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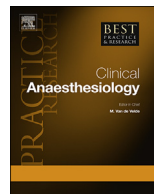


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Occupational burnout syndrome and post-traumatic stress among healthcare professionals during the novel coronavirus disease 2019 (COVID-19) pandemic



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This comprehensive review aims to explain the potential impact of coronavirus disease 2019 (COVID-19) on mental wellbeing of healthcare professionals (HCPs). Based on up-to-date research and psychological diagnostic manuals of *Diagnostic and Statistical*

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COVID-19 pandemic
healthcare practitioners

Manual of Mental Disorders, 5th edition and *International Classification of Diseases*, 11th revision, we describe associated psychological disorders and experiences that may arise related to COVID-19. Appropriate psychological measures are introduced, along with potential methodological limitations. Lastly, resilience building and preventative measures with interventions that may mitigate the impact on mental health of HCPs are described.

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Introduction

The coronavirus disease 2019 (COVID-19) experience in 2019/2020 brought an overwhelming impact on hospital systems and personnel. Many cases of tragic suicidal deaths have emerged throughout the pandemic. Consequently, attention to the wellbeing of healthcare professionals (HCPs) across the world has become imperative to appropriately support and monitor [1,10,23,33] and others). Some studies thus far have identified factors associated with mental health outcomes in HCPs. These are: (1) limited resources of hospitals, (2) threat of exposure to the virus as an added occupational hazard, (3) longer shifts, (4) disruption to sleep patterns, (5) work–life balance, (6) subsequent heightened dilemmas regarding patient duties versus fear of exposure to family members, (7) neglect of personal and family needs with increased workload, and (8) lack of sufficient communication and updated information. All of these have been identified as main factors contributing to increased physical and mental fatigue, anxiety, stress, and burnout (BO; [1,4,6,9,26,27,31,38,39]).

Mental health of HealthCare professionals and COVID-19

This review will describe some psychological terms: especially psychological (emotional) trauma, acute stress disorder (ASD) and post-traumatic stress disorder (PTSD), mass traumatic event, secondary traumatic stress (STS), moral injury, and BO to better understand underlying problems associated with COVID-19.

Psychological (emotional) trauma is a form of damage to the psyche that occurs as a result of experiencing either a single traumatic event, or multiple reoccurrences of traumatic events. Latest editions of *Diagnostic and Statistical Manual of Mental Disorders*, 5th edition (DSM-5) (2013) and *International Classification of Diseases*, 11th revision (ICD-11) [51], has revised their definitions of a traumatic event. For example, DSM-5 (2013) definition entailed the “exposure to event(s) that involved death, actual or threatened serious injury, or threatened sexual violation.” These are either experienced by: “(a) the individual, or (b) witness of it occurring to somebody else, (c) learning about the event that somebody close to you experienced actual or threatened violent or accidental death, or (d) experiencing repeated exposure to distressing details of an event.” Furthermore, cognitive dissonance, emotional distress, stress- and relationship-based, socio-economic and natural disaster-based are all subdivisions of psychological trauma which may occur simultaneously.

ASD and PTSD may develop following trauma, which hinder one's ability to cope with that experience. There are four categories of PTSD symptoms. They may come in the form of intrusive thoughts, avoidance of reminders (i.e. avoiding places or activities that can bring back intrusive memories), feeling and thinking negatively (i.e. ongoing fear, anger, guilt), as well as arousal and reactive symptoms (issues with concentration, sleep, or angry outbursts). These symptoms cause significant distress and problems functioning and persist for longer than a month to many years. Oftentimes, it is comorbid with anxiety, depression, or substance-use disorder. Autism spectrum disorder (ASD) symptoms are very similar to those of PTSD, though the onset occurs 3 days from experiencing trauma and lasts up to a month. Approximately, half of those who experience ASD develop PTSD.

It is, therefore, argued that the experience of a global pandemic like COVID-19 has the potential of being considered a **mass traumatic event**. The global scope of the pandemic, as well as the undercutting impact of all aspects of society are felt, the more so with increased accessibility and public exposure to documentation via the internet and social media [21]. Such worldwide, mass exposure to all kinds of information concerning COVID-19 implies the possibility of a mass traumatic event with an unprecedented impact on global mental health.

