

Original Article

Mental Health Outcomes and Coping Strategies Among Health Care Workers Exposed to Coronavirus Disease 2019 (COVID-19)

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Abstract

Background: The recent pandemic condition developed from the Coronavirus Disease 2019 (COVID-19) outbreak, have a profound effect on almost all the aspects of society. This outbreak has greatly compromised both the mental and physical health of the frontline healthcare workers and supporting hospital staff since they are responsible for the diagnosis and treatment of infected individuals with COVID-19. This study aimed to investigate the psychological impacts and factors causing stress among the healthcare workers & supporting hospital staff during the COVID-19 outbreak and also to identify the preferred coping strategies.

Methodology: This cross-sectional survey-based study was conducted from 1st to 30th February 2020. The sample comprised of frontline healthcare workers & hospital staff providing supporting services like laboratory personnel & administrative workers. The data was collected using a structured self-administered online questionnaire focusing on the impacts of COVID-19, factors causing stress and the coping strategies used by frontline medical workers to deal with the psychological impacts of such pandemics.

Results: A total of 127 frontline medical workers completed the survey. The findings from the present study suggested that frontline healthcare workers & hospital staff experience both psychological as well as emotional impacts due to COVID-19. The mean Impact of Event Scale (IES) score was 24.44 ± 19.41 indicating partial PTSD or at least a few symptoms of PTSD. The major factor causing stress among these health workers was their fear of inflicting COVID-19 on family (33.1%). Among the coping strategies, emotion-focused coping techniques and positive thinking were found to be the most preferred strategies among the frontline medical workers and hospital staff in coping stress associated with the COVID-19 outbreak.

Conclusion: The current study emphasizes the significance of the psychological impacts of COVID-19 among healthcare workers and the importance of psychiatric help for these long-term traumatic influences.

Keywords

Medical staff, Psychological impact, stressors, Coping strategies, COVID-19.



Introduction

In history, several infectious diseases have emerged at various times, but recently the globalization that facilitated the spread of pathological agents has increased, which contributed to world-wide pandemics¹. The novel coronavirus outbreak, which first occurred in Wuhan (China) in December 2019, has now attracted worldwide attention² since it has a high contagion potential, the incidence rate has increased exponentially. The fear and insecurity in the population regarding this virus have enhanced due to doubted information related to virus transmission, its geographical reach, the infected population and its actual mortality rate³. By May 4, 2020, there were 3,579,478 confirmed cases of COVID-19 from all around the world. According to the World Health Organization (WHO), in Pakistan 20,186 people contracted COVID-19 infection, and 462 people lost their lives⁴. Throughout Pakistan, the frontline medical staff has experienced an increased workload, working hour and these factors along with the fear and insecurity of COVID-19 have also increased the associated psychological stress.

The risk of psychological stress in medical teams and staff has long been investigated, during the previous pandemics like Severe Acute Respiratory Syndrome (SARS) and middle east respiratory syndrome (MERS). Studies have shown that previously the outbreaks of SARS and MERS had a profound effect on the mental health of the frontline medical caregivers and accelerated the stress levels resulting in posttraumatic stress disorder (PTSD) among majority survivors^{5,6}. Tam et al., 2003, have shown a significant association between the perception of the healthcare workers regarding the infection risk and the risk of developing PTSD⁵. Moreover, factors like social stigmatization and level of susceptibility are the other prime factors behind stress and anxiety mainly among

individuals exposed to COVID-19 cases or such an environment that might have increased risk levels⁴. The recent COVID-19 pandemic has led down immense psychological pressure among infected individuals, health professionals and the general public that may lead to several different psychological problems including anxiety, depression and insomnia⁷.

