was used; Patient Health questionnaire 9 item (PHQ-9) (n=2) (Kroenke, Spitzer, & Williams, 2001). Two measures of anxiety were used: Generalized Anxiety disorder 7 item (GAD-7) (n=2) (Spitzer, Kroenke, Williams, & Löwe, 2006), and the Self-rating anxiety scale (n=1)- Three measures of combined depression and anxiety were used; Depression Anxiety Stress scale 21 (DASS-21) (n=1) (Tay et al., 2020), 4 item depression and anxiety scale (PHQ 4) (n=1), Hamilton Anxiety and Depression scale (HADs)(n=1). Other measures included the Insomnia Severity index (n=3), and the Symptom check list revised (SCL-90) (n=1). Three of the studies used idiosyncratic measures including a SARS stress questionnaire (Cai et al., 2020) and a newly developed Psychological Stress questionnaire (Wu et al., 2020), or conducted semi-structured interviews (Sun et al., 2020). No studies were identified that examined PGD during the current COVID-19 outbreak.

Rates of disorder

As the studies used different questionnaires to measure the same mental health symptoms, pooled mean percentages were calculated. This was based on the percentage of participants (frontline or medical HCW) who displayed severe symptoms of the disorder or met a threshold for diagnosis according to the particular measure used. For example, the percentage of people with a cut off score of 33 or above on the IES-R. Overall, 44.9% participants presented with symptoms of PTSD, 27.2% with symptoms of depression and 27.7% with symptoms of anxiety and 36.1% with symptoms of insomnia.

Comparison of groups

Several studies compared the symptoms of mental disorders between groups of participants. The studies found mixed results. Three studies compared medical staff with non-medical staff (Lai et al., 2020; Lu, Wang, Lin, & Li, 2020; W. Zhang et al., 2020). Lai et al. (2020) found that nurses had more severe depression than physicians (7.1% vs 4.9%) and that distress was highest in health care workers in Wuhan (12.6%) (the region in China where the COVID-19 virus is thought to originate) compared neighboring regions of Hubei (7.2%). Those working in secondary hospitals were more likely to report depression (7.7% vs. 5.6%), anxiety (5.5% vs. 5.1%) and insomnia (1.0% vs. 0.6%) compared to tertiary hospitals. Lu et al., (2020) compared medical staff with administration staff and found that medical staff had higher rates of depression (25.5% vs. 18.7%). Zhang et al. (2020) compared medical health workers and non-medical health workers (e.g., therapists, technicians) and found higher rates of insomnia (38.4% vs. 30.5%), anxiety (13.0% vs. 8.5%) and depression (12.2% vs. 9.5%) in medical health workers. One study compared symptoms between the general public, frontline workers and non-frontline workers (Li et al., 2020). They examined severity scores on a measure of vicarious traumatization in the general public (75.5 average severity score) frontline nurses

(64.0 average severity score) and non-frontline nurses (75.5 average severity score) and found that frontline nurses had the lowest scores on vicarious traumatization.

Results from newly developed questionnaires and interviews

Two quantitative studies used questionnaires developed for the context of the study. Cai et al. (2020) used a context-specific questionnaire specifically developed to assess HCW coping strategies and psychological well-being. The questionnaire consisted of 5 sections (67 questions) including 'feelings', 'factors that induce stress', 'factors that reduce stress', 'personal coping strategies' and 'confidence for future outbreaks'. The study found that HCW experienced emotional stress during the COVID-19 outbreak and worries related to maintaining safety, transmission to family and friends, and high mortality rate. However, increases in new cases and lack of treatment options were not key stress factors. Overall HCW were motivated to continue working due to social and moral responsibilities and the health of their families.

Wu et al. (2020) developed a 9-item questionnaire 'Psychological Stress Questionnaire' to assess stress in health care workers during the COVID-19 outbreak. The questionnaire assessed medical staff and college students and it was found that medical staff showed more negative cognitive and emotional responses than students. The stress response also negatively affected the sleep of HCW.

One qualitative study conducted semi-structured interviews with 20 nurses to explore their experiences. Sun et al. (2020) used a phenomenological approach to explore the psychological impact on nurses of caring for patients with COVID-19. Four main themes emerged: significant amount of negative emotions in the early stage of the outbreak, coping and self-care styles, growth under pressure and positive emotions occurred simultaneously with negative emotions. Throughout the assessment period (January to Februrary 2020),

nurses felt extreme fatigue and physical discomfort. They also expressed key concerns for the well-being of their family. Interestingly after a week nurses experienced more positive than negative emotions. In fact, many nurses also expressed psychological growth including greater appreciation for health and family and positive sense of professional ethics and responsibility.