STS is considered a stressor for PTSD, according to the DSM-5 (2013). It has been studied among clinicians and HCPs who treat traumatically injured patients [35]. Symptoms are identical to PTSD [18] and STS definition entails psychological phenomena of compassion stress leading to compassion fatigue (CF), as well as vicarious traumatization. Compassion stress entails feeling of confusion, helplessness, and isolation along with STS symptoms. An ongoing or cumulative exposure to triggering events may result in CF, defined as biological and emotional exhaustion and dysfunction [14] that may lead to an inability to empathize and support others [19]. Over time, vicarious traumatization can occur, suggesting a permanent and cumulative change of schemas/perception on empathetic work with trauma survivors [30]. These concepts in research have often been used interchangeably, though it is important to clarify these concepts and their possibility of interrelation. Particularly, STS and CF are seen as contextually interchangeable, nevertheless CF is often accepted as a combination of BO and STS symptoms [2]. Unfortunately, thus far, confounding results exist regarding the magnitude of negative effects of short-term (ST) exposure, moreover, insufficient amount of research has been conducted on medical HCPs. Correlation analysis of a systematic review of suggest STS and VT correlate strongly with BO than with each other, suggesting that these constructs reach further than trauma-related psychopathology [22].

Moral injury is a term used to define psychological distress resulting from actions, or lack thereof, which violate one's ethical or moral code [40]. This may lead to heightened negative thoughts about themselves or others, and intense feelings of disgust, guilt, or shame [40]. It is possible that given the lack of resources that occurred in some countries during the outbreak, HCPs may face difficult decisions when it comes to choosing who, that is, requires life support, or the need to decline family and friend visits of dying patients [36,50] preprint).

Burnout and COVID-19

Over the last 10 years, BO has become a significant psychosocial problem that is caused by unsuccessfully managed chronic stress in the workplace. It is a psychological syndrome characterized by energy depletion, increased mental distance from one's work (i.e. cynicism or negativism), and reduced professional efficacy (WHO; ICD-11; 2013; 2018). HCPs are a particularly susceptible demographic given the demanding nature of their profession and work environment, hence the prevalence of BO among HCPs is continuously high [11,38,39]. The prevalence of symptoms associated with BO includes anxiety, depression, lower satisfaction, and care quality, as well as PTSD and increased suicide rate among the demographic [3]. It is, therefore, necessary to consider the psychological baseline of HCPs given the potentially traumatizing situations they may be exposed to during COVID-19.

Additionally, previous epidemic studies examining the psychological impacts of the *severe acute respiratory syndrome* (SARS) outbreak, for example, worldwide found a greater risk of PTSD and overall increase in mental health disorders during and after the epidemic among the public, as well as among healthcare practitioners [32,44].

Looking closer at BO among HCPs across China during the epidemic outbreak [52], were the first to conduct a study comparing BO among HCP frontline workers with HCPs working in their usual wards, utilizing the Maslach Burnout Inventory–Medical Personnel (MBI–MP) measure. The unexpected findings of their study suggest that the frequency of BO is significantly smaller in frontline workers than that of HCPs in their usual ward [52]. Concluded that directly addressing the virus on the frontline is thought to bring greater sense of situation control, and control in the workplace is considered to be a leading motivation for engagement that decreases chances of BO occurrence.

Additionally, it may be necessary to distinguish HCPs responsible for wards based on patients with greater vulnerability of viral infection and the HCP's susceptibility to BO (i.e. burns or oncology departments). Hence, it is necessary to entail the entire healthcare personnel, not just those working on the frontline.

Proposed measures

Burnout

The leading measure of (occupational) BO is the Maslach Occupational Burnout Inventory Tool (MBI [29]; used also in clinical population (by [8], and also for HCPs: for example, the MBI–**Human Services Survey** (MBI–HSS; [28], or MBI–Medical Personnel (MBI–MP) and the MBI–General Survey (MBI–GS) are used. Formulated in accordance with the WHO and ICD-11 BO definitions, the original questionnaire assesses three scales consisting of 22 items: emotional exhaustion (feelings of emotional overextension by one's work), depersonalization (unfeeling and impersonal response towards patients), and personal accomplishment (feelings of competence and successful achievement in ones work). The three scales demonstrate strong sample-specific reliability based on the 84 published studies thus far, and further validated for human service occupations, including medical professionals. Other, shorter BO inventories include, for example, among others, 9-item Bergen Burnout Inventory (BBI-9; [12,37]. The 9-item inventory consists of three core dimensions, each possessing three items: (1) exhaustion at work; (2) cynicism toward the meaning of work; and (3) sense of inadequacy at work. Or the Oldenburg Burnout Inventory (OLBI [5]; and Copenhagen Burnout Inventory [24] and others [42] inventory can be used for measurement.

