



Evaluation of Knowledge, Practices, Attitude, and Anxiety of Nurses towards COVID-19 during the Current Outbreak in Karachi, Pakistan

¹Section Head Clinical Nursing, Liaquat National Hospital and Medical College, Karachi, Pakistan

²Assistant Professor & Head, Department of Oral Biology, Altamash Institute of Dental Medicine, Karachi, Pakistan

³Assistant Professor, Department of Psychiatry, Dow University of Health Sciences, Karachi.

⁴Associate Professor, Department of psychiatry, Bahria University Medical & Dental College, Karachi, Pakistan

⁵Ophthalmologist, Layton Rahmatulla Benevolent Trust Hospital, Karachi, Pakistan

⁶Assistant Professor, Department of Dental and Maxillofacial Surgery, Liaquat National Hospital, Karachi, Pakistan

⁷Head Nurse Eye & ENT Service line, Aga Khan University Hospital, Karachi, Pakistan

⁸Resident of Psychiatry, Metro Health System, Cleveland, USA

***Corresponding Author:**

Dr. M. Mansoor Majeed

Email:

mmansoormajeed@gmail.com

Shaheena Salman Alwani¹, Muhammad Mansoor Majeed², Zoobia Ramzan³, Shahzad Rauf⁴, Muhammad Saad Syed⁵, Sheikh Haroon Shah⁶, Monia Zeeshan Hirwani⁷, Faiq Hamirani⁸

Abstract

Background: Since the emergence of the novel coronavirus, the front line soldiers during this pandemic are the healthcare professionals because of their direct association with COVID19 patients. In the management of such patients, nurses play a significant role through proper care and preventive measures. Due to its contagious nature, fatality, and no proper medicine, it is a risk to the health and life of nurses and has an impact on their psychological health.: The aim of the current study was to assess the knowledge, attitude, practices, and anxiety levels of the frontline nurses

Methods: It was an online questionnaire-based cross-sectional survey targeting only those nurses involved in the management of COVID-19 patients from different hospitals of Karachi, Pakistan. SPSS 21 was used for data analysis. Descriptive analysis, Chi-Square, and t-tests were applied. P-value <0.05 was considered significant.

Results: Data of 78 nurses were analyzed. We observed that nurses possess good knowledge about COVID-19, its sources, symptoms, and routes of transmission of the Virus, etc. The knowledge mean score was calculated at 14.67 ± 3.36 . Health Department /Hospital and social media are the main sources of information regarding COVID-19. We investigated that 92.3% of the nurses had mild to severe anxiety and anxiety levels are significantly higher among females ($P < 0.05$).

Conclusion:-We concluded that the nurses performing their duties with COVID-19 positive patients have good knowledge and attitude. But their anxiety levels are high. Psychological interventions along with training should be given.

Keywords--: Perceptions; infectious disease; pandemic; healthcare workers

Introduction

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) is the latest member of the Corona Virus family (1) and has been declared a

pandemic by World Health Organization (WHO) on 11th March 2020 as the virus was reported to be highly contagious and deadly (2). Based on the current data the total number of reported cases of coronavirus disease (COVID-19) are more than 20 million and over

600000 have died while the figure is raising exponentially (3). In Pakistan, the first case of the virus was reported on 26th Feb 2020, a university student travelled from Iran, which was the hub of this virus after China (4). By this time (31st May 2020) Pakistan has crossed the 70000 confirmed reported cases and with more than 1400 deaths so far (3).

To control the spread, the Centers for Disease Control and Prevention (CDC) has recommended a guideline and a protocol to follow (5). Mainly this virus spreads via aerosols, direct contact with the infected person or indirectly by touching a surface that has a virus on it. Fever, sore throat, dry cough, and shortness of breath are the main symptoms (6). Up till now, there is no specific treatment other than supportive treatment and its morbidity rates are less than 5% (7, 8). The nature of this virus is rapidly changing and new information regarding 2019-nCoV is pouring daily. So updated knowledge and trainings are very necessary to tackle this deadly virus (6).

