Psychological burden of covid-19 health crisis on health professionals and interventions to minimize the effect: what has history already taught us?

Carico psicologico della crisi sanitaria da covid-19 negli operatori sanitari e interventi per ridurne l'effetto: cosa ci ha insegnato la storia?

ORESTIS TSONIS[1*], KALLIOPI DIAKAKI[2], FANI GKROZOU[3], AIKATERINI PAPADAKI[4], EVANGELOS DIMITRIOU[5], MARIA PARASKEVAIDIS[6,7], MARIA KYRGIOU[6], EVANGELOS PARASKEVAIDIS[1], MINAS PASCHOPOULOS[1], EVANGELIA MARIA TSAPAKIS[2], VASSILIKI SIAFAKA[8]

*E-mail: orestis.tsonis@gmail.com

[1]Department of Obstetrics and Gynaecology, University Hospital of Ioannina, Greece
[2] "Agios Charalambos" Mental Health Clinic, Heraklion, Greece
[3]Department of Obstetrics and Gynaecology, University Hospitals of Birmingham, UK
[4] Dromokaiteio Psychiatric Hospital, Athens, Greece
[5] Department of Mathematics, University of Ioannina, Greece
[6] Institute of Reproductive and Developmental Biology, Department of Metabolism, Digestion and Reproduction& Surgery and Cancer, Imperial College London, UK
[7]Department of Pharmacy and Biomedical Sciences, University of Central Lancashire, Preston, UK
[8]Department of Speech and Language Therapy, School of Health Sciences, University of Ioannina, Greece

SUMMARY. Health professionals have been at the frontline of the health service since the outbreak of covid-19, responding promptly to diagnose, support and treat infected patients. World Health Organization (WHO) has already praised their contribution and their essential role in controlling this disease. Some of the main concerns of covid-19's impact to health service staff include work overload, exhaustion, and high risk of self-infection or transmission to family members. Moreover, during the pandemic, caregivers' mental health inevitably becomes vulnerable, with salient stress and anxiety-related symptoms. Uncertainty, fear of contagion, guilt, hopelessness, stigmatization and, in some cases, long-term post-traumatic stress disorder (PTSD) are few of the potential effects posed by this outbreak on health workers. In this review, lessons learnt from previous global crises or pandemics on the psychological impact of health workers are presented. History could potentially provide essential information on how to best manage, support and optimize our approach to this highly appreciated and much needed group of professionals. Targeted and prompt interventions could reduce the psychological strain of health professionals, thus, further improving provided patient care. Covid-19 is an on-going health crisis and this work, even though generated by limited existing data, could be used to inform governments and/or institutions and lead on decisions and changes in current guidelines.

KEY WORDS: health professionals, covid-19, fear, anxiety, stigmatization, mental support, pandemic.

RIASSUNTO. Gli operatori sanitari sono stati in prima linea nel servizio sanitario dallo scoppio della pandemia da covid-19, rispondendo prontamente per diagnosticare, supportare e curare i pazienti infetti. L'Organizzazione Mondiale della Sanità (OMS) ha già elogiato il loro contributo e il loro ruolo essenziale nel controllo di questa malattia. Alcune delle principali preoccupazioni dell'impatto di covid-19 sul personale del servizio sanitario includono il sovraccarico di lavoro, l'esaurimento e l'alto rischio di autoinfezione o trasmissione ai membri della famiglia. Inoltre, durante la pandemia, la salute mentale dei caregiver diventa inevitabilmente vulnerabile, con stress salienti e sintomi legati all'ansia. L'incertezza, la paura del contagio, il senso di colpa, la disperazione, la stigmatizzazione e, in alcuni casi, il disturbo da stress post-traumatico (PTSD) a lungo termine sono alcuni dei potenziali effetti posti da questo focolaio sugli operatori sanitari. In questa rassegna vengono presentati gli insegnamenti tratti da precedenti crisi globali o pandemie sull'impatto psicologico degli operatori sanitari. La storia potrebbe potenzialmente fornire informazioni essenziali su come gestire, supportare e ottimizzare al meglio il nostro approccio a questo gruppo di professionisti molto apprezzato e tanto necessario. Interventi mirati e tempestivi potrebbero ridurre lo stress psicologico degli operatori sanitari, migliorando ulteriormente l'assistenza fornita ai pazienti. Covid-19 è una crisi sanitaria in atto e questo lavoro, anche se generato da dati esistenti limitati, potrebbe essere utilizzato per informare i governi e/o le istituzioni e guidare le decisioni e i cambiamenti nelle attuali linee guida.

