

Factors Affecting the Psychological Well-being of Health Care Workers During an Epidemic: A Thematic Review

Joel Philip¹, Vinu Cherian²

ABSTRACT

Background: Health care workers (HCWs) constitute a vulnerable group in terms of physical, mental, and emotional health setbacks during an epidemic. An in-depth understanding of the effects of epidemics on HCWs is of utmost importance, in order to put in place measures for their well-being. The purpose of the review was to compile, compare, and contrast the available information so as to produce a lucid picture of how HCWs are impacted during an epidemic, and the factors that affect their mental health.

Methods: A literature search of MEDLINE and Google Scholar databases was conducted to uncover research pertaining to four major epidemic outbreaks over the last two decades. The search was carried out at three levels using pertinent key words. The records thus identified were narrowed down at three further levels, that is, by screening of the title, abstract, and full text, to obtain articles most relevant to the subject matter. Data extraction was done using a spreadsheet to compile the relevant data. Data synthesis was done by studying those factors found to affect psychological well-being of HCWs and separating them into suitable sub-groups. Recommendations to mitigate the

psychological impact were proposed.

Results: Thirteen factors were identified, which were grouped under the broad categories of socio-demographic variables, individual characteristics, social characteristics, and psychological constructs.

Conclusion: Epidemics have a profound impact on psychological well-being of HCWs. There is a pressing need to address the issue of the psychological health of this vulnerable group.

Keywords: Mental health, health care worker, epidemic

Key Messages: The factors affecting the psychological well-being of HCWs during an epidemic outbreak are primarily poor social support, stressful work environments, greater patient contact, inadequate training, quarantine, history of physical or mental health issues, poor coping mechanisms, high perceived risk, stigma, social isolation, and a lack of resilience. Mental health professionals have an important role to play in mitigating the impact of these factors by extending the necessary support and professional expertise to HCW in need.

Epidemics have been a scourge on populations for centuries, with the term acquiring medical signifi-

icance ever since it was used by Hippocrates in his works over 2,000 years ago. Physicians, nurses, and auxiliary health care personnel have historically been at the forefront of these battles and continue to selflessly do so today. It follows that they may be disproportionately affected more than any other occupational class, in terms of physical, mental, and emotional health. An in-depth understanding of the effects of epidemics on health care workers (HCWs) at the frontlines is of utmost importance, in order to put in place measures for their well-being.¹

A large study conducted in a tertiary care hospital during the severe acute respiratory syndrome (SARS) epidemic and published in the *British Journal of Psychiatry* estimated that over 75% of HCWs suffered some form of psychiatric morbidity.² Studies have also determined that these psychological effects often continue long after the epidemic has been brought under control, persisting for as long as three years after the outbreak.³ These facts are a reminder of the severity of the issue of the adverse mental health consequences of epidemics on frontline medical professionals.

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The psychological impact on HCWs may comprise anxiety, mood disorders, or symptoms of post-traumatic stress. Similar to the varied effects on mental health, the contributory factors to poor mental health outcomes are also several. A systematic review that studied this during the SARS outbreak delineated some of the factors that affected mental health of HCWs; however, the search was limited to social and occupational variables. The mental health impact was found to be different depending upon the socio-demographic variables, specialty grade, work responsibilities, or even the time during the evolution of the epidemic when the study was undertaken.⁴ It is important to identify and address such factors, in order to mitigate the adverse effects on health care personnel.

To this end, several studies have been conducted on related topics over the years. However, these have been carried out in different geographic areas, using varying methodologies, and at times producing differing results. We carried out an in-depth literature search of all published studies over the past two decades concerning the psychological fallout of epidemics on HCWs. Our search covered research pertaining to four major epidemic outbreaks, that is, coronavirus disease 2019 (COVID-19), Ebola, Middle Eastern respiratory syndrome coronavirus (MERS-CoV) and SARS. The objective was to compile, compare, and contrast the available information so as to produce a lucid picture of how HCWs are impacted during an epidemic, and the factors that affect their mental health. This, in turn, lays the groundwork for recommendations to protect the psychological well-being of this vulnerable group.

Materials and Methods

A literature search was done on MEDLINE and Google Scholar to obtain articles fulfilling the following criteria:

1. Published in English journals
2. Published in peer-reviewed journals
3. Dealing with the designated subject matter

Searching and Screening

The search was done at three levels to narrow down the results and obtain the most relevant articles. At the first

level, terms related to mental health outcomes were used to carry out the search, such as “anxiety,” “depression,” and “post-traumatic stress.” At the second level, terms related to the prevailing health emergency were utilized, such as “epidemic,” “pandemic,” “SARS,” “MERS,” “Ebola,” “COVID-19,” etc. At the third level, the search was carried out using terms specific to the group of interest, such as “doctor,” “nurse,” “HCW,” “health care professional,” etc. The search was carried out independently by two authors, and the results were combined. The citations thus identified were listed and duplicated articles were sieved out. Articles that were selected for further reading were of several designs, including but not limited to original articles, systematic reviews, narrative reviews, commentaries and letters, as well as qualitative surveys.^{5,6}

The titles of the articles were screened to remove those that were irrelevant to the subject matter. The abstracts of the remaining articles were scanned for narrowing the pool further to maintain relevance. Finally, the full texts of the articles that were remaining were screened to ensure adherence to inclusion criteria. The flowchart pertaining to the methodology of screening and selection of articles is elaborated in **Figure 1**.