Discussion

This rapid systematic review screened 3408 studies and found 10 studies suitable for inclusion with a total of 13,999 participants. All of the included studies took place in China, except for one which took place in India and Singapore. Although none of the studies explored symptoms of PGD, 7 studies used standardized scales to document symptom rates of anxiety, depression, insomnia and/or PTSD. Two of the studies used study specific questionnaires to explore psychological distress specifically related to the COVID-19 outbreak. This rapid systematic review found three main findings. Firstly, the rates of mental health disorder symptoms are high in HCW (PTSD: 44.9%, depression: 27.2%, anxiety: 27.7% and insomnia: 36.1%). Secondly, several studies compared symptoms between HCW and non-HCW. HCW were consistently found to have significantly higher symptom rates than students, the general population or non-health care related hospital staff, expect for rates of vicarious traumatization which was found to be significantly higher in non-frontline nurses (75.5 average severity score) compared to frontline nurses (64.0 average severity score). Lastly, the use of qualitative methods revealed that along with symptoms of distress HCW may also experience positive emotions, psychological growth and a strong sense of social/moral purpose.

The current point prevalence rate of 44.9% PTSD found in HCW is very high compared with the general population, which is around 1%. For example, a large European

population sample found a point prevalence of PTSD of 1.1% (Darves-Bornoz et al., 2008). Previous studies of HCW responses during an epidemic have also found high rates of PTSD (between 35 and 50%) during the Middle East Respiratory syndrome (MERs) (Lee, Kang, Cho, Kim, & Park, 2018) and Severe Acute Respiratory syndrome (SARs) outbreaks (Su et al., 2007). Additionally, the findings of this review confirm that frontline HCW are at increased risk of symptoms compared with non-frontline medical staff or the general public. Indeed, several nurses have resigned due to overwork during the COVID-19 pandemic (Telegraph, 2020). Work-related factors, such as working closely with infected patients, working in the emergency or Intensive Care departments and the increase in workload may directly impact frontline HCW stress levels (Lu et al., 2020).

The majority of studies used validated questionnaires to assess PTSD, anxiety, depression and insomnia. However, there are some important caveats to consider. In order to receive a diagnosis of PTSD, symptoms must be present for at least 1 month (Brewin et al., 2017). Before strong conclusions can be made about the rates of PTSD symptoms in this population it would be prudent to examine rates at different times throughout the pandemic. For example after 1 month of frontline work, 3 months and 6 months. Nonetheless, previous studies have found that initial rates of PTSD in HCW may be maintained throughout and after the course of a health crisis. For instance, Lee et al. (2018) found that PTSD in medical staff remained high one month after lockdown during the MERS outbreak. Additionally, there could be some bias in the questionnaires that were not adapted to the Chinese-speaking population. Lai et al (2020) and Li et al (2020) refereed to the use of Chinese versions of the validated measures, however it is not clear to what extent the items or translation of these measures have been specifically adapted for this context.

Interestingly, this review confirms the value of using mixed methods. Although the quantitative data suggests that HCW experience high rates of symptoms and distress, the

qualitative findings suggest a more hopeful and positive outcome. The findings from the qualitative studies and newly developed scales offer some insight for the course of psychotherapeutic interventions. The study specific developed scales provided a more in depth assessment of the specific nature of distress experienced by these groups. They also considered culturally specific symptoms or experiences as they were developed within this cultural group. One of the important findings was that a period of acute distress for HCW is followed by some improvements in mental health. Sun et al., (2020) found that in the early stage of the epidemic negative emotions were most prominent during the first week, but after the initial stage nurses develop good coping strategies including activating systems of social support, using psychological techniques such as breathing techniques, humor and mindfulness. This has been found in previous studies during the SARS epidemic (S.-H. Lee et al., 2005; Wong et al., 2005). Additionally, it suggests that a period of immediate initial psychological support for HCW early in the epidemic maybe most useful. Lee et al. (2005) recommended a screening assessment after HCW are initially assigned pandemic related tasks. However, recently Chen et al., (2020) conducted a survey of nurses mental health needs during the COVID-19 pandemic and found that support from a psychologist was not necessarily endorsed. Many nurses refused psychological support and, although distressed, clearly stated that they did not have psychological difficulties. After interviews with the staff, practical solutions were discovered including providing a designated room for rest and recovery for nurses, official support and protocols for dealing with uncooperative patients, clear rules for use of protective equipment, leisure activities and training on how to use stress reduction techniques and access to psychological counsellors when needed. This informed and proactive response may provide more appropriate and accessible support to HCW who face acute stress temporarily. This important finding would not have been so carefully explored if previously validated quantitative questionnaires had been used exclusively. The

use of situation specific questions and semi-structured interviews allowed the researchers to explore resilience and coping strategies used by HCW. Questions also arose concerning the value of diagnosing a mental disorder, such as PTSD, as this early stage. Some may argue that the symptoms that these HCW experience should be classified as a normal response to an abnormal situation. Importantly, some studies concluded that HCW should be given space and time to choose the coping strategies they preferred in an empowered and proactive way (Sun et al., 2020). A mental health diagnosis at an early stage may not always be helpful or empowering (Chen et al., 2020).