Healthcare professionals (HCPs) are the front line soldiers in the outbreak of any disease and are more susceptible to be infected because of their direct and close interaction with the diseased individuals (9, 10). They may not only be infected but in severe cases, it may lead to the death of the HCPs, or a similar scenario may happen with their family members or closed ones (11). In the current pandemic, thousands of healthcare professionals and healthcare workers were infected in China, Spain, Italy, France, Turkey, and other parts of the world (12-14). International Council of Nursing (ICN) stated that over 90000 healthcare workers have been infected with COVID-19 and only the death toll of nurses is estimated to be 360 (15, 16). In Pakistan, hundreds of HCPs are reported COVID-19 positive along with many deaths (17, 18). Moreover, a suicide case of 27 years old doctor has also been reported in the turmoil of COVID-19 due to anxiety (19).

The current situation is a challenge for HCPs to cope up with anxiety, stress, and depression, not only for their health and life but for the safety of their family members. In such conditions, it is quite normal HCPs to develop psychological, mental or other health-related problems (20). Health care workers involved with the testing and treatment of individuals with COVID-19 are more vulnerable than the general public as well as more prone to spread the infection to their loved ones and this may also result in psychological distress (21, 22). Furthermore, during the episodes of Severe acute respiratory syndrome (SARS) and Middle

East Respiratory Syndrome (MERS) multiple cases of panic attacks, anxiety, stress even suicides have been reported (23-26).

The transmission of the disease among the HCP is linked with improper training, not following the recommended protocols or guidelines, absence of isolation rooms, and also the lack of knowledge and awareness regarding the course and spread of the disease (27). It is well documented that proper knowledge of the disease may have a positive impact on the attitude and practices thus fewer chances of infection (28).

Nursing is the largest healthcare profession in the world, with approximately 20 million nurses worldwide (29). Along with the other HCPs nurses plays a pivotal role in healthcare setup in prevention, infection control, isolation, continuous monitoring of the patients and because of their unique patient-facing nature, there are occupational risks to providing care during the COVID-19 outbreak (30) and it is also reported that the chances of occupational exposure are relatively higher in nurses (31). Moreover, previous studies have shown that higher levels of anxiety and depression among the nurses due to their long interaction with the patients and the nature of their job (32-34).

The current study aimed to assess the knowledge, practices, attitude, and anxiety levels toward COVID-19 among nurses of Karachi, Pakistan who were directly involved with COVID-19 patients.

Methodology

Study Design: It is an online survey-based cross-sectional study conducted in May 2020 during the period of strict lockdown.

Sampling: Rao soft was used to determine the sample size. The minimum required sample size was 67 considering a response rate of 50%, 90% confidence interval (CI), and a 10% margin of error. A supplementary 20% (n=13) was added to overcome any flaws or discrepancies in the filling up of the survey form. So the final sample size was considered 80.

Study Population: Participants of the current study were the frontline nurses deputed in the management of COVID-19 in different hospitals and isolation centers of Karachi, Pakistan.

A validated questionnaire, previously used in Iran with a few modifications, was used for the current analysis (35).

Ethics: Ethical approval was obtained from the ethics and review committee of Altamash Institute of Dental Medicine, Karachi, Pakistan (AIDM/EC/04/2020/03).

Statistical Analysis: For data analysis SPSS V.21 for analysis. To check the significance of demographic characteristics Chi-square test was used. Independent sample t-test was performed to access any difference in mean anxiety score among genders. Differences in mean anxiety scores among different age groups and educational levels were accessed by one-way ANOVA. A p-value of less than 0.05 considered as significant in all tests.

Results

Total 85 forms were submitted and due to incomplete submissions and errors, we excluded 7 forms so the data of 78 nurses were analyzed.

No significant difference among the gender was found. Majority of the participants were in the age group of 18-30 years, had a bachelor's degree with at least 6 to 15 years of experience and. A statistically significant difference in age, education, and the experience was found. (**Table1**)

In the current study, we explored that 12 (15.38%) of nurses reported that they were infected with SARS-CoV-2 ($P>0.05$) and 56(71.79%) of the participants claimed that their colleagues have been infected with the virus ($P<0.05$). A family member of 14 (17.94%) of the participants found positive for COVID-19 ($P>0.05$). The bulk of the participants were aware of the symptoms, treatment options, routes of transmission, and risk factors for COVID-19. A substantial number of participants answered correctly (**Table 2**). The knowledge score ranged from 5 to 19 and the mean knowledge score of nurses was 14.67 ± 3.36 ($P<0.05$). All participants knew that COVID19 is a viral disease and it is contagious. A considerable number of the participants answered correctly (**Table 2**) Three main symptoms of COVID-19 i.e. fever, shortness of breath, and dry Cough was mentioned by 98.71, 98.71, and 91.02% of the nurses respectively. (**Table 2**)