Results from the recent reports suggested that the overall mortality rate of COVID-19 is far greater than SARS and MERS combined because of the high transmission rate⁸. The experience of the medical staff regarding SARS outbreak, suggested that the mental health impacts of such infections are both short & long term, as the social distancing & life-style modifications in response to these viruses alter the mental health and result in psychological distress⁹, and the trend is expected to continue. Reports suggest that during SARS and MERS outbreaks, the infection rate among the medical workers was 21% and 18.6% respectively & anxiety and depression were the commonly reported adverse psychological effects¹⁰. Yet there is no specific treatment developed for this infection, which is one of the major reasons behind high infectious spread among the healthcare providers & increased mortality¹¹. All these factors may have immediate or long-psychological consequences on the mental health of the frontline medical staff, that may have acute or chronic somatic effects that may further results in different pathological infections or diseases¹². This suggests that efficient and comprehensive actions should be taken to protect the mental health of the medical team for better control & prevention of this pandemic.

The frontline medical workers usually opt for either positive or negative coping strategies against such pandemics. Previous studies suggest that optimism, resilience and altruism have shown to have a positive effect on

reducing psychological stress among healthcare workers^{11,13}. At the same time, objective measures may help to reduce the psychological stress in the medical staff along with effective infection control, personal protective measures with clear policies and protocols¹⁴. However, it is necessary to assess the quality of mental health services, since the evidence-based mental health services are preferable¹⁵. Evidently, the use of coping strategies reduces negative emotions and result in the appropriate management of stressful events¹⁶.

Therefore, the current study aimed to investigate the psychological impact of COVID-19 among the frontline medical workers and supporting hospital staff & the preferred coping strategies to overcome the associated stress.

Methodology

This cross-sectional study was conducted from 1st to 30th February 2020, including frontline healthcare workers, medical teams and hospital staff working under the pressure of COVID-19 outbreak. All of these healthcare workers were from the department of infectious disease, fever clinic, quarantine centers, intensive care units (ICU) and tertiary care hospitals of Karachi, Pakistan. Due to the current crisis & COVID-19 emergency, the study was designed to ensure clinical safety and data was collected systematically using a self-administered online questionnaire. The subject's demographic details were inquired together with the impacts, contributory factors of the stress associated with the COVID-19 outbreak and the coping strategies used by the medical workers. 127 medical workers including doctors, nurses & staff completed the survey.

The questionnaire was divided into three main sections with 60 questions in total, the first section focused on Impacts of COVID-19. We used the Impact of Event Scale-Revised (IES-R) was used to evaluate the psychological impacts of COVID-19. It is a self-reporting tool including 22-items for the assessment of subjective distress caused by traumatic events¹⁷. The second section intended to explore the factors causing stress during emergency conditions. The components of Snell's questionnaire regarding fear of infectious diseases were used, the stressors were rated using Likert scale representing I (not at all) to 5 (very)¹⁸. In the third section of the questionnaire, the coping strategies used by the frontline medical team and staff for stress suppression were investigated, 25 items of the Brief COPE (dispositional version) explaining coping strategies were used. The scores were indicative of the tendency of implementation of the corresponding coping strategies¹⁹. The data was statistically analyzed using SPSS Version 20.0 and presented as frequency, percentage, mean and standard deviation (SD).

Results

A total of 127 participants completed the online survey including 58 males and 69 females. The majority of the participants were in between 18 to 54 years, with a mean age of 28.67 years. Nurses accounted for 90.6% of the study sample while doctors and other staff together accounted for only 9.4%. The mean clinical experience among the enrolled participants was 5.82 years. All the participants included in the study worked at different levels at different hospitals, clinics, quarantine centers, or intensive care units. Of the total, around 48% of participants had encountered COVID-19 cases in recent times while 51.9% didn't encounter any.

Impacts of COVID-19 among the frontline medical team and staff

The IES-R scores among the frontline medical team and staff are displayed in Table I. The mean IES-R score was 24.44 ± 19.41 among the enrolled subjects. Almost 10.2% of medical staff have suggested that this outbreak of COVID-19 reminders brought back the feeling about it, while 33.9% of healthcare staff felt such thing a little bit. Similarly, 11% of the frontline medical team and staff showed that they extremely felt irritable and angry since the outbreak of COVID-19. 32.3% of study participants suggest that they think about this virus a lit bit at times when they did not mean to. To not think about it, 12.6% try their level best at extreme levels, while 22.8% of participants have shown to try not to think about it at a moderate level. Out of study participants, 26.8% of individuals suggest that they find themselves stuck in this COVID-19 situation a little bit. While 17.3% of participants suggest that it is moderately hard for them to concentrate on a specific thing due to the stress caused by the outbreak of COVID-19. 20.5% of study participants also suggest that they have had few bad dreams about COVID-19 since it starts getting rapidly increase with high frequency. Moreover, about 22.8% of frontline medical staff suggest that they felt themselves alert 24/7 moderately in this epidemic condition.