For those who may experience long-term chronic stress, beyond the first week or month, a new intervention, that has recently been introduced by Albott et al. (2020) may be helpful. Based on previous research with first responders, 'Battle Buddies' is a peer support model that uses 'stress inoculation' methods (such as prioritizing sleep, exercise and nutrition, developing a personal resilience plan, and self-monitoring for stress) to support HCW at risk of developing burn out or PTSD. The theoretical background for this programme, the 'Anticipate-Plan-Deter' model, was used with success in the 2015 Ebola outbreak and found to support HCW who were exposed to traumatic stressors (Schreiber, Cates, Formanski, & King, 2019). Based on the findings of this review we suggest a two-stage approach for assessment and possible treatment of distress in HCW related to the COVID-19 pandemic. Firstly, within the first month, HCW should be screened for possible symptoms of high anxiety and PTSD, however a diagnosis should not be made. Instead guidance and signposting to self-help strategies, peer support and possible psychological intervention (such as Battle Buddies) could be offered. The emphasis should be on normalizing their distress and providing practical support. Secondly, after one month, HCW who still experience severe distress may be referred to more intensive psychological therapy.

Importantly these studies also note that along with distress, HCW also experienced a range of positive emotions including an experience of psychological growth (Sun et al., 2020; Wu et al., 2020). Sun et al., (2020) found that nurses reflected on how their experience helped them to appreciate their health and friends and family. Additionally, they felt a strong sense of pride and professional identity. Emotions such as confidence, happiness, calmness were also frequently mentioned. Previous research has confirmed the importance of fostering positive emotions after trauma. Stimulating confidence and a sense of purpose along with gratefulness maybe important areas for preventative interventions to focus (Kent, Davis, & Reich, 2013).

Limitations

The original aims of this review were amended after no PGD peer reviewed literature was found. This is perhaps due to the nature of PGD, that currently should only be diagnosed 6 months after a loss (WHO, 2018). Future reviews should be conducted in 6 months to one years' time in order to explore possible symptoms of PGD in HCW. As the nature of this review is a rapid systematic review we only conducted searches in two databases and we only found 10 studies in more than 3400 papers perhaps indicating that our search terms were too broad. Future studies should also consider PUBMED and search for studies conducted outside of the English language. Additionally, although the quality of the studies was found to be high, often the inclusion or exclusion criteria for the sampling method was not made clear. This could introduce some bias in the results as pooling the results across similar group labels (e.g., HCW) may in fact be averaging data from very different groups of professions.

Conclusion

The rates of PTSD symptoms are very high in HCW working on the frontline of the COVID-19 epidemic. There may be an acute phase of symptoms during the first week to 1 month whereby HCW could benefit from immediately accessible self-guided and practical support. After this initial acute phase some HCW may need additional support in the form of formal psychotherapy for PTSD, however others may experience psychological growth and resilience.

Conflicts of Interest: None.

Credit Author Statement

CK wrote the manuscript, conducted the analysis and conceptualized the review

HZ conducted the literature search and analyzed the data

AM and LL reviewed and edited manuscript

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First Author, Year	Country	Sample Size	Aim	Group comparisons	Outcome measures	PTSD %	Depression %	Anxiety %	Insomnia
Cai et al., 2020	China	534	To investigate the psychological impact and coping strategies of frontline medical staff in Hunan province, adjacent to Hubei province, during the COVID-19	No	SARS COVID stress questionnaire, 5 different sections	N/A	N/A	N/A	N/A
Chew et al., 2020	Singapore, India	906	To examine the association between psychological outcomes and physical symptoms among healthcare workers.	HCW with vs. without physical symptoms, and HCW in Indian vs. Singapore	Depression Anxiety Stress Scale 21, IES-R, list of 16 physical symptoms	7.4	10.6	15.7	N/A
Huang et al., 2020	China	230	To investigate the mental health of clinical first-line medical staff in COVID-19 epidemic	No	Post-traumatic stress disorder self rating scale (PTSD-SS), Self-rating Anxiety scale	27.4	N/A	23.0	N/A
Lai et al., 2020	China	1257	To evaluate mental health outcomes among HCW treating patients with COVID-19 by quantifying the magnitude of symptoms of depression, anxiety, insomnia, and distress and by analyzing potential risk	Nurse vs. physician, Wuhan vs. Hubei province	Chinese versions of validated measurement tools: PHQ-9; GAD-7, the 7-item Insomnia Severity	71.5	50.4	44.6	34