We analyzed that a significant number of nurses have anxiety ($p<0.001$). Nurses having no or mild anxiety are 6 (7.7%) and 6 (7.7%) respectively and those having moderate, high and very high levels of anxiety are 19 (24.4%), 24 (30.8%) and 23 (29.5%) respectively (**FIG 1**). A significant difference in the levels of anxiety was observed among the genders ($p=0.016$). Females are more anxious as compared to males (**FIG 1**). In the range of 1-5, where 1 means no anxiety and 5 means very severe anxiety, we calculated that the mean

anxiety score to be infected for participants was 3.60 ± 1.25 and for their family, the mean anxiety level was recorded 3.85 ± 1.31 . Anxiety about performing measures like aerosol producing procedures, taking a nasopharyngeal swab, nebulizing, suctioning, etc. was calculated 3.30 ± 1.33 (**Fig 3**). We evaluated that the anxiety levels are significantly higher among those individuals who have been previously infected with COVID-19 ($P=0.013$).

As per our results, around 80% of the nurses put face masks, protective clothing, placed suspected patients in a ventilated single room, routinely clean and disinfect environmental surface, frequent hand cleaning and follow respiratory hygiene and cough etiquette and practice social distancing. (**Table 3**).

Current study findings demonstrate a positive attitude of the nurses towards COVID-19. We found that 75(96%) nurses who have dedicated themselves to COVID-19 patients willing to continue their work. A large number of nurses 72 (92.3%) want more people to be trained to fight with COVID-19 and 59(75.6%) of the nurses rejected the idea of having attendants with the patients in the hospital (**Table 3**).

Table 1: Demographic Characteristics of the Participants

Variable		Number (%)	P value
Gender	Male	40 (51.3)	0.821
	Female	38 (48.7)	
		78 (100)	
Age	18-30	37 (47.4)	<0.001
	31-40	34 (43.6)	
	41-50	5 (6.4)	
	51-60	2 (2.6)	
Educational Level	High School Diploma or less	6 (7.7)	<0.001
	Diploma In Nursing	31 (39.7)	
	Bachelor degree in Nursing	33 (42.3)	
	Master degree In Nursing	8 (10.3)	
Work Experience	0-5 years	30 (38.46)	0.013

	6-15	34 (43.58)	
	16 and More	14 (17.9)	
Have you been COVID-19 Positive	Yes	12 (15.38%)	
	NO	66 (84.62%)	

Table 2: Knowledge of the Participants

Questions	Options	Number (%)
COVID-19 Mortality Rate	< 5%	44 (56%.41)
	10% -20%	19 (24.35%)
	21% - 30%	5 (6.41%)
	> 30%	10 (12.82%)
Incubation Period	2-14 days	43 (55.12%)
	2-7 days	2 (2.56%)
	7-14 days	30 (38.56%)
	7-21 days	3 (3.84%)
Symptoms of COVID-19	Fever	77(98.71%)
	Dry Cough	71 (91.02%)
	Runny Nose	56 (71.79%)
	Shortness of Breath	77 (98.71%)
	Joint/Muscle ache	42 (53.84%)
	Red Eyes	35 (44.87%)
	Headache	42 (53.84%)
	Diarrhea	32 (41.02%)
	Wet cough	30 (38.46%)
COVID 19 is a	Viral Disease	78 (100%)
	Protozoal Disease	0 (0.0%)
	Bacterial Disease	0 (0.0%)
	Fungal Disease	0 (0.0%)
Route of Transmission	Airborne	62 (79.48%)
	Direct Contact	68 (87.17%)
	Droplet	70 (89.74%)
	Indirect Contact	56 (71.79%)
	Sexual Contacts	23 (29.48%)
	Fecal-Oral Route	29 (37.17%)
Factors considered to identify patients at risk of having COVID-19	Presence of symptoms of Respiratory Distress	70 (89.74%)
	Presence of symptoms of Gastroenteritis	20 (25.64%)