PTSD

When it comes to PTSD, context of the traumatic event and previous history of mental health aid in advising the necessary methods and intervention. The most frequently used scales are the post-traumatic stress disorder checklist (PCL [47]; scale and the post-traumatic stress diagnostic scale (PDS; [15]. Others include clinician-administered PTSD scale for DSM-5 (CAPS-5), structured clinical interview for DSM-IV (SCID) PTSD modules that are DSM-5-based instruments. The Impact of Event Scale–Revised (IES-R) may be particularly helpful given that it is a self-report questionnaire that can assess subjective distress and suggest a preliminary diagnosis of PTSD. Similarly, the Professional Quality of Life (ProQoL-5 [43]; can be utilized to identify potentialities of negative psychological effect and CF. The 30-item inventory measures the positive and negative impacts of experiences in professions that offer help/require compassion. The individual denotes on a scale of 1–5 item.

Methodological issues

We have to mention necessary methodological issues. When it comes to traumatic stress, primarily self-reported data are used to diagnose mental health-related outcomes. This has imposed certain limitations when it comes to identifying individuals who are more predisposed to the eventual development of PTSD or other mental health disorders following trauma [16]. Proposed, for example, machine learning methods/techniques within routine collection of data in emergency rooms as a form of gathering more robust individual mental health profiles. Furthermore, ecological momentary assessment (EMA) methods have been suggested to provide clearer mental health assessments in real time [34]. For example, inflammatory blood markers may offer a helpful solution in identifying individuals with greater susceptibility to PTSD.

Interventions

Not all experiences have been or will be the same for each individual; this will also vary based on the level of exposure in hospitals within each city, culture, and country. That is always necessary to have in mind. Although every individual has varying psychological baselines, providing mental health

tools with a preventative function is important for everybody [41], since education about mental health along with subsequent prevention and mitigation are key at times like this [49]. One way is for hospitals to promote policies that can minimize the risk of negative psychological effects in group of HCPs [31].

It is imperative that hospitals provide for the fundamental physiological needs of HCPs. This entails providing adequate nutrition, making sure rotations/schedules are being met for sufficient rest, and to limit possible overworking that is a known driver for BO [31], as well as protective gears such as masks to ensure protection from infection [49]. Furthermore, providing psychological support onsite in a comfortable environment that may offer trauma-focused cognitive-behavioral therapy (CBT) has demonstrated to be useful in previous epidemics that are offered in better multiple session, as single sessions are known to have minimal effect [31].

Social and peer support has also been identified as a major protective factor against trauma impact [7] and overall mental wellbeing [53]. Hence, routine support processes, that is, peer support programs that provide briefing on the potential psychological effects that can occur at such times have (pandemic) an educational purpose [17,49]. Sufficient preparation for the psychological effects that can be anticipated, as well as what the overall potential traumatic experiences that can be anticipated and associated challenges as preparation in the form of psychoeducational seminars [31]. Other forms of prevention and psychoeducation are psychoemotional self-care activities. It is necessary in time of pandemic think of treating stress and trauma and develop psychological tools for HCPs intended to protect not only the Frontline from PTSD, traumatic stress, and BO, but also all HCPs. It is challenge to design programs to alleviate acute stress from ongoing events, focus on stabilization and symptom formation, and reprocessing trauma memories. Some research suggests the use of psychological micro-practices, these are activities that focus on better management of the emotional aspects of stress [13,45]. The psychological micro-practices beating stress and trauma are founded on CBT and mindfulness practices with the aim to manage symptoms of emotional exhaustion and depersonalization [45]. Mindfulness, gratitude practices, CBT, imagination and trauma work, eclectic therapy, and reading have also been demonstrated as successful in PTSD therapy [20,25,46,48]. It is a call to set up program like these to prevent PTSD and BO during pandemic.

Summary

This article explained the potential impact of COVID-19 on mental wellbeing of HCPs. We described the associated psychological disorders and emotional experiences that may arise during pandemic. For better understanding of reaction during pandemic among HCPs, we defined psychological (emotional) trauma, ASD, PTSD, mass traumatic event, STS, moral injury, and BO. We wrote down proposed measures and suggested possible intervention for treating trauma, stress and following BO. All that can help not only Frontline HCPs, but all of them in a way how to prevent and use some psychological techniques for beating stress and trauma for the prevention of BO. This article can help us better understand the emotional state and experience during pandemic in HCPs and can be a call for managing of prevention program for HCPs for the prevention of mental disease and BO. HCPs can finally better understand underlying psychotraumatic problems and experience associated with COVID-19 or another pandemic.