Data Extraction

A spreadsheet was created to enter the data pertaining to each article in a systematic manner for obtaining a “bird’s eye view” of the literature. The information entered included the disease involved, year and country of study, type of study, nature of study sample, number of participants, factors affecting mental health that were studied, conclusions, and limitations of the study.

Data Synthesis

A separate list was synthesized of all factors that were found to affect mental health of HCWs during an epidemic. These factors were then clubbed into sub-groups based on common themes. If a factor was found to produce differing effects on the study population, the reasons for the same were discussed. Factors that were statistically significant and common to two or more studies, as

well as recommendations put forward by authors to mitigate the negative impacts of epidemics were noted.

Results

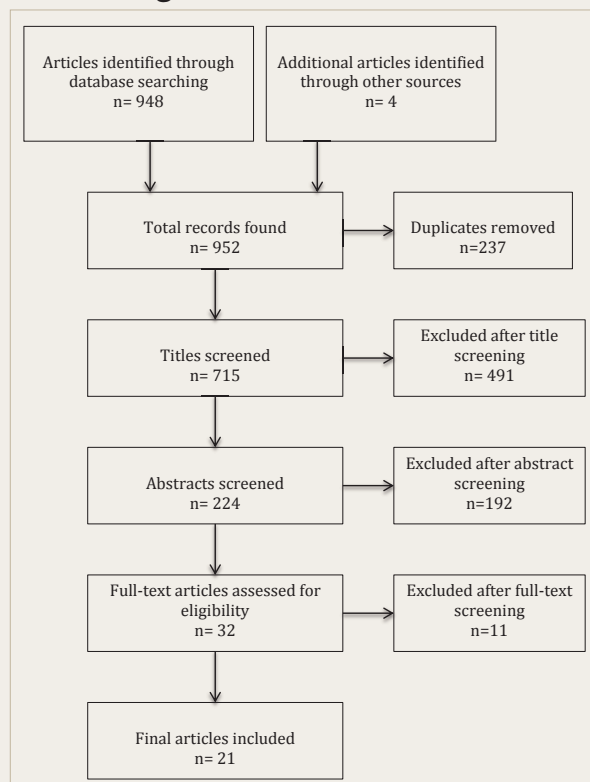
The initial search using the terms elaborated in the methodology, in varying permutations and combinations, yielded over 900 results. These were pared down to exclude studies that did not consider factors responsible for adverse mental health outcomes in health care professionals, the above being the area of interest of our review. Studies that did not meet the inclusion criteria were also removed. Finally, the most relevant articles were selected for the purpose of review. The information extracted from the pertinent original research articles has been laid out in **Table 1**.

Based on a detailed and critical evaluation, we were able to classify the factors affecting the mental health of HCWs during an epidemic into several themes.

1. **Age:** Two studies found an association between age and psychological distress. One study done in China following the COVID-19 pandemic found that middle-aged staff tended to have a higher risk of mental health problems, owing to greater family burden, while another study conducted after SARS concluded that younger age was associated with greater depressive symptomatology.^{7,8} Overall, older HCWs suffered fewer psychological setbacks during an epidemic outbreak.
2. **Gender:** There is a lack of consensus about the association of psychiatric morbidity with gender, with some studies reporting it to be more common in females and others stating the contrary. Two studies done during the SARS epidemic and two others carried out during the COVID-19 pandemic have shown that psychiatric morbidity is higher among female HCWs.^{2,9-11} One study undertaken during the Ebola pandemic suggested higher psychiatric morbidity among men.¹² Additionally, this study noted that male medical staff were prone to encounter greater stigmatization from the community at large.
3. **Marital status:** Two studies conducted after SARS documented greater levels of anxiety among married hospital staff.^{9,13} On the other hand,

FIGURE 1.

Flowchart of Screening and Inclusion/Exclusion of Studies



two other studies determined that persons who were unmarried had a higher risk of depressive symptoms, thereby pointing to the possible role of spouses in guarding against depression, by being a source of social support.^{7,8} Hence, it was shown that family ties contributed to anxiety symptoms but protected against depressive symptoms.