Table I: Estimating the impact of COVID-19 on the frontline medical doctors & hospital staff through IES-R Scores

IES-R Scores in Medical Health Care Personnel		Range			Mean \pm SD	
IES-R Intrusion		0-32			9.43 \pm 7.58	
IES-R Hyperarousal		0-24			6.63 \pm 5.84	
IES-R Avoidance		0-28			8.37 \pm 6.64	
IES-R Total		0-84			24.44 \pm 19.41	
Impact summary of IES-R	Not at all	A little bit	Moderately	Quite a bit	Extremely	
Reminders bringing back feelings about it	33(26)	43(33.9)	32(25.2)	6(4.7)	13(10.2)	
Having trouble staying asleep	60(47.2)	36(28.3)	16(12.6)	8(6.3)	7(5.5)	
Other things kept making me think about it	31(24.4)	44(34.6)	28(22)	14(11)	10(7.9)	
Felt irritable and angry.	52(40.9)	39(30.7)	15(11.8)	7(5.5)	14(11)	
Avoided letting myself get upset or irritated	41(32.3)	35(27.6)	31(24.4)	10(7.9)	10(7.9)	
Think about it when I didn't mean to.	48(37.8)	41(32.3)	19(15)	13(10.2)	6(4.7)	
Felt as if it wasn't real or never happened	46(36.2)	41(32.3)	20(15.7)	11(8.7)	9(7.1)	
Stay away from reminders of it as far as possible	34(26.8)	32(25.2)	40(31.5)	11(8.7)	10(7.9)	
Scenes about it frequently pop into my mind	32(25.2)	42(33.1)	29(22.8)	11(9.4)	11(9.4)	
I am jumpy and easily startled about it	38(29.9)	46(36.2)	23(18.1)	12(9.4)	8(6.3)	

I tried not to think about it.	45(34.5)	32(25.2)	29(22.8)	5(3.9)	16(12.6)
I still have a lot of memories about it, but It doesn't bother me now	59(46.5)	32(25.2)	16(12.6)	9(7.1)	11(8.7)
Felt Numb	80(63)	23(18.1)	11(8.7)	6(4.7)	7(5.5)
Every time I find myself stuck in this situation	59(46.5)	34(26.8)	14(11)	8(6.3)	12(9.4)
Having trouble falling asleep.	56(44.1)	41(32.3)	12(9.4)	10(7.9)	8(6.3)
Waves of strong feelings about it.	45(35.4)	38(29.9)	24(18.9)	8(6.3)	12(9.4)
Trying hard to remove it from my memory.	40(31.5)	45(35.4)	20(15.7)	7(5.5)	15(11.8)
Trouble concentrating.	53(41.7)	35(27.6)	22(17.3)	7(5.5)	10(7.9)
Reminders cause sweating, trouble breathing, nausea, or a pounding heart.	77(60.6)	25(19.7)	13(10.2)	6(4.7)	6(4.7)
Bad dreams about it.	77(60.6)	26(20.5)	8(6.3)	5(3.9)	11(8.7)
Felt alert 24/7	40(31.5)	35(27.6)	29(22.8)	8(6.3)	15(11.8)

*Values are given as n(%)

Factors causing stress during COVID-19 outbreak

Table 2 elaborates on the factors causing stress among health professionals during the outbreak of COVID-19. Almost 23.6% and 29.9% of participants get stressed out due to moderately worrying about negligent and endangering co-workers and patients respectively. The main factors as suggested by 40.9% of participants is the cause of the physical discomfort by the protective gears. Moreover, the fear of any family individual been infected by COVID-19 moderately affect 30.7% of frontline medical staff. Furthermore, 34.6% of participants suggest that the lack of knowledge and equipment can be of the slightest cause of stress in this epidemic condition. The conflict between duty and safety can also be one of the factors causing stress in frontline medical staff. While 17.3% of study participants suggest that displaying COVID-19 like symptoms in one own self can moderately cause stress in medical staff during the outbreak of COVID-19.