PAROLE CHIAVE: operatori sanitari, covid-19, paura, ansia, stigmatizzazione, supporto mentale, pandemia.

INTRODUCTION

The covid-19 (novel coronavirus [2019-nCoV]) outbreak originated in Wuhan, China, in December 2019 and rapidly spread globally[1,2]. As early as one month later, the first cases of health care workers providing care for covid-19 patients were reported[1]. Previous epidemics, pandemics or outbreaks that pose an international concern should be considered in order to effectively manage and support health professionals during these difficult times[3,4]. These crucial times demand greater understanding of past health crises in order to prevent healthcare associates' exhaustion and psychological distress[3].

Lessons learnt from previous outbreaks help scientists decide on the appropriate management, diagnosis and treatment and planning of more effective interventions and support policies for health professionals[5]. Higher transmissibility of covid-19 compared to previous coronavirus outbreaks would potentially challenge the integrity of our health systems as well as the alertness and resilience of health professionals worldwide[5]. Protection of health workers is imperative since previous epidemics have shown increased mortality and mental morbidity rates in this subgroup[6].

In addition to threatening physical health, covid-19 also threatens mental health of both the general population and health professionals, mainly as a response to lockdowns, social isolations and uncertainties about future. The pandemic shows special features that cause a wide range of negative emotions, such as low mood, heightened generalized or specific concerns, fear, helplessness and hopelessness. Physical symptoms could be just as troublesome, including insomnia, severe somatization symptoms, and more often than not exacerbation of a pre-existing mental disorder. Lack of appropriate and coordinated psychological interventions for health professionals under this type of crisis is profound and further approaches need to be developed in order to alleviate psychological distress related to demanding working conditions during these outbreaks[7].

International literature lacks in scientific evidence focusing mainly on the psychological burden of covid-19 global health crisis on health professionals, thus, a systematic review is not able to be conducted at present. Scientific evidence regarding previous health crises, as declared by WHO, and their impact on health professionals needs to be explored in a timely manner[8] Further studies, specifically addressing the subject on research, need to be conducted in order to elucidate the psychological aspects of a pandemic on healthcare personnel and to suggest proven optimal approaches to support these important subgroups.

The aim of the present review is to explore the psychological reactions experienced by health professionals in the context of previous pandemics, and to record interventions applied in previous health crises in order to relieve symptoms of mental strain.

MATERIALS AND METHODS

Three major search engines, namely MEDLINE, PubMed and EMBASE were searched for articles published prior to 20th March 2020 that matched any combination of the following key words [virus] OR [COVID-19] AND [outbreak] OR [pandemic] AND [health professionals] OR [doctors] OR [nurses] OR [hospital staff] AND [fear] OR [anxiety] OR [stigmatization] AND [mental] OR [psychological] AND [support]. Only scientific papers in English were included.

The review focuses on the outbreak of viruses, whose spread was declared by the WHO as a Public Health Emergency of International Concern (PHEIC) or as Pandemic. In modern history, PHEIC declarations concerned the H1N1 virus outbreak, the Severe Acute Respiratory Syndrome (SARS) outbreak, the Middle East Respiratory Syndrome (MERS) outbreak, the Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) outbreak and the Ebola virus outbreak.

Here, chronologically-based scientific evidence is presented, describing the effects of virus outbreaks on health personnel and the interventions developed and applied in each case. Papers on the mental distress of the general population during a pandemic or the psychological effect of infected patients or family members were excluded. All articles included were reviewed by O.T., K.D, E.T., V.S.