4. Educational level: A study conducted during the Ebola crisis concluded that greater educational attainment was associated with a lesser quantum of psychological suffering.¹⁴ Lacunae in knowledge concerning Ebola in medical personnel was found to be associated with lower scores on scales measuring health-related quality of life.¹⁵ Educational level was hence a predictor of how people respond in stressful situations like an epidemic outbreak, with less education contributing to greater psychological effects.
5. Occupational role: Studies have found that workers on the frontlines of an epidemic are more prone to psychological problems.^{2,7-9,11,14,16} One

study determined that the number of hours spent treating symptomatic patients at close quarters was a predictor of psychological distress in staff.¹⁷ Medical personnel caring for colleagues who were unwell were also concerned and anxious about their level of expertise.¹⁸ Whereas some studies observed that nurses were more prone to post-traumatic stress, others noted that physicians were at higher risk.^{3,7,19,20} Depressive symptoms were more common than anxious symptoms among doctors and nurses.⁷ Having an intermediate professional designation was associated with greater distress.¹¹ One study found that the psychological distress experienced by general physicians was significantly higher than that of the Traditional Chinese Medicine practitioners.²¹

The level of work experience was also significant to mental distress. Newly inducted staff with work experience less than two years had significantly higher scores on mental health questionnaires.⁷ Non-essential staff and technicians reported feeling iso-

lated and disconcerted that they were unable to contribute substantially to relief efforts. The term “non-essential” may have added to this sentiment.^{7,18} Compared to staff in tertiary hospitals, those in secondary hospitals reported higher scores on scales measuring symptoms of depression, anxiety, and insomnia.^{7,11} Samples from general hospitals of western medicine were more likely to report psychological distress and anxious symptoms, while those who worked at infectious disease hospitals reported more depressive symptoms.⁷ Hence, health care professionals with less experience, as well as greater and more prolonged patient contact, were at greater risk of psychological distress.

6. Past medical history: A recent survey found that among health personnel, having an underlying medical condition was a risk factor for depression, anxiety, insomnia, somatization, and obsessive-compulsive symptoms.¹⁰ A history of traumatic events was also significantly associated with greater depressive symptomatology.⁸ Another study published in *Lancet* observed that persons with pre-existing mental health issues received less support compared to their counterparts with no such past history.⁷ One study on HCWs treating MERS patients pointed out that they were prone to develop symptoms similar to post-traumatic stress disorder (PTSD) even after one month had elapsed.¹⁶ Studies have also established that a neurotic personality often sets the stage for mental health issues following stressors such as an epidemic.^{3,16} Hence, a history of past medical or psychiatric disorders was noted to make health workers more vulnerable to psychological disturbances during an epidemic.
7. Affliction of family and friends: The occurrence of the epidemic disease in close family and friends predictably has a negative influence on the psychological status and morale of health care personnel. This was documented in two studies on SARS frontline workers.^{8,9} A separate study conducted in emergency department personnel concluded that the overall

TABLE 1.

Studies Included in the Review

Epidemic/Country	Authors/Design	Participants	Psychological Measures	Results
COVID-19 China (Wuhan)	Kang et al. 2020 Cross-sectional (web-based survey)	183 doctors and 811 nurses	Generalized Anxiety Disorder (GAD-7) Patient Health Questionnaire (PHQ-9) Insomnia Severity Index (ISI-7) Impact of Event Scale-Revised (IES-R)	In total, 36.9% of the sample had sub-threshold mental health disturbances, 34.4% had mild disturbances, 22.4% had moderate disturbances, and 6.2% had severe disturbances. Younger women were affected to a greater extent. In total, 36.3% of participants had accessed printed psychological materials, 50.4% had accessed psychological resources available on media platforms, and 17.5% had participated in psychotherapy.
COVID-19 China (Wuhan, Hubei province)	Lai et al. 2020 Cross-sectional	493 doctors and 764 nurses	Generalized Anxiety Disorder (GAD-7) Patient Health Questionnaire (PHQ-9) Insomnia Severity Index (ISI-7) Impact of Event Scale-Revised (IES-R)	A considerable proportion of participants reported symptoms of depression (50.4%), anxiety (44.6%), insomnia (34.0%), and distress (71.5%). Nurses, women, frontline health care workers, and those working in Wuhan, China, reported more severe degrees of all measurements of mental health symptoms. Frontline health care workers involved in direct diagnosis, treatment, and care of patients with COVID-19 had a higher risk of symptoms of depression, anxiety, insomnia, and distress, and these results were statistically significant.
COVID-19 China (31 provinces)	Liu et al. 2020 Cross-sectional (web-based survey)	1,853 doctors and 2,826 nurses	WHO 20-item Self-Reporting Questionnaire (SRQ-20) Zung Self-rating Anxiety Scale (SAS) Zung Self-rating Depression Scale (SDS)	The prevalence of psychological distress, anxious symptoms, and depressive symptoms were 15.9%, 16.0%, and 34.6%. Those who were middle-aged, divorced or widowed, seldom or not living with family members, nurses, working at high-risk departments, having experiences of treatment for COVID-19 or other infectious diseases, from designated hospitals for COVID-19 treatment and working in higher level hospitals had a higher risk of developing at least one mental health problem. Medical staff with more mental health problems received less psychological help compared with those without any problem.
COVID-19 China	Zhang et al. 2020 Cross-sectional (web-based survey)	680 doctors, 247 nurses, and 1,255 non-medical health workers	Insomnia Severity Index (ISI) Generalized Anxiety Disorder (GAD-2) Patient Health Questionnaire (PHQ-4) Symptom Check List Revised (SCL-90-R)	Compared to non-medical health workers ($n = 1,255$), medical health workers ($n = 927$) had a higher prevalence of insomnia (38.4% vs. 30.5%), anxiety (13.0% vs. 8.5%), depression (12.2% vs. 9.5%), somatization (1.6% vs. 0.4%), and obsessive-compulsive symptoms (5.3% vs. 2.2%). Among medical health workers, having a physical illness was an independent risk factor for insomnia, anxiety, depression, somatization, and obsessive-compulsive symptoms. Living in rural areas, being female, and being at risk of contact with COVID-19 patients were the most common risk factors for insomnia, anxiety, obsessive-compulsive symptoms, and depression.
COVID-19 Pondicherry, India	Rajkumar 2020 Narrative review	Four articles finally included	A literature search of PubMed database	Symptoms of anxiety and depression (16%–28%) and self-reported stress (8%) are common psychological reactions to the COVID-19 pandemic.
Ebola Sierra Leone	Ji et al. 2016 Cross-sectional	59 Sierra Leone medical staff, 21 logistic staff, 22 medical students, 41 Chinese medical staff, 18 Ebola survivors	Symptom Check List Revised (SCL90-R)	Ebola survivors had extreme somatization, obsession compulsion, depression, anxiety, hostility, phobic anxiety, paranoid ideation, bad sleep, and appetite. Medical staff, who had direct contact with Ebola patients, including nurses, red zone cleaners, and blood team members, had more obvious psychological symptoms. Higher level of education received was associated with fewer psychological symptoms.
Ebola Liberia	Li et al. 2015 Cross-sectional	52 medical staff	Symptom Check List Revised (SCL90-R)	Mental distress among participants was not very serious. Male medical workers and those responsible for cleaning and disinfection showed significant increases in scores for psychological dimensions, such as obsessive-compulsive, anxiety, phobic anxiety, interpersonal sensitivity, paranoid ideation, and positive symptom total.