Table 2: Factors causing stress during COVID-19 outbreak

Stressors	Not at All	Slightly	Moderately	Very Much
Worry about negligent and endangering co-workers	27(21.3)	43(33.9)	30(23.6)	27(21.3)
Worry about negligent and endangering patients	21(16.5)	41(32.3)	38(29.9)	27(21.3)
Uncertain about when the epidemic will be under control	30(23.6)	42(33.1)	29(22.8)	26(20.5)
Worry about getting infected	22(17.3)	37(29.1)	34(26.8)	34(26.8)
Worry about inflicting COVID-19 on family	15(11.8)	31(24.4)	39(30.7)	42(33.1)

Protective gears cause physical discomfort	21(16.5)	41(32.3)	52(40.9)	13(10.2)
Documentation and reporting procedures unclear	56(44.1)	34(26.8)	22(17.3)	15(11.8)
Lack of knowledge and equipment	43(33.9)	44(34.6)	28(22)	12(9.4)
Lack of manpower	47(37)	34(26.8)	30(23.6)	16(12.6)
Conflict between duty and safety	31(24.4)	42(33.1)	33(26)	21(16.5)
Emotionally instability	36(28.3)	41(32.3)	30(23.6)	20(15.7)
Deteriorating patients' condition	35(27.6)	41(32.3)	31(24.4)	20(15.7)
Co-workers displaying COVID-19 like symptoms	47(37)	34(26.8)	34(26.8)	12(9.4)
Yourself displaying COVID-19 like symptoms	76(59.8)	19(15)	22(17.3)	10(7.9)

*Values are given as n(%)

Coping strategies of the frontline medical team and staff

The coping strategies preferred by the frontline medical team and staff are divided into 4 categories; Emotion-Focused coping, Problem-solving coping, Avoidance and Positive thinking. 43.3% of study participants suggested that they were comforted and understood by others while 34.6% said that they have been provided emotional support from others for coping sometimes. Most frontline medical teams took problem-solving strategies to cope up the psychological stress, almost 44.1% of participants suggest to get help and advice from others sometimes. While 41.7% and 42.5% took actions to try to make the situation better or they think hard about the step to be taken respectively. 33.1% of participants avoided the situation by doing things to let their unpleasant feelings escape. While 40.2% of individuals suggest turning to other activities to take their mind off of COVID-19. Moreover, 33.1% coped with the situation with positive thinking, they learned to live with it, 32.3% had started to accept the reality of the fact that this virus exists and the outbreak is real. Moreover, 36.2% of the participants suggest that they have been looking for something good in the current situation.

Table 3: Shows the coping strategies used by frontline medical workers & staff against COVID-19

Emotion focused coping	Not at All	Rarely	Sometimes	Very Often
I've been getting comfort and understanding from others	15(11.8)	33(26)	55(43.3)	24(18.9)
I've been getting emotional support from others	23(18.1)	39(30.7)	44(34.6)	21(16.5)
I've been praying or meditating	19(15)	27(21.3)	47(37)	34(26.8)
I've been trying to find comfort in my religion or spiritual beliefs	17(13.4)	25(19.7)	45(35.4)	40(31.5)
Problem solving coping	Not at All	Rarely	Sometimes	Very Often
I've been getting help and advice from others	15(11.8)	31(24.4)	56(44.1)	25(19.7)
I've been trying to get advice or help from other people about what to do	21(16.5)	35(27.6)	48(37.8)	23(18.1)