PSYCHOLOGICAL IMPACT OF WORLD HEALTH CRISES ON HEALTH PROFESSIONALS

In the 21st century, two additional coronavirus outbreaks were recorded. In 2002 and 2012, the number of hospitalized patients infected with SARS and MERS respectively, was substantial, jeopardising the health of hospital personnel[1]. Epidemiologic studies revealed that in previous epidemics of SARS and MERS 23.1% and 9.8% of health professionals were infected respectively, underlying the high risk of viral transmission in this subgroup of the general population and the need to further support them, as the physical symptoms of the disease worsen psychological distress[1,9,10]. High perceived discrimination was observed among health professionals who were often forced to be quarantined, alongside feelings of isolation, frustration and inadequacy. Under these circumstances health workers usually experience fear and guilt, feeling inadequate to protect themselves, their families and the environment they live in from spreading the infection. Interestingly, the same group often exhibits altruistic behaviours posing a great threat to the health system[11]. Long-term negative sequelae of any pandemic on health professionals' well-being is expected with previous global health outbreaks informing ways to support these workers adequately in order to cope with the demands of this pandemic[8] (Table 1).

The H1N1 pandemic revealed that the main concerns of health professionals focused on their personal safety and the safety of their families. Clinicians often seemed to show higher willingness to provide care when motivation was increased by clinical managers or national or local authorities[12,13]. A cross-sectional study among health providers showed that direct protection by national or regional political authorities had a positive impact in increasing motivation and decreasing hesitation to go to work[14]. The main difficulty of health workers was their inadequacy to shift their perception from a patient-focused approach to a population-focused healthcare service[12-15]. In a pre-pandemic planning survey, the need for educational programs was emphasized. These should focus on enhancing professionalism in order to

Table 1. Pandemics and Global Health Crises.

Period	Health Crisis	Affected population	Health professionals' psychological impact	Declaration
2002-2003	Severe Acute Respiratory Syndrome (SARS)-CoV	26 countries affectedMainly China, Taiwan, Hong Kong, Singapore and Toronto, Canadainfecting 8096 peoplecausing 774 deaths	depression, anxiety, fear, and frustration were notedobsessive compulsive disorder and post-traumatic stress disorder in the long run	Public health emergency of international Concern (PHEIC)
2009	H1N1	Worldwide151.700-575.400 deaths	Fear of personal health Fear of family members' safety	Pandemic
2012	Middle East Respiratory Syndrome (MERS)-CoV	25 counties affectedinfecting 2494 peoplecausing 854 deaths	Stigmatization Fear, anxiety Social rejection Altruism	Public health emergency of international Concern (PHEIC)
2005*-2013	HIV/AIDS	Worldwide>32,000,000 deaths	Fear of infection Anxiety Stigmatization	Pandemic
2014-2016	Ebola	Worldwide, primarily concentrated in West Africa>11,300 deaths	Shortage of Mental Health Professionals Inefficient support providers Feelings of stigma, regret and isolation Inadequate local initiatives	Public health emergency of international Concern (PHEIC)
2019-on going	Covid-19	Worldwide(214 countries so far and 2 international conveyances) 37,313,888 cases 1,075,358 deaths	To be explored	Pandemic

* major outbreak in the developed countries; Data Worldometers.
Last updated: October 10 , 2020

maintain solid and prepared staff during a potential health crisis thereby supporting the primary care system[12].

A cross-sectional study estimating SARS-related stress among health professionals revealed similar experiences to the ones emerging following natural disasters and life-threatening traumatic situations[16-18]. In a study by Chong et al.[16], the thought that caregivers could potentially get lethally infected by the spread of the virus, overwhelmed the majority of affected individuals. The initial phase of the spread of the disease was accompanied by the loss of a sense of control which is a major contributor to the physical burnout, frustration, vulnerability and perceived threat[16,19] Moreover, when the disease was effectively controlled, often described as the second phase, health workers showed avoidance as a coping strategy and higher rates of psychiatric morbidity, especially depression[16,20]. On the other hand, recognition of health workers' contribution was considered as a positive experience, since appreciation seemed to ameliorate their negative feelings[21]. In Toronto, Canada, health workers, one or two years after the outbreak showed similar or lower rates of psychiatric disorders compared to the general population, implying hope and underlying the need to enhance the morale of and the psychological support for health care professionals[22]. Another interesting aspect is that health professionals in intensive care units (ITUs) or emergency departments experienced lower levels of stress compared with colleagues working in different departments, reflecting the fact that the former are better trained in crisis management having developed effective coping strategies focusing on problem solving[23].