Ebola Germany	Lehmann et al. 2015 Cross-sectional	42 doctors and nurses from internal medicine, 32 doctors and nurses responsible for Ebola patient treatment, 12 laboratory staff from the research laboratory	Short Form Health Survey (SF-12) Somatic Symptom Scale (SSS-8) Generalized Anxiety Disorder scale (GAD-7) Patient Health Questionnaire (PHQ-9) Functional Assessment of Chronic Illness Therapy (FACIT)	The best predictors of poor physical and mental HrQoL were perceived lack of knowledge about the Ebola virus disease and fatigue.
Ebola Sierra Leone	McMahon et al. 2016 Qualitative	35 health care providers comprising community health officers, nurses, maternal child health aides, community health workers, and laboratory technicians	In-depth interviews and Inductive coding on transcripts	Providers described feeling lonely, ostracized, unloved, afraid, saddened, and no longer respected. They discussed restrictions on behaviors that enhance coping, including attending burials and engaging in physical touch. Providers described infection prevention measures as necessary but divisive because screening booths and protective equipment inhibited bonding or "suffering with" patients.
Ebola Sierra Leone	Raven et al. 2018 Qualitative	25 health workers and 19 key informants	In-depth interviews and inductive coding on transcripts	There were several important coping strategies, including those that drew upon existing mechanisms: being sustained by religion, a sense of serving their country and community, and peer and family support. Externally derived strategies included: training which built health worker confidence in providing care, provision of equipment to do their job safely, a social media platform which helped health workers deal with challenges, workshops that provided ways to deal with the stigma associated with being a health worker, and risk allowance, which motivated staff to work in facilities and provided an additional income source.
MERS-CoV Korea	Lee et al. 2018 Cross-sectional	1,800 hospital practitioners and 73 quarantined patients undergoing hemodialysis	Impact of Events Scale-Revised (IES-R) (administered twice, once during the hospital shutdown and again one month after the shutdown) Mini International Neuropsychiatric Interview (MINI) Hospital Anxiety and Depression Scale (HADS)	During the initial stages of the MERS outbreak, health care workers who performed MERS-related tasks scored significantly higher on the total IES-R and its subscales. In the second assessment of the high-risk group, the sleep and numbness subscale scores from the IES-R differed depending on the implementation of home quarantine, and the intrusion subscale scores differed depending on the performance of MERS-related tasks.
SARS Taiwan (Taipei)	Chen et al. 2007 Prospective	90 task force members (66 nurses, 11 physicians, 7 technicians, 6 respiratory care specialists) and 82 control subjects	Medical Outcome Study Short-Form 36 Survey (MOS SF-36)	Vitality, social functioning, and mental health immediately after care and vitality and mental health after self-quarantine and off-duty shifts were among the worst subscales. The social functioning, role emotional, and role physical subscales significantly improved after self-quarantine and off-duty shifts. The length of contact time with patients with SARS was associated with some subscales (role emotional, role physical, and mental health) to a mild extent. The total number of contact-hours with symptomatic patients with SARS was a borderline predictor of mental health score.
SARS Taiwan	Chong et al. 2004 Cross-sectional	1,257 health workers	Impact of Events Scale (IES) Chinese Health Questionnaire to assess psychiatric morbidity (CHQ)	The estimated prevalence of psychiatric morbidity was 75.3%. In total, 77.4% of respondents reported anxiety, 74.2% depression, poor family relationships, 69.0% somatic symptoms, and 52.3% sleep problems. The average IES score was 34.8 with significantly higher scores in men, in technicians, in those with work experience of less than two years, among those exposed to SARS and in those not living with their family. No significant difference in the IES score was found between marital status and different age groups. Those who were responsible for the care of SARS patients, especially women, manifested higher rates of psychiatric morbidity. No statistically significant difference was found in relation to age, marital status, or living conditions.