I've been taking action to try to make the situation better	17(13.4)	26(20.5)	53(41.7)	31(24.4)
I've been concentrating my efforts on doing something about the situation	19(15)	30(23.6)	50(39.4)	28(22)
I've been trying to come up with a strategy about what to do	21(16.5)	30(23.6)	51(40.2)	25(19.7)
I've been thinking hard about what steps to take	17(13.4)	26(20.5)	54(42.5)	30(23.6)
I've been trying to see it in a different way, to make it seem more positive	34(26.8)	30(23.6)	38(29.9)	25(19.7)
Avoidance	Not at All	Rarely	Sometimes	Very Often
I've been doing things to let my unpleasant feelings escape	27(21.3)	36(28.3)	42(33.1)	22(17.3)
I've been expressing my negative feelings	54(42.5)	31(24.4)	33(26)	9(7.1)
I've been using alcohol or other drugs to help me get through it	83(65.4)	17(13.4)	22(17.3)	5(3.9)
I've been criticizing myself for things that happened	71(55.9)	20(15.7)	26(20.5)	10(7.9)
I've been refusing to believe that it has happened	69(54.3)	34(26.8)	18(14.2)	6(4.7)
I've been saying to myself "this isn't real"	70(55.1)	29(22.8)	21(16.5)	7(5.5)
I've been giving up the attempt to cope	60(47.2)	27(21.3)	31(24.4)	9(7.1)
I've been turning to other activities to take my mind off of it	31(24.4)	26(20.5)	51(40.2)	19(15)
I've been giving up trying to deal with it	48(37.8)	27(21.3)	39(30.7)	13(10.2)
Positive thinking	Not at All	Rarely	Sometimes	Very Often
I've been making jokes about it	74(58.3)	29(22.8)	19(15)	5(3.9)
I've been making fun of the situation	84(66.1)	19(15)	18(14.2)	6(4.7)
I've been learning to live with it	26(20.5)	35(27.6)	42(33.1)	24(18.9)
I've been accepting the reality of the fact that it has happened	19(15)	32(25.2)	41(32.3)	35(27.6)
I've been looking for something good in what is happening	23(18.1)	33(26)	46(36.2)	25(19.7)

*Values are given as n(%)

Discussion

The medical teams including doctors, nurses and other hospital staff are always on the frontline during such pandemic of infectious disease. Literature suggests that during the outbreak of SARS and MERS, medical staff suffered not only from stress due to the

ongoing pandemic but also faced the long-term psychological problems²⁰. Although it has been seen that each epidemic has different significant psychological impacts on the frontline medical health workers²¹. This study was conducted to investigate the psychological impacts of the outbreak of COVID-19 among the frontline medical team and hospital staff of

Karachi, Pakistan. Along with the impacts, this study also demonstrates the coping strategies opted by the medical workers to get relief from the psychological stress.

According to Xiang et al., in this scenario of the new COVID-19, three factors should be considered while developing mental health strategies that include the multidisciplinary mental health teams, regular and accurate updates on the outbreak of COVID-19 with clear communication and establishing a safe psychological counseling service²². Studies have shown that it is essential to maintain the mental health of the staff to better control infectious diseases. Still, the best approach during this epidemic situation remains unclear^{22,23}. Therefore, learning from psychological interventions can be expected to be beneficial for frontline medical health workers and will also help them to respond to future unexpected infectious diseases outbreaks²⁴.

The findings from the present study suggested that the frontline medical workers who are in a continuously exposed environment with COVID-19 suspects, tend to experience psychological as well as emotional stress. The mean IES score was 24.44 ± 19.41 , a score this high is suggestive of partial PTSD²⁵. This has also been seen in the past studies that demonstrate the mental health of medical staff in other epidemics^{14,20}. One of the most important factors that could cause the development of psychological stress among the frontline medical workers was inflicting COVID-19 on family (33.1%). In agreement, a previous study on SARS also identified similar factors causing stress i.e. worrying about infecting the other family members, lack of manpower, lack of knowledge and equipment, etc²⁶. Another recent study in

support showed that the majority of the medical staff was worried to see their infected colleagues (37.8%) and were also on the stake as they might themselves carry the infection to their families (53.7%)²⁷.