Authorship

All named authors meet the International Committee of Medical Journal Editors (ICMJE) criteria for authorship for this article, take responsibility for the integrity of the work as a whole, and have given their approval for this version to be published.

Declaration of competing interest

Dr Kaye serves on the Speakers Bureau for Merck, Inc.

Practice points

- The coronavirus disease 2019 (COVID-19) experience in 2019/2020 brought an overwhelming impact on hospital systems and personnel
- Many cases of tragic suicidal deaths have emerged throughout the pandemic. Consequently, attention to the wellbeing of healthcare professionals (HCPs) across the world has become imperative to appropriately support and monitor
- Some studies thus far have identified factors associated with mental health outcomes in HCPs. These are: (1) limited resources of hospitals, (2) threat of exposure to the virus as an added occupational hazard, (3) longer shifts, (4) disruption to sleep patterns, (5) work–life balance, (6) subsequent heightened dilemmas regarding patient duties versus fear of exposure to family members, (7) neglect of personal and family needs with increased workload, and (8) lack of sufficient communication and updated information.

Research agenda

- Further studies are needed to elucidate the quality of studies assessing factors associated with mental health outcomes during the high-stress period of a pandemic
- Further investigation is needed to see how post-traumatic stress and burnout can affect the quality of care of healthcare professionals during a pandemic

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References

- *[1] Adams JG, Walls RM. Supporting the health care workforce during the COVID-19 global epidemic. *Jama* 2020;323(15):1439–40.
- *[2] Adams RE, Boscarino J, Figley CR. Compassion fatigue and psychological distress among social workers: a validation study. *Am J Orthopsychiatry* 2006;76(1):103–8. <https://doi.org/10.1037/0002-9432.76.1.103>.
- [3] Alharbi J, Jackson D, Usher K. Compassion fatigue in critical care nurses. An integrative review of the literature. *Saudi Med J* 2019;40(11):1087–97. <https://doi.org/10.15537/smj.2019.11.24569>.
- *[4] American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 5th ed. 2013. <https://doi.org/10.1176/appi.books.9780890425596>.
- [5] Bakker AB, Demerouti E, Verbeke W. Using the job demands–resources model to predict burnout and performance. *Hum Resour Manag* 2004;43:83–104. <https://doi.org/10.1002/hrm.20004>.
- [6] Boyraz G, Legros DN. Coronavirus disease (COVID-19) and traumatic stress: probable risk factors and correlates of post-traumatic stress disorder. *J Loss Trauma* 2020:1–20.
- [7] Brooks M, Graham-Kevan N, Robinson S, et al. Trauma characteristics and posttraumatic growth: the mediating role of avoidance coping, intrusive thoughts, and social support. *Psychological Trauma Theory, Research, Practice, and Policy* 2019;11(2):232–8. <https://doi.org/10.1037/tra0000372>.
- [8] Kleijweg JHM, Verbraak MJPM, et al. The clinical utility of the Maslach Burnout Inventory in a clinical population. *Psychol Assess* 2013;25(2):435–41.
- *[9] De Paiva LC, Canário ACG, de Paiva China ELC, et al. Burnout syndrome in health-care professionals in a university hospital. *Clinics* 2017;72(5):305–9.
- *[10] Choi KR, Skrine JK, Logsdon CM. Nursing and the novel coronavirus: risks and responsibilities in a global outbreak. *J Adv Nurs* 2020;76(7):486–1487. <https://doi.org/10.1111/jan.14369>.
- *[11] Embriaco N, Azoulay E, Barrau K, et al. High level of burnout in intensivists: prevalence and associated factors. *Am J Respir Crit Care Med* 2007;175(7):686–92. <https://doi.org/10.1164/rccm.200608-1184OC>.
- [12] Feldt T, Rantanen J, Hyvönen K, et al. The 9-item bergen burnout inventory: factorial validity across organizations and measurements of longitudinal data. *Ind Health* 2014;52(2):102–12. <https://doi.org/10.2486/indhealth.2013-0059>.
- *[13] Fessell D, Cherniss C. Coronavirus Disease 2019 (COVID-19) and beyond: micropractices for burnout prevention and emotional wellness. *J Am Coll Radiol* 2020;17(6):746–8. <https://doi.org/10.1016/j.jacr.2020.03.013>.