	History of travel to areas experiencing an upsurge of COVID-19	68 (84.61%)
	History of contact with possible infected patients	66 (84.61%)
What is the routine treatment of COVID 19?	No Treatment	18 (23.07%)
	Supportive Treatment	66 (84.61%)
	Vaccine	6 (7.69%)
	Not sure	14 (8.97%)
	Other (Onion, Steam, Ablution)	04 (5.12%)

Table 3: Practices and Attitude of Nurses towards COVID-19

Item	Response	
	Yes	No
Put facemask on known or suspected patients	75	3
Place known or suspected patients in adequately ventilated single rooms	68	10
All health staff members wear protective clothing	72	6
Avoid moving and transporting patients out of their area unless necessary	70	8
Routinely clean and disinfect surfaces in contact with known or suspected patients	67	11
Clean and disinfect environmental surfaces	64	14
Frequently clean hands by using alcohol-based hand rub or soap and water	69	9
Safe injection practices (i.e., aseptic technique for parenteral medications)	47	31
Respiratory hygiene / cough etiquette	64	14
Practice social distancing	65	13
Do you see the need for more people to be trained by the medical staff?	72	6
In a hospital do you prefer having more attendants with the patient?	18	59
Do you want to continue work with COVID 19 patients? If we get Proper Training and PPE	42 29 YES	3 04

If we get a special allowance	75	
Total		

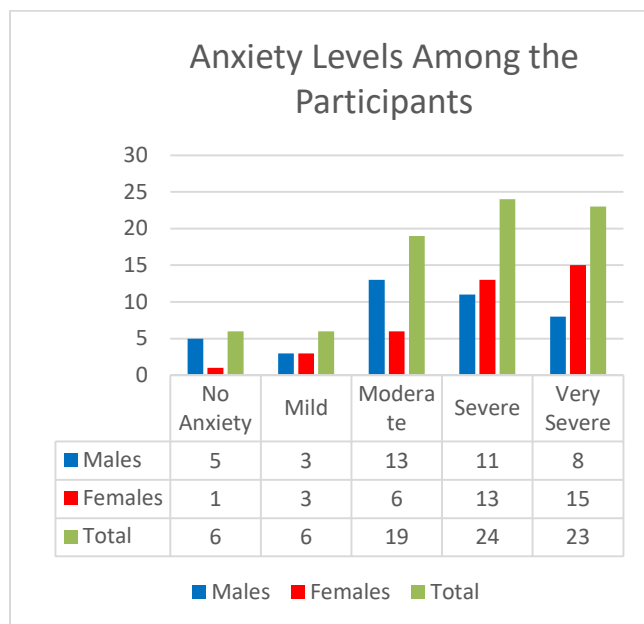


Figure 1: No of males, females, and the total number of participants with no, mild, moderate, severe, and very severe anxiety.

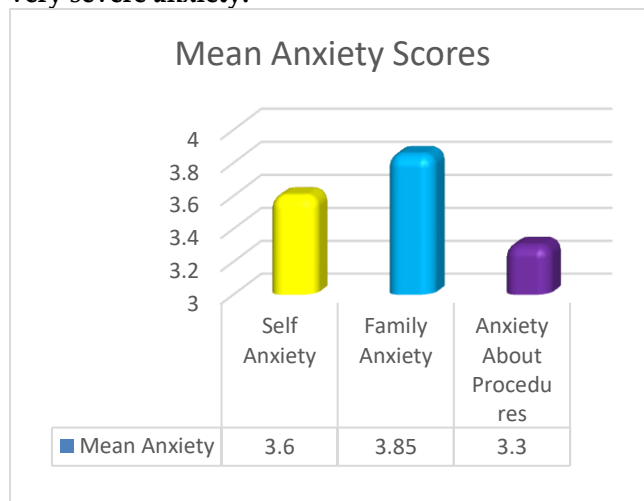


Figure 2: Mean Anxiety Score (1 means no anxiety and 5 means very severe anxiety)

Discussion

To best of our knowledge, this is the first study that has targeted only the Nurses to assess their knowledge and practices towards COVID 19 and their level of anxiety in Pakistan. This study was being conducted when Pakistan crossed the mark of 70000 confirmed

reported cases of COVID 19. We assessed their knowledge, attitude, and practice to shield them and prevent the further spread of the infection. It is reported that nurses are more prone to infection due to close contact with the patients (36). Moreover, we analyzed the anxiety levels among the nurses as studies suggest that in case of big disasters mental health issues may arise (37).