Another qualitative study on the emotions experienced by health professionals during MERS revealed a four themed pattern regarding their perception of this health crisis. Stigmatization, fear and anxiety about the future, social rejection and underestimation of the disease were the main sentiments that health providers mentioned. Altruistic behaviours were common, but, in some cases, the need to provide care outweighed the need to protect themselves from a possible infection[24,25]. Post-traumatic stress disorder (PTSD) was estimated as equal to one experienced by MERS infected patients including near-death experiences and feelings of alienation[26]. Additionally, the need to overcome this painful experience resulted in a unconscious rejection of the victims, the infected patients and surprisingly themselves, as adequate caregivers, leading them to further alienation and depression[24,27]. Long-term impact of this perceived "bio-disaster" was accompanied by fear of disease, obsessive compulsive disorder (OCD) and post-traumatic stress disorder (PTSD), with reported overall psychiatric morbidity reaching 75%[16,28,29].

Although HIV (Human Immunodeficiency Virus) was identified in 1989, by 2013 HIV infection was already a pandemic leading to death millions of people and costing billions to the health systems worldwide. Lack of scientific evidence or education, as well as, shortage of resources, especially in countries facing poverty, led health workers to a great deal of stress when caring for an infected patient. Fear of contagion and stigma related to this untreatable condition stressed out health professionals of this domain. Studies have shown that better understanding of the condition led to mental well-being among health workers working with HIV

positive patients or patients suffering with AIDS over the years[30]. HIV/AIDS pandemic shares common traits with covid-19 outbreaks in terms of stigmatization, fear of personal and family safety and anxiety for the future as they are perceived by health professionals worldwide.

Recently, Ebola Virus Disease (EDV) outbreak was declared as a public health crisis affecting populations worldwide. This epidemic seemed to affect a number of subgroups including patients, health professionals, relatives affected by human losses, not separately explored, and it has been estimated that 27.5 to 83.3% of affected individuals were more likely to experience symptoms of anxiety and that 12 to 75% of these individuals were more likely to present signs of depression. The majority of studies did not focus on health professionals psychological effects rather than provided information for the affected individuals in general, which presented PTSD, sleep disturbances, obsessive compulsive disorder (OCD), substances abuse, social anxiety and other symptoms of psychological distress which in some cases could lead to suicidal ideation. In this case, physical symptoms of EDV, as well as, long-term disabilities (ophthalmologic disturbances and chronic pain etc.) were treated separately from mental disorders. Lack of psychological support programs addressing to the psychological impact on health workers and in addition, continuous stigma for survivors and health professionals was profound. In other words, EDV was not faced holistically, rather than treated symptomatically, and this gap led to an undiagnosed mental disability, not only for affected individuals, but, also, for health continuous stigma for survivors and health professionals was profound. In other words, EDV was managed symptomatically rather than holistically, and this gap led to undiagnosed mental burden, not only in affected individuals, but in health workers as well[31,32]. In a recent systematic review by Cénat et al.[31], it was highlighted that, during the EDV pandemic, mental health and psychosocial support programs were offered to health workers only in a small scale. In these programs, health workers were offered cognitive behavioural group therapy in order to cope with stigmatization, anxiety, stress and grief. Authors emphasized the lack of adequate training of mental health support providers and the absence of local or regional implementation of these programs rather than an internationally driven initiative that was not given in a timely manner. Inadequate training of non-specialized providers, due to a shortage of mental health professionals, led to non-efficient psychological support programs with controversial results on the improvement of health workers' mental state.[31,33]

INTERVENTIONS TO RELIEVE THE PSYCHOLOGICAL BURDEN OF HEALTH PROFESSIONALS

Coronavirus disease outbreak has given rise to great uncertainty, instilling an intense feeling of anxiety and fear to the general public and, in particular to people with pre-existing mental health problems. Regarding hospital staff, work overload, frustration, alienation, the loss of patients and exhaustion have all been shown to harm their mental health and psychological wellbeing. According to a report from China, health workers experience a vast number of psychological symptoms during this unprecedented situation, including depressive symptoms, sleep disturbances, denial, anger, and fear affecting their ability to provide care[34].