- [14] Figley CR. *Brunner/Mazel psychological stress series, No. 23. Compassion fatigue: coping with secondary traumatic stress disorder in those who treat the traumatized*. Brunner/Mazel; 1995.
- [15] Foa EB. *Posttraumatic diagnostic scale manual*. Minneapolis, USA: National Computer Systems; 1995.
- [16] Galatzer-Levy I, Ma S, Statnikov A, et al. Utilization of machine learning for prediction of post-traumatic stress: a re-examination of cortisol in the prediction and pathways to non-remitting PTSD. *Transl Psychiatry* 2017;7:e1070. <https://doi.org/10.1038/tp.2017.38>.
- [17] Greenberg N, Docherty M, Gnanapragasam S, et al. Managing mental health challenges faced by healthcare workers during covid-19 pandemic. *BMJ* 2020;368.
- [18] Greinacher A, Derezza-Greeven C, Herzog W, et al. Secondary. Traumatization in first responders: a systematic review. *Eur J Psychotraumatol* 2019;10(1):1562840.
- [19] Hoffmann JP. Gender, risk, and religiousness: can power control provide the theory? *J Scientific Study Religion* 2009;48(2).
- [20] Hopwood TL, Schutte NS. A meta-analytic investigation of the impact of mindfulness-based interventions on post traumatic stress. *Clin Psychol Rev* 2017;57:12–20.
- [21] Horesh D, Brown AD. Traumatic stress in the age of COVID-19: a call to close critical gaps and adapt to new realities. *Psychological Trauma Theory, Research, Practice, and Policy* 2020;12(4):331.
- [22] Huggard P, Stamm BH, Pearlman LA. Physician stress: compassion satisfaction, compassion fatigue and vicarious traumatization. In: Figley C, Huggard P, Rees CE, editors. *First do no self-harm: understanding and promoting physician stress resilience*. Oxford University Press; 2013. p. 127–45. <https://doi.org/10.1093/acprof:oso/9780195383263.003.0007>.
- *[23] Kang L, Li Y, Hu S, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *The Lancet Psychiatry* 2020;7(3):e14.
- [24] Kristensen TS, Borritz M, Villadsen E, et al. The Copenhagen Burnout Inventory: a new tool for the assessment of burnout. *Work Stress* 2005;19:192–207. <https://doi.org/10.1080/02678370500297720>.
- [25] Lang AJ. Mindfulness in PTSD treatment. *Current Opinion in Psychology* 2017;14:40–3.
- [26] 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(3):e203976.
- *[27] Lee SA, Jobe MC, Mathis AA. Mental health characteristics associated with dysfunctional coronavirus anxiety. *Psychol Med* 2020;1–2.
- [28] Lheureux F, Truchot D, Borteyrou X, et al. The Maslach Burnout Inventory-Human Services Survey (MBI-HSS): factor structure, wording effect and psychometric qualities of known problematic items. *Trav Hum Le: A Bilingual and Multi-Disciplinary Journal in Human Factors* 2017;80(2):161–86. <https://doi.org/10.3917/th.802.0161>.
- [29] Maslach C, Jackson SE. The measurement of experienced burnout. *J Occup Behav* 1981;2:99–113.
- [30] Pearlman LA, Saakvitne KW. *Trauma and the therapist: countertransference and vicarious traumatization in psychotherapy with incest survivors*. New York: W.W. Norton; 1995. p. 451.
- [31] Restauri N, Sheridan AD. Burnout and posttraumatic stress disorder in the coronavirus disease 2019 (COVID-19) pandemic: intersection, impact, and interventions. *J Am Coll Radiol* 2020;17(7):921–6. <https://doi.org/10.1016/j.jacr.2020.05.021>.
- [32] Reynolds J, Griffiths KM, Cunningham JA, et al. Clinical practice models for the use of E-mental health resources in primary health care by health professionals and peer workers: a conceptual framework. *JMIR Ment Health* 2015;2(1):e6. <https://doi.org/10.2196/mental.4200>.
- [33] Rimmer A. Covid-19: give NHS staff rest spaces and free parking not thank yous, says doctor. *BMJ* 2020;368:1171. <https://doi.org/10.1136/bmj.m1171>.
- [34] Robbins ML, Kubiak T. Ecological momentary assessment in behavioral medicine: research and practice. In: Mostofsky DI, editor. *Wiley Blackwell handbooks of behavioral neuroscience. The handbook of behavioral medicine*. Wiley-Blackwell; 2014. p. 429–46. <https://doi.org/10.1002/9781118453940.ch20>.
- [35] Roden-Foreman JW, Bennett MM, Rainey EE, et al. Secondary traumatic stress in emergency medicine clinicians. *Cogn Behav Ther* 2017;46(6):522–32. <https://doi.org/10.1080/16506073.2017.1315612>.
- *[36] Rosenbaum L. Facing covid-19 in Italy — ethics, logistics, and therapeutics on the epidemic's front line. *N Engl J Med* 2020;382:1873–5. <https://doi.org/10.1056/NEJMp2005492>.
- [37] Salmela-Aro K, Rantanen J, Hyvönen K, et al. Bergen Burnout Inventory: reliability and validity among Finnish and Estonian managers. *Int Arch Occup Environ Health* 2011;84:635–45.
- [38] Shanafelt TD, Boone S, Tan L, et al. Burnout and satisfaction with work-life balance among US physicians relative to the general US population. *Arch Intern Med* 2012;172(18):1377–85.
- [39] Shanafelt TD, Hasan O, Dyrbye LN, et al. Changes in burnout and satisfaction with work-life balance in physicians and the general US working population between 2011 and 2014. *Mayo Clin Proc* 2015;90(12):1600–13.
- [40] Shay J. Moral injury. *Psychoanal Psychol* 2014;31(2):182–91. <https://doi.org/10.1037/a0036090>.
- [41] Shigemura J, Ursano RJ, Morganstein JC, et al. Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan: mental health consequences and target populations. *Psychiatr Clin Neurosci* 2020;74(4):281.
- [42] Sinval J, Querios C, Pasian S, et al. Transcultural adaptation of the Oldenburg burnout inventory (OLBI) for Brazil and Portugal. *Front Psychol* 2019;10:338. <https://doi.org/10.3389/fpsyg.2019.00338>.
- [43] Stamm BH. *Professional quality of life: compassion satisfaction and fatigue version 5*. 2009–2012.
- [44] Styra R, Hawryluck L, Robinson S, et al. Impact on health care workers employed in high-risk areas during the Toronto SARS outbreak. *J psychosomatic Res* 2008;64(2):177–83.
- [45] Sultana A, Sharma R, Hossain M, et al. Burnout among healthcare providers during COVID-19 pandemic: challenges and evidence-based interventions. 2020. <https://doi.org/10.20529/IJME.2020.73>.
- [46] Vujanovic AA, Smith LJ, Green C, et al. Mindfulness as a predictor of cognitive-behavioral therapy outcomes in inner-city adults with posttraumatic stress and substance dependence. *Addict Behaviors* 2020;104:106283.
- [47] Weathers FW, Litz BT, Herman DS, et al. The PTSD checklist (PCL): reliability, validity, and diagnostic utility. San Antonio: Annual Convention of the International Society for Traumatic Stress Studies; 1993.
- [48] Wieggersma S, Nijdam MJ, van Hessen AJ, et al. Recognizing hotspots in Brief Eclectic Psychotherapy for PTSD by text and audio mining. *Eur J Psychotraumatology* 2020;11(1):1726672.