SARS China	Liu et al. 2012 Cross-sectional	549 hospital employees	Chinese version of the Center for Epidemiologic Studies Depression Scale (CES-D) Impact of Event Scale-Re- vised (IES-R)	In total, 77.2% of the sample had CES-D scores lower than 16 and so were considered to have a low level of depressive symptoms, 14.0% had CES-D scores between 16 and 24 and were considered to have moderate levels of depressive symptoms, the remaining 8.8% had CES-D scores of 25 or higher and were considered to have high levels of depressive symptoms. Being single, having been quarantined during the outbreak, having been exposed to other traumatic events before SARS, and perceived SARS-related risk level during the outbreak were found to increase the odds of having a high level of depressive symptoms three years later. Altruistic acceptance of risk during the outbreak was found to decrease the odds of high post-outbreak depressive symptom levels.
SARS Taiwan	Lu et al. 2006 Cross-sectional	127 health workers	Chinese Health Questionnaire Eysenck Personality Questionnaire Parental Bonding Instrument	A total of 22 participants (17.3%) developed significant psychological symptoms, and 105 participants (82.7%) showed no obvious symptoms. Maternal care and neuroticism directly influenced the ability of health care workers to deal with the impact of SARS. Maternal overprotection had an indirect influence on the ability to cope with the impact of SARS.
SARS Taiwan	Lung et al. 2009 Longitudinal	127 health workers	Chinese Health Questionnaire to assess psychiatric morbidity Eysenck Personality Questionnaire to assess personality traits Parental Bonding Instrument to assess care and protection for each parent	Health care workers who had psychological symptoms at follow-up reported these were associated with daily-life stress and not the SARS crisis. Early maternal attachment and neuroticism were found to have a greater effect on life-threatening stress than daily-life stress. Physicians had more somatic symptoms than nurses.
SARS Canada (Toronto)	Maunder et al. 2003 Retrospective iterative study	19 SARS infected patients of which 11 were health workers	Descriptions of the experiences of staff	Patients with SARS reported fear, loneliness, boredom, and anger. They worried about the effects of quarantine and contagion on family members and friends and experienced anxiety about fever and the effects of insomnia. Staff was adversely affected by fear of contagion and of infecting family, friends, and colleagues. Caring for health care workers as patients and colleagues was emotionally difficult. Uncertainty and stigmatization were prominent themes for both staff and patients. The hospital's response included establishing a leadership command team and a SARS isolation unit, implementing mental health support interventions for patients and staff, overcoming problems with logistics and communication, and overcoming resistance to directives.
SARS Singapore	Verma et al. 2004 Cross-sectional	721 general practitioners and 329 traditional Chinese medicine practitioners	Generalized Health Questionnaire (GHQ-28) Impact of Events Revised Scale (IES-R) HIV Stigma Scale	The mean score of the GHQ somatic, anxiety, and social dysfunction subscales were significantly higher in General Practitioners as compared to Traditional Chinese Medicine Practitioners. The GHQ total score, as well as the subscales, was significantly correlated with the IES-R and stigma subscales ($P < 0.05$). General Practitioners who were directly involved in the care of patients with SARS were significantly more likely to be affected as compared to those not involved in the care of patients with SARS.
SARS Hong Kong	Wong et al. 2005 Cross-sectional	123 doctors, 257 nurses, 82 health care assistants	18 item self-designed questionnaire to assess distress Brief COPE (Chinese version)	The mean overall distress level was 6.19 out of a 10-point scale. The mean overall distress levels for doctors, nurses, and health care assistants were 5.91, 6.52, and 5.44, respectively. The overall distress level for nurses was significantly higher than for health care assistants but not doctors. The overall distress level was highly and significantly correlated with six sources of distress: vulnerability/loss of control, health of self, spread of virus, health of family and others, changes in work, and being isolated. In terms of coping strategies, doctors were significantly more likely than nurses and health care assistants to use planning; nurses were significantly more likely than doctors to use behavioral disengagement; whereas health care assistants were significantly more likely to use self-distraction ($P < 0.05$).