Several interesting conclusions can be drawn from the recent experience in Wuhan regarding the impact of this crisis in health care professionals and the possible interventions needed. A well-designed psychological intervention plan should aim at addressing the mental health demands of vulnerable staff. Firstly, medical workers should have access to psychological assistance to help them deal with mental distress symptoms. A number of services staffed with mental health professionals should be developed, aiming to provide education and support. The rapid response of the Chinese mental health services set a great example, since their interventions included online guidance for the medical staff, a hotline aiming to provide psychological support and supervision, as well as group therapy and other group activities in order to handle high stress levels[34,35]. This approach contributed to better understand the concerns, problems and needs of hospital workers. It helped to optimize measures taken in order to minimize feelings of uncertainty and exhaustion by offering better places for rest, food supplies, and alternative ways of communication with the family, training on how to best approach patients' problems, and setting specific rules on the use of protective equipment. In addition to providing facilities and satisfying basic needs, these interventions aim strengthen interpersonal relations.

In times of crisis, optimal close interpersonal relationships are vital in reducing helplessness, improving mood and enhancing life prospects. Therefore, during social isolation, finding other ways of communicating through electronic devises (e.g., smartphones, tablets, etc.) is necessary. According to Lazarus and Folkman, the way a person assesses situations determines their reactions to stress and their efforts to cope with stressful situations[36]. Each intervention should take into account all known mediators of stress, the Stress Adaptation Model and the basic principles of Crisis Intervention, which include immediate intervention, action, limited and targeted goals, focused problem solving and support[37,38].

Based on previous experience, knowledge of the possible factors affecting healthcare providers' psychological status during health crises, the optimal approaches resulting in efficient education and support of healthcare workers, is available. For instance, long before the H1N1 outbreak, a hospital affected by the SARS pandemic put forward a hypothetical scenario of a pandemic in order to test and prepare health workers towards an upcoming global health crisis. The results of this study were quite promising suggesting higher levels of preparedness, resilience and cooperation between individuals. Furthermore, it seems that simulation scenarios might be beneficial in building greater trust between the healthcare team members and reduces negative emotions[39]. A study from Ireland during the high risk influenza outbreak in 2015 examined concerns expressed by nurses in the event of an influenza pandemic in order to evaluate their preparedness[16]. It was suggested that addressing their concerns and worries in advance decreases levels of fear and insecurity and minimizes number of days off work. Organizing psychosocial interventions, providing communication, training and education, ensuring sufficient medical supplies and facilities for staff, as well as supporting their families are all important factors in increasing the availability of nursing staff during a pandemic and should be included in a preparedness

plan[15]. Recent experience from the Chinese Ebola outbreak further revealed the importance of measures aiming to ensure the safety of medical staff in order to successfully cope with the crisis brought up by a pandemic[33].

One of the latest web-based cross-sectional studies aiming to assess the population mental health burden during the pandemic in China reported that almost one out of four healthcare professionals presented with high levels of anxiety and insomnia probably due to work overload and depression caused by the pandemic. The same survey suggested several strategies in order to relieve psychological symptoms in general population and especially in those more vulnerable. Fact-check control of information received is highlighted and avoiding too many harmful rumours is suggested[40]. Maintaining normal work habits and adequate rest time, as well as, regular physical workout, are also suggested aiming to improve symptoms such as insomnia. Finally, the study underlines the need for close monitoring of psychological consequences caused by the outbreak[40].