			factors associated with these symptoms		Index and the IES-R				
Li et al., 2020	China	740	The address psychological stress, especially vicarious traumatization caused by the COVID-19 in medical staff, volunteers, and the general public.	General public vs. frontline staff vs. non-frontline staff	The Chinese version of the vicarious traumatization questionnaire	N/A	N/A	N/A	N/A
Lu et al., 2020	China	2299	To assess the psychological status of HCW	Medical staff vs. administration staff	Fear: Numeric rating scale, Hamilton anxiety and Depression scale	N/A	12.1	25.5	N/A
Sun et al., 2020	China	20	To explore the psychology of nurses caring for COVID-19 patients.	No	Phenomenological approach, interviews 4 themes emerged; negative emotions, self-coping styles, growth under pressure, positive emotions	N/A	N/A	N/A	N/A
Wu et al., 2020	China	4268	To understand the psychological stress status of medical staffs during the outbreak of COVID-19.	Medical staff vs. college students	Idiosyncratic Psychological Stress Questionnaire	N/A	N/A	N/A	N/A
Zhang, Yang et al., 2020	China	1563	We aimed to investigate the prevalence rate of insomnia and to confirm the related social psychological factors among medical staff in	Comparison of rates of insomnia	Insomnia severity index, PHQ 9, GAD 7, IES-R	73.4	50.7	44.7	36.1

			hospitals during the COVID-19 outbreak.						
Zhang, Wang et al., 2020	China	2182	We explored whether medical health workers had more psychosocial problems than nonmedical health workers during the COVID-19 outbreak	Medical workers vs. non-medical workers	Insomnia severity index, Symptom check list reviews SCL 90, PHQ 4 (2 item anxiety and depression scale)	N/A	12.2	13	38.4

Table 1 Study characteristics, N/A = not assessed, percentage of symptoms presented for frontline HCW only; PTSD = posttraumatic stress disorder

First Author, Year	1. Was the research question/objective clearly stated?	2. Were all subjects selected or recruited from the same or similar populations (including the same time period)?	3. Were the inclusion and exclusion criteria for being in the study pre-specified and applied uniformly to all participants?	4. Was the study population and size clearly specified and defined?	5. Were standardized measures used, or where measures are designed for the study, attempts to ensure reliability and validity were made?	6. Were the data collected in a way that addressed the research issue?	7. Was the participation rate stated and at least 50%?	8. Was the number of participants described at each stage of the study?	9. If the study followed participants up, were reasons for loss to follow-up explained?	10. Were details of statistical tests sufficiently rigorous and described?	11. Were details of confidence intervals given?	12. Were potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?	13. Was the answer to the study question provided?	14. Are the findings related back to previous research?	15. Do conclusions follow from the data reported?	16. Are conclusions accompanied by the appropriate caveats?
Cai et al., 2020	1	1	1	1	0	1	0	1	N/A	1	1	1	1	1	1	1
Chew et al., 2020	1	0	0	1	1	1	1	1	N/A	1	1	1	1	1	1	1
Huang et al., 2020	1	1	1	1	1	1	1	1	N/A	1	1	1	1	1	1	1
Lai et al., 2020	1	1	0	1	1	1	1	1	N/A	1	1	1	1	1	1	1
Li et al., 2020	1	1	0	1	1	1	0	1	N/A	1	1	1	1	1	1	1
Lu et al., 2020	1	1	1	1	1	1	1	1	N/A	1	1	1	1	1	1	1
Sun et al., 2020	1	1	1	1	N/A	1	1	1	1	N/A	N/A	N/A	1	1	1	1
Wu et al., 2020	1	1	0	1	1	1	0	1	N/A	1	1	1	1	1	1	1
Zhang, Yang et al., 2020	1	1	1	1	1	1	1	1	N/A	1	1	1	1	1	1	1

Zhang, Wang et al., 2020	1	1	1	1	1	1	0	1	N/A	1	1	1	1	1	1	1

Table 2 Study quality, 1= yes, 0= no, N/A = not applicable, Quality assessment questions based on Brooks et al., 2018, see appendix 2