The finding of the current study showed that nurses in Karachi have sufficient knowledge regarding different aspects of COVID-19. In a recent study conducted on health care professionals in Pakistan revealed that HCP has good knowledge of COVID-19 (38, 39). Moreover, different studies performed in different parts of the world showed strikingly similar results (35, 40, 41). Contradictory to the findings of our study, research conducted in Pakistan a few weeks before, reported a low level of knowledge among the nurses (42). The disparity in expertise, in our view, is due to the training sessions and awareness workshops carried out by the health departments and hospitals. Furthermore, awareness campaigns on social media and print media have brought change as well. Previous studies in different parts of the world during the epidemic revealed that the rate of influx of information is much high during the current pandemic due to stress and depth of the situation (43, 44).

We appraised that the Health department or hospitals and social media and are the two major sources of information regarding COVID 19. Our results are further endorsed by different studies stated that the previously mentioned sources are the primary sources of information regarding COVID-19 (39, 45, 46).

In this study, 57 (73.07%) participants have received formal training to cater to the COVID-19 positive patients and infection control. Contrary to our findings the previous study conducted in Pakistan showed that 50% of the nurses had not undergone any training and have limited knowledge about COVID-19(42). Training may be the justification for increased awareness and knowledge amongst nurses, as is apparent in the current report. Zhong et al stated that with good knowledge and practice and following the protective measures, HCPs not only save themselves but show a good message of awareness to the community (47).

We investigated that 12 (15.38%) nurses were infected with COVID 19 and 56(71.79%) of the nurses have a colleague(s) that had been infected with the COVID

19. Moreover, 14(17.94%) nurses reported that their family member(s) had been infected. HCPs show a high prevalence of getting an infection with any contagious or non-contagious infection (48). Furthermore, data from other countries are in accordance with our findings(49) In Italy 12 % of the nurses got COVID-19. In Brazil, it is also reported that 1000s of nurses have been infected and 100s died (50). The same is the condition in other countries as per reports (51-53) Moreover we believe that a higher rate of infection and mortality among healthcare professionals and their family members could be one of the causes of anxiety. However, contrary to our results, a study in Iran in the early days of COVID-19 showed different outcomes with zero cases of infection among nurses (35).

In our survey, the vast majority of participants also agree that there is a desperate need for more skilled personnel in health care facilities to address the need that is triggered by the current pandemic in various research studies (54, 55).

Anxiety is an undesirable emotional condition perceived individually and it is reported that anxiety is one of the commonest psychological hurdles of nurses (31). In our study 72 (91.3%) nurses have the overall anxiety ranges from mild to very severe. In a similar study on health care workers conducted in China expressed similar results (56) and in another study that was purely conducted over nurses showed a higher level of anxiety among the nurses which further validates our findings, furthermore in agreement with the results of our study it also showed the anxiety for the family member (35, 57, 58). Moreover, previous studies have also shown a higher level of anxiety and depression among the nurses due to their long interaction with the patients and the nature of their job (32). Similar findings were reported by other studies during SARS and MERS epidemics (24, 59, 60). According to the results of this study, females have more anxiety as compare to males, this is in accordance with the outcome of other studies (61, 62).

Data from COVID-19 research and other outbreaks of infectious respiratory disease indicates strong concern for nurses besides personal or family well-being in the face of close interaction with a potentially deadly virus and the burden of combining this concern with the ethical requirements of continuing to provide care (63, 64).

In our opinion, the high rate of anxiety among the nurses is because of the unavailability of personal protective equipment (PPE), lack of counselling sessions, deficiency of proper health care facilities, etc. Moreover, job stress, demands, exertions may not only harm the psychology and mental health but also on the general wellbeing(65, 66). Moreover due to social media and easy access to the current news and information that the anxiety and obsession have been increased (67, 68). The anxiety of nurses towards their family members to be infected with COVID-19 is significantly on the higher side. Studies have shown that due to the highly contagious nature of this virus healthcare professionals are in stress and depression as they might transfer the infection to their family members(40). In order to reduce the anxiety counselling sessions should be organized. The same recommendations were given in parallel studies as the wellbeing of the mental state is crucial in order to manage infectious diseases (69, 70).