Studies in the past have shown that gender differences regarding the ability to cope up the stress also exist. It is suggested that women are more likely to develop social and personal mechanisms to cope with stress as compared to men in society and work place²⁸. Although we have not evaluated the gender-based differences but the responses showed that the emotion-focused coping technique and positive thinking, are mostly preferred by the frontline medical workers to cope with the stress during the COVID-19 outbreak. Problems solving strategies that required help and advice from others have also been seen to be beneficial coping strategies during the COVID-19 outbreak. The most common coping strategies used by medical workers during infectious disease pandemics to reduce stress include family support and positive attitude²⁹. However, the coping strategies must be further explored, requiring long-term studies and investigations to figure out the effective ones.

This study has several limitations that must be mentioned including the short duration. This was a self-administered online survey, which signifies the chances of biasness. As this study was cross-sectional and short-term, we have not studied the continuous psychological impacts of COVID-19 among medical workers. However, the findings from this study can be used as the baseline for long-term investigations on the psychological status of the healthcare workers during the COVID-19 pandemic. Furthermore, the use of objective stress measurement tools is highly

recommended in future studies to prevent biases.

Conclusion

The frontline medical health workers tend to experience psychological stress due to infectious disease pandemics. Several different factors can initiate stress development including the thoughts of infecting a family member with COVID-19 or deteriorating the patient's condition or lack of knowledge and equipment and so on. The frontline medical workers tend to opt for emotion-focused coping and positive thinking to relieve the stress in such pandemic conditions. Moreover, the frontline medical staff needs support and facilitation by the government to retain their involvement in the current scenario. Our study highlights the significance of psychiatric support that must be provided to all the exposed healthcare workers as these psychological events cause long-term mental health effects.

Conflicts of Interest

None.

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References

1. Morens DM, Fauci AS. Emerging infectious diseases: threats to human health and global stability. *PLoS Pathog.* 2013;9(7):e1003467.
2. Peng PW, Ho PL, Hota SS. Outbreak of a new coronavirus: what anaesthetists should know. *Br. J. Anaesth.* 2020;124(5): 497–501.
3. Malta M, Rimoin AW, Strathdee SA. The coronavirus 2019-nCoV epidemic: Is hindsight 20/20?. *EClinicalMedicine.* 2020;20:100289.
4. Worldometer. World/ Counties / Pakistan. [Cited April 18, 2020]. Available at: <https://www.worldometers.info/coronavirus/country/pakistan/>
5. Tam CW, Pang EP, Lam LC, Chiu HF. Severe acute respiratory syndrome (SARS) in Hong Kong in 2003: stress and psychological impact among frontline healthcare workers. *Psychological Med.* 2004;34(7):1197-1204.
6. Lee SM, Kang WS, Cho AR, Kim T, Park JK. Psychological impact of the 2015 MERS outbreak on hospital workers and quarantined hemodialysis patients. *Comprehensive Psy.* 2018;87:123-127.
7. Li W, Yang Y, Liu ZH, Zhao YJ, Zhang Q, Zhang L, Cheung T, Xiang YT. Progression of mental health services during the COVID-19 outbreak in China. *Int J Biol Sci.* 2020;16(10):1732.
8. Mahase E. Coronavirus: covid-19 has killed more people than SARS and MERS combined, despite lower case fatality rate. *BMJ.* 2020;368:m641.
9. Maunder RG, Lancee WJ, Balderson KE, Bennett JP, Borgundvaag B, Evans S, Fernandes CM, Goldbloom DS, Gupta M, Hunter JJ, Hall LM. Long-term psychological and occupational effects of providing hospital healthcare during SARS outbreak. *Emerg. Infect. Dis.* 2006;12(12): 1924–1932.
10. Peeri NC, Shrestha N, Rahman MS, Zaki R, Tan Z, Bibi S, Baghbanzadeh M, Aghamohammadi N, Zhang W, Haque U. The SARS, MERS and novel