SARS China	Wu et al. 2009 Cross-sectional	549 hospital employees	Impact of Events Revised Scale (IES-R)	In total, 10% of respondents experienced high levels of posttraumatic stress (PTS) symptoms since the SARS outbreak. Respondents who had been quarantined, or worked in high-risk locations such as SARS wards, or had friends or close relatives who contracted SARS, were 2 to 3 times more likely to have high PTS symptom levels, than those without these exposures. Respondents' perceptions of SARS-related risks were significantly positively associated with PTS symptom levels and partially mediated the effects of exposure. Altruistic acceptance of work-related risks was negatively related to PTS levels.
SARS London, United Kingdom	Brooks et al. 2017 Systematic review	22 papers finally included	Data extraction from four databases using PRISMA guidelines	The psychological impact of SARS on employees appeared to be associated with occupational role, training/preparedness, high-risk work environments, quarantine, role-related stressors, perceived risk, social support, social rejection/isolation, and impact of SARS on personal or professional life.

COVID-19: coronavirus disease 2019, MERS-CoV: Middle Eastern respiratory syndrome coronavirus, SARS: severe acute respiratory syndrome, WHO: World Health Organization, HrQoL: Health-related quality of life, COPE: Coping Orientation to Problems Experienced, PTS: post-traumatic stress; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

distress level was highly and significantly correlated with the health of family and significant others.¹⁹ This is, therefore, an important factor that needs to be addressed.

8. Attachment and coping styles: One study conducted during SARS found that a majority of aid workers deployed in the disaster suffered a stress reaction, yet this was guided by both neuroticism and prior levels of maternal attachment. A greater level of maternal over-protection predicted worse mental health following the disaster, and these findings persisted in a three-year follow-up period.^{3,20} A separate study concluded that certain coping strategies such as denial and substance use were found to be positively correlated to the level of emotional distress.¹⁹ These findings make clear that faulty attachment and coping styles are related to psychological issues in adult HCWs during stressful situations like an epidemic.
9. Effect of quarantine: Nearly 30% of quarantined individuals in the general population develop psychological symptoms, with longer durations of quarantine associated with greater distress.²² HCWs have been reported to experience fear, frustration, and stigma both during and after mandated quarantines.²³ They had worries regarding their personal safety, passing on the infection to significant others as well as concerns about being stigmatized in society.¹⁸ One study found that the vitality

and psychological well-being of SARS HCWs one month after quarantine remained worse than those in a control group.¹⁷ Studies conducted three years after the SARS outbreak also determined that respondents who had been quarantined were two to three times more likely to have high levels of post-traumatic stress, as well as an increased prevalence of depressive symptoms.^{8,9} Similar results were obtained following the MERS epidemic.¹⁶ These findings highlight the fact that persons with mental health setbacks take longer to recuperate and bring to attention the adverse mental health effects of quarantine on HCWs.

10. Perception and altruistic acceptance of risk: A study published in the Canadian Journal of Psychiatry highlighted the important proposition that post-traumatic symptom levels following an epidemic may be related to peoples' perceptions of the stress and the risks involved. In the above study, a positive correlation was established between the two.⁹ The authors also noted that the negative mental health effects could be partially offset by an altruistic acceptance of risk; in this case, a negative correlation was established.
11. Stigma: Studies have noted that frontline workers are at an exceptionally high risk of contracting the epidemic disease, as well as being stigmatized, ostracized, and even attacked.²⁴⁻²⁹ In one qualitative study, HCWs described feeling stigmatized

by those with whom they had earlier shared close relations, and the overall effect on their mental state was described as distressing.⁵ Psychosocial support extended to field workers by mental health personnel as part of another study was found to be useful in mitigating the effects of stigma.⁶ Therefore, stigma is a significant factor that has been found to affect work morale and productivity in HCWs during epidemics.

12. Social isolation: While the lack of social contact can have a detrimental effect on the mental health of the general population, these are multiplied in HCWs. A study of distancing measures in a tertiary hospital following SARS noted that employees were advised not to interact with colleagues outside of work hours, at a time when people longed for understanding from like-minded individuals. Meals had to be taken alone as eating would necessitate removing one's mask. E-mail was used extensively as a substitute for personal interaction and communication. It was concluded that these measures put into place, while being scientifically sound, led to staff feeling lonely and "cut-off," which in turn affected their psychological health.¹⁷ These findings have also been noted in observations made during subsequent epidemic outbreaks.^{11,24,17,30}
13. Resilience: Resilience is broadly understood as the ability to bounce back from setbacks. Only one study included in the review evaluated the

role of resilience as a protective factor in HCWs during an epidemic. In this qualitative study, field workers, during the course of interviews, reported that in spite of a lack of adequate infrastructure, they were able to overcome challenges in order to carry out their professional responsibilities. This was interpreted by the authors as an indicator of considerable reserves of resilience in the study population.⁶

Discussion

The literature search was exhaustive as it spanned four epidemics over 20 years, in addition to being specific to the vulnerable group in question, that is, HCWs. A number of factors were determined to be noteworthy in contributing to mental health effects. The factors that we studied have been divided under the broad categories of socio-demographic variables, individual characteristics, professional characteristics, social characteristics, and psychological constructs.