There are also many useful directions regarding management of mental conditions in humanitarian emergencies (mhGAP/ Humanitarian Intervention Guide). Assessment of individual's condition and current understanding of the situation is of cardinal importance, as well as providing information and addressing personal concerns during a support session. Raising awareness about available services, ensuring availability of the necessary sources (food supplies, protecting equipment) and providing a supportive atmosphere for patients and staff are also highly recommended[41].

Taking all the above into consideration, in order to meet the high demands of an unprecedented health crisis, the mental health of healthcare workers should be guaranteed. A mental health plan, aiming to deal with the psychological burden of health professionals, should be integrated into the general policy of health response. Several measures should be implemented in order to prevent psychosocial impact, to assess and finally support mental health (Figure 1).

- Accurate update on the outbreak should be provided in an honest and open manner in order to minimize the sense of fear and uncertainty[33].
- Multi-disciplinary mental health teams, including psychiatrists, psychologists, social workers, etc., should be developed, aiming to:
  - assess and treat healthcare workers presenting with symptoms of psychological distress[15];
  - perform regular screening of staff for depression, anxiety or other mental health symptoms and disorders, especially those who seem to be more vulnerable[42];
  - daily or regularly supporting and encouraging staff with group therapies or group activities;
  - develop a website concerning psychosocial issues associated with the current situation and encourage individuals with pre-existing mental health problems to make contact proactively[37];
  - organize a telephone helpline staffed by mental health teams, which will provide immediate emotional support if needed; and
  - create a database to record personal details[36].
- Facilities for rest and isolation should be provided for the medical staff as well as adequate food and daily living supplies[40].

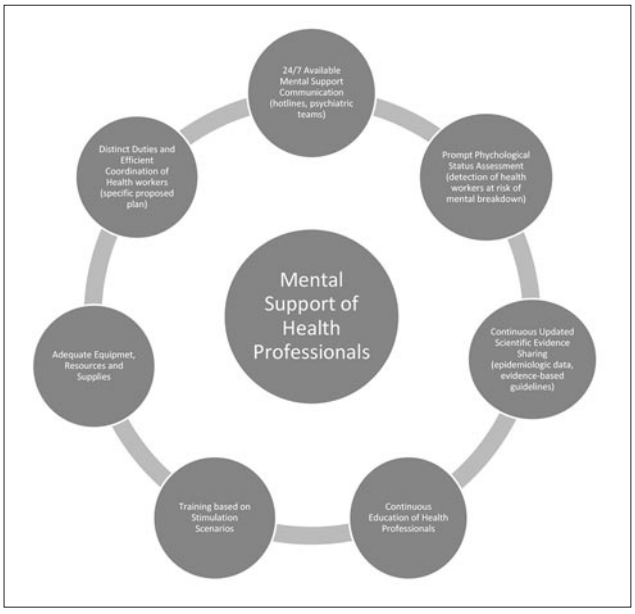

Figure 1. Proposed intervention need to be guaranteed in order to maintain psychological wellbeing of health workers during world health crises.

- Sufficient medical equipment and protective measures should be available. Both measures should be taken to reduce insecurity and fear while considering the respect in human rights[42].
- Provision of alternative ways of communication between healthcare workers and their families in order to minimise the sense of isolation[38].
- Authorities should encourage healthcare managers to ensure that their staff members are supportive to each other. In addition, they should provide incentives to the healthcare professionals in order to reward their dedication and overwork[34,35].
- Authorities should ensure that sufficient staff works in healthcare in order to avoid burn-out[41].

CONCLUSIONS

Covid-19 is an unprecedented global health crisis affecting all. Health workers stay at the frontline in an effort to control and manage the detrimental effects of the disease. Mental health is a key component in reassuring the endurance of any health service. Both health professionals in quarantines and those who continue working longer shifts under questionable personal safety, expose themselves to a pandemic infection and should be supported by healthcare managers through focused mental health programs[11]. Moreover, exhaustion is inevitable since the majority of health systems is not prepared for the number of patients needing treatment. In countries like Greece or the United Kingdom, authorities have to plan a step upfront promptly so that health workers cope with the work overload and psychological distress[8].