- coronavirus (COVID-19) epidemics, the newest and biggest global health threats: what lessons have we learned?. *Int. J. Epidemiol.* 2020; 0(0): 1–10.
11. Wu P, Fang Y, Guan Z, Fan B, Kong J, Yao Z, Liu X, Fuller CJ, Susser E, Lu J, Hoven CW. The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. *Can J Psychiat.* 2009;54(5):302-311.
 12. Esler M. Mental stress and human cardiovascular disease. *Neurosci Biobehav Rev.* 2017;74:269-276.
 13. 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 Psychiat Nurs.* 2018;32(1):2-6.
 14. Koh D, Lim MK, Chia SE, Ko SM, Qian F, Ng V, Tan BH, Wong KS, Chew WM, Tang HK, Ng W. Risk Perception and Impact of Severe Acute Respiratory Syndrome (SARS) on Work and Personal Lives of Healthcare Workers in Singapore What Can We Learn?. *Med Care.* 2005; 43(7): 676-682.
 15. Aarons GA, Glisson C, Green PD, Hoagwood K, Kelleher KJ, Landsverk JA, Research Network on Youth Mental Health. The organizational social context of mental health services and clinician attitudes toward evidence-based practice: a United States national study. *Implementation Sci.* 2012;7(1): Article number: 56.
 16. Folkman S, Bernstein L, Lazarus RS. Stress processes and the misuse of drugs in older adults. *Psych Aging.* 1987;2(4): 366–374.
 17. Donna M. the impact of Event Scale-Revised (IES-R). 2019. Issue Number 19. Available at: <https://consultgeri.org/try-this/general-assessment/issue-19.pdf>
 18. Snell WE, Finney P. The Multidimensional AIDS Anxiety Questionnaire. In C. M. Davis, W. L. Yarber, and S. L. Davis (Eds.), *Handbook of sexuality-related measures.* Newbury Park: Sage. 1998:351-353.
 19. Baumstarck K, Alessandrini M, Hamidou Z, Auquier P, Leroy T, Boyer L. Assessment of coping: a new french four-factor structure of the brief COPE inventory. *Health Qual Life Out.* 2017;15(1): Article number: 8.
 20. Khalid I, Khalid TJ, Qabajah MR, Barnard AG, Qushmaq IA. Healthcare workers emotions, perceived stressors and coping strategies during a MERS-CoV outbreak. *J. Clin. Med. Res.* 2016;14(1):7-14.
 21. 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.* 2007;24(1):12-17.
 22. Xiang YT, Yang Y, Li W, Zhang L, Zhang Q, Cheung T, Ng CH. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *Lancet Psychiat.* 2020;7(3):228-229.
 23. Kang L, Li Y, Hu S, Chen M, Yang C, Yang BX, Wang Y, Hu J, Lai J, Ma X, Chen J. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *Lancet Psychiat.* 2020;7(3):e14.
 24. Chen Q, Liang M, Li Y, Guo J, Fei D, Wang L, He L, Sheng C, Cai Y, Li X, Wang J. Mental health care for medical staff in China during the COVID-19

- outbreak. *Lancet Psychiat.* 2020;7(4):e15-16.
25. Asukai N, Kato H, Kawamura N, Kim Y, Yamamoto K, Kishimoto J, Miyake Y, Nishizono-Maher A. Reliability and validity of the Japanese-language version of the impact of event scale-revised (IES-RJ): four studies of different traumatic events. *J. Nerv. Ment. Dis.* 2002;190(3):175-182.
26. Lee SH, Juang YY, Su YJ, Lee HL, Lin YH, Chao CC. Facing SARS: psychological impacts on SARS team nurses and psychiatric services in a Taiwan general hospital. *Gen. Hosp. Psychiatry.* 2005;27(5):352-358.
27. Jiang Y. Psychological impact and coping strategies of frontline medical staff in Hunan between January and March 2020 during the outbreak of Coronavirus Disease 2019 (COVID 19) in Hubei, China. *Med Sci Monit.* 2020;26:e924171.
28. Eisenbarth CA. Coping with Stress: Gender differences among college students. *Coll. Stud. J.* 2019; 53(2):151-162.
29. Lai TH, Tang EW, Chau SK, Fung KS, Li KK. Stepping up infection control measures in ophthalmology during the novel coronavirus outbreak: an experience from Hong Kong. *Graefes Arch Clin Exp Ophthalmol.* 2020; 258:1049–1055.