First, we evaluated socio-demographic variables to characterize their impact on mental health. While these variables obviously cannot be altered, literature does point to certain sub-groups who would benefit from added psychosocial support.³¹ An evaluation of the differential psychological effects based on age revealed that middle-aged doctors and health care staff were more likely to suffer psychological consequences during outbreaks. The additional responsibilities associated with this age bracket was deemed responsible for mental health setbacks.⁷ With regard to gender, there were varying conclusions reached on variations in mental health outcomes. Whereas some studies found that women were more predisposed owing to their psychological constitution, others reported that men suffered greater owing to the nature of their work, bringing them in closer contact with suspected cases. Marriage and having a supportive partner were found to protect against post-traumatic stress symptoms when working in unfavorable environments during an epidemic.^{7,8} Studies have documented that greater social support leads to better psychological outcomes.^{32,33} Better organizational support has also been found to allay fears in medical staff.³⁴ We

found that educational attainment and awareness was associated with less psychological distress, possibly due to better coping strategies and better access to social support systems.

With respect to individual characteristics, a past history of mental health problems was found to make HCWs more vulnerable to depression and anxiety following the stress of an epidemic.¹⁰ Such individuals were also found to access psychological services less and hence were less benefitted by such available interventions.⁷ Co-existing medical problems added to the probability of a new-onset psychological issue. These findings remind us that future psychological intervention providers should pay more attention to medical staff with mental health problems. Supportive measures could be provided for those staff with such high-risk characteristics on a priority basis. HCWs who had close relations who fell prey to the illness were two to three times more likely to suffer psychological consequences.⁹ These findings suggest that persons fitting a certain socio-demographic profile, specifically middle-aged persons with greater family responsibilities, fewer social contacts, less educational attainment, and a past history of medical and psychiatric illness are more prone to psychological distress. Such individuals in a health team need to be promptly identified and provided the necessary support, by way of interventions like delineation of work responsibilities and provision of psychological counseling services.

Next, the significance of professional characteristics and variables were noted. Different studies came to different conclusions as to whether doctors, nurses, or auxiliary staff had greater psychological consequences. However, a systematic review conducted after SARS determined that nurses were more likely to be affected on the occupational spectrum.⁴ Doctors and nurses on the frontlines, with closer and more prolonged patient contact, had greater mental health problems. The stress placed on HCWs functioning in these so-called "high-risk" environments have been elucidated in several studies, and there is a need to identify such psychological problems at an early stage.^{9,35,36}

A lack of adequate work experience and having to treat colleagues suffering from

the illness were found to worsen existing stress, precipitating anxiety and depression. Studies have recorded that a sense of expertise that comes with training facilitates a more robust psychological response to an epidemic. In this way, training is found to be a protective factor in preventing psychological breakdown.³⁷⁻³⁹ Workers who had to undergo mandatory quarantines secondary to exposures were found to have worse psychological outcomes, especially with regard to sleep and post-traumatic stress symptoms, when compared to controls. Quarantine periods have been found to amplify post-traumatic stress symptoms of front-line workers in several studies.^{9,36,40} Such issues were found to take a long time to recover, sometimes persisting as long as three years after the outbreak. The length of quarantine has also been previously associated with negative outcomes, such as anger and avoidance.³⁴ Hence, a review of literature surrounding the professional characteristics contributing to psychological distress reveals that nursing staff, those with fewer years of experience, staff working in designated isolation wards, and persons who have had to undergo quarantines are at greater risk. Such personnel need to be provided the requisite training for medical management of afflicted patients. Supply of adequate personal protective equipment, working in shorter shifts, provision of psychological support services, and telephonic check-ins during quarantine can help mitigate psychological setbacks.

On the social front, the stigma faced by HCWs in the community has been adequately described in qualitative studies. The effects of this, in terms of work satisfaction, motivation, and psychosocial setbacks, have also been illustrated in several journal communications. Stigma was found to lead to social isolation and ostracism of health care personnel in their communities. These, in turn, had far-reaching consequences on their mental health.^{13,32,41,42} The stigma surrounding HCWs may be alleviated by tackling misinformation regarding disease spread. Public education campaigns to rebuild trust within the community and promoting public acts to show appreciation to health workers can also play a role in reducing stigma.⁶

On evaluating the role of psychological constructs, we noted that a low level of maternal attachment and greater over-protectiveness were associated with increased morbidity.²⁰ Maternal attachment and personality characteristics of neuroticism were found to have a more profound impact on life-threatening stressful events than daily-life stresses.³ Certain coping styles like anticipation and planning were found to be more protective than others. Doctors were more likely to use planning as a coping strategy, whereas nurses utilized behavioral disengagement.¹⁹ Modalities of accessing information surrounding the epidemic and the perception of risk to self were also important in predicting psychological problems. The concept of “perceived risk” was studied, wherein we noted that greater perceived risk led to increased levels of post-traumatic stress. This has been noted in other hospital-based studies as well, which has established a similar correlation with PTSD symptoms.^{9,13,43} A sense of altruism concerning one’s work was protective and helped allay fears of contracting the disease oneself or transmitting it to loved ones.⁹ These findings have ramifications, as mature coping mechanisms and a positive perception of one’s role in the epidemic response are found to be protective. Conducting workshops on these aspects for health workers can produce positive outcomes in this regard.