During these difficult times, focusing on the development of strategies addressing the mental health support of health professionals is imperative. International and national authorities ought to take action to address this under-reported, underestimated, but important issue. Further studies should be conducted to better elucidate the psychological aspects of the covid-19 pandemic on the healthcare personnel and to suggest optimal approaches in order to support this important subgroup of the population.

Authors' contribution: all other authors contributed equally by retrieving data, analysing scientific evidence and providing feedback for the final form of this review.

Conflict of interests: the authors have no conflict of interest to declare.

REFERENCES

1. Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. Lancet 2020; 395: 470-3.
2. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. Lancet 2020; 395: 1054-62.
3. The Lancet. Emerging understandings of 2019-nCoV. Lancet 2020; 395: 311.
4. Favre G, Pomar L, Musso D, Baud D. 2019-nCoV epidemic: what about pregnancies? Lancet 2020; 395: e40.
5. Wilder-Smith A, Chiew CJ, Lee VJ. Can we contain the COVID-19 outbreak with the same measures as for SARS? Lancet Infect Dis 2020; 20: e102-7.
6. Chang D, Xu H, Rebaza A, Sharma L, Dela Cruz CS. Protecting health-care workers from subclinical coronavirus infection. Lancet Respir Med 2020; 8: e13.
7. Hellewell J, Abbott S, Gimma A, et al. Feasibility of controlling COVID-19 outbreaks by isolation of cases and contacts. Lancet Glob Health 2020; 8: e488-96.
8. Kang L, Li Y, Hu S, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. Lancet Psychiatry 2020; 7: e14.
9. Ghebreyesus TA, Swaminathan S. Comment Scientists are sprinting to outpace the novel coronavirus. Lancet 2020; 395: 762-4.
10. Peng EY-C, Lee M-B, Tsai S-T, et al. Population-based post-crisis psychological distress: an example from the SARS outbreak in Taiwan. J Formos Med Assoc 2010; 109: 524-32.
11. Brooks SK, Webster RK, Smith LE, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. Lancet 2020; 395: 912-20.
12. Cowden J, Crane L, Lezotte D, Glover J, Nyquist AC. Pre-pandemic planning survey of healthcare workers at a tertiary care children's hospital: ethical and workforce issues. Influenza Other Respi Viruses 2010; 4: 213-22.
13. Matsuishi K, Kawazoe A, Imai H, et al. Psychological impact of the pandemic (H1N1) 2009 on general hospital workers in Kobe. Psychiatry Clin Neurosci 2012; 66: 353-60.
14. Imai H, Matsuishi K, Ito A, et al. Factors associated with motivation and hesitation to work among health professionals during a public crisis: a cross sectional study of hospital workers in Japan during the pandemic (H1N1) 2009. BMC Public Health 2010; 10: 672.
15. McMullan C, Brown GD, O'Sullivan D. Preparing to respond: Irish nurses' perceptions of preparedness for an influenza pandemic. Int Emerg Nurs 2016; 26: 3-7.
16. Chong MY, Wang WC, Hsieh WC, et al. Psychological impact of severe acute respiratory syndrome on health workers in a tertiary hospital. Br J Psychiatry 2004; 185: 127-33.
17. Hull HF. SARS control and psychological effects of quarantine, Toronto, Canada. Emerg Infect Dis 2005; 11: 354-5.
18. Lin CY, Peng YC, Wu YH, Chang J, Chan CH, Yang DY. The psychological effect of severe acute respiratory syndrome on emergency department staff. Emerg Med J 2007; 24: 12-7.
19. Shiao JSC, Koh D, Lo LH, Lim MK, Guo YL. Factors predicting nurses' consideration of leaving their job during the SARS outbreak. In: Nursing Ethics. New York: SAGE Publications, 2007.
20. Wu KK, Chan SK, Ma TM. Post-traumatic stress after SARS. Emerg Infect Dis 2005; 11: 1297-300.