- [49] Walton M, Murray E, Christian MD. Mental health care for medical staff and affiliated healthcare workers during the COVID-19 pandemic. *Eur Heart J Acute Cardiovasc Care* 2020;9(3):241–7. <https://doi.org/10.1177/2048872620922795>.
- [50] Williamson EJ, Walker AJ, Bhaskaran K, et al. OpenSAFELY: factors associated with COVID-19-related hospital death in the linked electronic health records of 17 million adult NHS patients. *Nature* 2020. <https://doi.org/10.1038/s41586-020-2521-4>.
- [51] World Health Organization. International classification of diseases for mortality and morbidity statistics (11th Revision). 2018. Retrieved from, <https://icd.who.int/browse11/l-m/en>.
- [52] Wu Y, Wang J, Luo C, et al. A comparison of burnout frequency among oncology physicians and nurses working on the front lines and usual wards during the COVID-19 epidemic in Wuhan, China. *J pain symptom Manag* 2020;60(1):e60–5. <https://doi.org/10.1016/j.jpainsymman.2020.04.008>.
- [53] Xiao H, Zhang Y, Kong D, et al. The effects of social support on sleep quality of medical staff treating patients with coronavirus disease 2019 (COVID-19) in January and February 2020 in China. *Med Sci monitor: Int Med J Exp Clin Res* 2020;26:e923549.