Recommendations

Several studies and journal correspondences from frontline workers during epidemic crises have suggested interventions and guidelines to mitigate the psychological aftermath on HCWs. Whereas some suggestions were region-based and limited by available area-specific resources, others were broader and easily generalizable to a larger pool of health care personnel.

We enlist below a list of suggestions to safeguard the mental health of medical personnel during an epidemic, based on the current review of literature:

1. Managers and senior staff must be able to identify personnel at greater risk of developing psychological issues and provide support promptly where necessary. Less critical roles must be identified for those more vulnerable to crises.^{37,44}
2. Frontline staff must be identified and suitably upskilled with psychological first aid training and knowledge on coping strategies in order to be able to support co-workers showing early signs of distress.^{14,44-46}
3. A forum must be made available for medical personnel to voice their concerns surrounding the challenges of patient care. Peer support programs must be made available and accessible.⁷
4. Guidelines must be put in place to ensure greater physical distancing and better personal hygiene at the workplace. Conducting meetings on online platforms should be encouraged as a step in the right direction.¹¹
5. Quarantine must be promoted only when deemed appropriate, that is, when there is significant disease transmission even when the person does not show symptoms, and if this asymptomatic period is neither too long nor too short.^{47,48}
6. Whenever planning is underway to execute measures to safeguard the psychological well-being of medical workers and hospital employees, discussions should involve all involved disciplines. There must be adequate representation from the departments of psychology, psychiatry, chaplaincy, social work, nursing and hospital administration. This will ensure that multiple viewpoints are considered to put forward the most effective plans.^{46,49}
7. Psychological assistance hotline teams must be set up, comprised of volunteers who have received the relevant psychological training. Team members will be able to provide telephonic guidance to personnel to help effectively tackle mental health problems.³⁰ For instance, clinical psychologists based at the National Health Service (NHS) Trust at King’s College, London have set up a volunteer service that provides assistance for medical personnel through various platforms like e-mail and video conferencing.¹⁴
8. The National Institute for Health and Care Excellence (NICE) recommends “active monitoring” to make sure that staff who fall sick are identified early and supported with high-quality care.⁵⁰
9. Leaders, both at the grassroots and higher levels of the federal govern-

ment, must offer clear and authoritative instructions and set out appropriate guidelines regarding protective measures, which in turn can allay excessive fear and apprehension.^{14,51}

Role of Mental Health Professionals

Psychiatrists and clinical psychologists need to assume leadership roles in order to safeguard the mental health of treating teams during an epidemic. Their expertise can be invaluable in the early identification and treatment of psychological issues that arise in their clinical colleagues. Medication, as well as psychological interventions like cognitive behavior therapy, can be offered to help those who come forward to seek support. Workshops may be conducted for medical staff to prepare them for the psychological challenges associated with being on the frontlines of the epidemic. Psychiatrists can screen personnel for psychological vulnerabilities before being deployed to especially stressful work environments. They can work with team leaders to allay stigma and encourage help-seeking. Team leaders can be encouraged to foster stronger social bonds between team members and strengthen social support systems at the workplace. Under the guidance of a psychiatrist, clinical supervisors can be supported to engage in “active monitoring” of their colleagues.⁵⁰ Mental health professionals can thus play a prominent role in sustaining the psychological well-being of HCWs during an epidemic.⁵²

Limitations

Despite the included studies being of several designs, the largest proportion was cross-sectional in nature. Prospective and longitudinal studies, which provide more robust evidence, were fewer in number. Some of the studies were conducted during the peak of the epidemic outbreak when governments had passed advisories on staying indoors. Information was hence collected through web-based surveys. Questionnaires were also mailed to laypersons who acted as a control group in some studies. Without personal interaction with a clinical professional who, under normal circum-

stances, generally administers such psychological tools, this group may have had unanswered queries about some items on the scale. This may have produced some inconsistency in the test results in a small proportion of subjects. Finally, the response rates were low in a few studies and less than 50% in two of the evaluated works.^{19,21}

Conclusion

Our study highlights those factors that play an important role in determining the psychological impact of epidemics on HCWs. A better understanding of the subject can go a long way toward putting in place measures to mitigate this, thereby ensuring a healthy and sustainable medical workforce.

Declaration of Conflicting Interests

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