21. Khalid I, Khalid TJ, Qabajah MR, Barnard AG, Qushmaq IA. Healthcare workers emotions, perceived stressors and coping strategies during a MERS-CoV outbreak. Clin Med Res 2016; 14: 7-14.
22. Lancee WJ, Maunder RG, Goldbloom DS. Prevalence of psychiatric disorders among Toronto hospital workers one to two years after the SARS outbreak. Psychiatr Serv 2008; 59: 91-5.
23. Maunder RG, Lancee WJ, Balderson KE, et al. Long-term psychological and occupational effects of providing hospital healthcare during SARS outbreak. Emerg Infect Dis 2006; 12: 1924-32.
24. Almutairi AF, Adlan AA, Balkhy HH, Abbas OA, Clark AM. "It feels like I'm the dirtiest person in the world": Exploring the experiences of healthcare providers who survived MERS-CoV in Saudi Arabia. J Infect Public Health 2018; 11: 187-91.
25. Koh Y, Hegney DG, Drury V. Comprehensive systematic review of healthcare workers' perceptions of risk and use of coping strategies towards emerging respiratory infectious diseases. Int J Evid Based Healthc 2011; 9: 403-19.
26. Kim Y. Nurses' experiences of care for patients with Middle East respiratory syndrome-coronavirus in South Korea. Am J Infect Control 2018; 46: 781-7.
27. Park JS, Lee EH, Park NR, Choi YH. Mental health of nurses working at a government-designated hospital during a MERS-CoV outbreak: a cross-sectional study. Arch Psychiatr Nurs; 32: 2-6.
28. Lee SM, Kang WS, Cho AR, Kim T, Park JK. Psychological impact of the 2015 MERS outbreak on hospital workers and quarantined hemodialysis patients. Compr Psychiatry 2018; 87: 123-7.
29. Ro JS, Lee JS, Kang SC, Jung HM. Worry experienced during the 2015 Middle East Respiratory Syndrome (MERS) pandemic in Korea. PLoS One 2017; 12: e0173234.
30. Koto MV, Maharaj P. Difficulties facing healthcare workers in the era of AIDS treatment in Lesotho. Sahara J 2016; 13: 53-9.
31. Cénat JM, Mukunzi JN, Noorishad PG, Rousseau C, Derivois D, Bukaka J. A systematic review of mental health programs among populations affected by the Ebola virus disease. J Psychosom Res 2020; 131: 109966.
32. Schreiber M, Cates DS, Formanski S, King M. Maximizing the resilience of healthcare workers in multi-hazard events: lessons from the 2014-2015 Ebola response in Africa. Mil Med 2019; 184 (Suppl 1): 114-20.
33. Li Y, Wang H, Jin XR, et al. Experiences and challenges in the health protection of medical teams in the Chinese Ebola treatment center, Liberia: a qualitative study. Infect Dis Poverty 2018; 7: 92.
34. Guan W, Ni Z, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med 2020; 382: 1708-20.
35. Chen H, Guo J, Wang C, et al. Clinical characteristics and intrauterine vertical transmission potential of COVID-19

infection in nine pregnant women: a retrospective review of medical records. Lancet 2020; 395: 809-15.
36. Lazarus RS, Folkman S. Stress, appraisal and coping. New York: Springer, 1984.
37. James RK, Gilliland BE. Crisis intervention strategies. Pacific Grove, CA: Brooks/Cole Pub Co, 2016.
38. Roberts AR. Crisis Intervention Handbook: assessment, treatment and research. Oxford, UK: Oxford University Press, 3rd Edition, 2005.
39. Aiello A, Young-Eun Khayeri M, Raja S, et al. Resilience training for hospital workers in anticipation of an influenza pandemic. J Contin Educ Health Prof 2011; 31: 15-20.
40. Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 epidemic in China: a web-based cross-sectional survey. medRxiv 2020; 2020.02.19.20025395.
41. WHO, UNHCR. mhGAP Humanitarian Intervention Guide (mhGAP-HIG): clinical management of mental, neurological and substance use conditions in humanitarian emergencies. World Health Organization, 2015.
42. Lai J, Ma S, Wang Y, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. JAMA Netw Open 2020; 3: e203976.