Conclusion

We conclude that nurses working with COVID-19 patients have a good understanding of symptoms, illness process, care strategies, etc. Anxiety is highly prevalent among nurses due to COVID-19.

It is also recommended that appropriate counselling sessions help them deal with the pandemic. We agree that adequate preparation and mentoring along with fortnightly or monthly refresher course will aid in coping with such circumstances.

Conflict of Interest:

The authors declare that they do not have any interests that could constitute a real, potential or an apparent conflict of interest for their involvement in the publication.

Funding: None

Acknowledgements: We acknowledge the support of the ethic and review committee of Altamash Institute of Dental Medicine, Karachi, Pakistan. We would like to extend heartfelt graciousness to Dr. Shoaib Durrani from Durrani Dental Clinic, Karachi, Pakistan, Mr. Muhammad Saqlain of Quaid -e-Azam University, Pakistan and MS. Marzieh Nemati, Bahareh Ebrahimi and Fatemeh Nemati of Shiraz University of Medical Sciences, Iran and to all the participants and people who provided support at every step of the research.

Strength and Limitations:

This study emphasized the less discovered field where very limited literature was available. The sample size was limited as the study only comprises of the nurses from Karachi, Pakistan working with COVID-19 so the results cannot be generalized. It was an online survey so factors like dishonest answers and biasness should be considered.

Author's contribution:

AS and MM conceived the study and designed the questionnaire. HM, SM and SH collected data. SM and SH performed statistical analyses and prepared tables and figures. MM, FH and AS drafted the manuscript. AS reviewed the manuscripts. MM supervised the project and is responsible for the integrity of the research. All authors contributed comprehensively contributed in writing and critically revised and approved the final draft of the manuscript.

References

1. Zhou P, Yang X-L, Wang X-G, Hu B, Zhang L, Zhang W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *nature*. 2020;579(7798):270-3.
2. WHO. WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020 [cited 2020 11 March]. Available from: <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>.
3. Pakistan Go. COVID-19 Cases in Pakistan 2020 [updated 31st May, 2020 - 09:51 am (GMT+5); cited 2020 25th May]. Available from: <http://www.covid.gov.pk/stats/pakistan>.
4. Saqlain M, Munir MM, Ahmed A, Tahir AH, Kamran S. Is Pakistan prepared to tackle the coronavirus epidemic? *Drugs Therapy Perspectives*. 2020:1-2.
5. CDC. Interim Infection Prevention and Control Recommendations for Patients with Suspected or Confirmed Coronavirus Disease 2019 (COVID-19) in Healthcare Settings 2020 [cited 2020 8th June]. Available from: <https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control-recommendations.html>.
6. CDC. How COVID-19 Spreads 2020 [Available from: <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/how-covid-spreads.html>].
7. Velavan TP, Meyer CG. The COVID-19 epidemic. *Tropical medicine international health* 2020;25(3):278.
8. Roser M, Ritchie H, Ortiz-Ospina E, Hasell J. Coronavirus disease (COVID-19)-Statistics and research. *Our World in data* 2020.
9. Alharthy N, Alrajeh OA, Almutairi M, Alhajri A. Assessment of anxiety level of emergency health-care workers by generalized anxiety disorder-7 tool. *International Journal of Applied Basic Medical Research*. 2017;7(3):150.
10. Paterson JL, Sofianopoulos S, Williams B. What paramedics think about when they think about fatigue: Contributing factors. *Emergency Medicine Australasia* 2014;26(2):139-44.
11. Reid L. Diminishing returns? Risk and the duty to care in the SARS epidemic. *Bioethics*. 2005;19(4):348-61.
12. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA network open*. 2020;3(3):e203976-e.
13. Chen W, Huang Y. To Protect Health Care Workers Better, To Save More Lives With COVID-19. *Anesthesia Analgesia*. 2020.
14. ERSOY A. The frontline of the COVID-19 pandemic: Healthcare workers. *Turkish Journal of Internal Medicine*. 2(2):31-2.
15. Nurses TICO. Immediate and serious threat: ICN calls on WHO member states to collect and share data on health worker COVID-19 infection rates and deaths 2020 [updated 18 May 2020; cited 2020 18th May]. Available from: <https://www.icn.ch/news/immediate-and-serious-threat-icn-calls-who-member-states-collect-and-share-data-health-worker>.
16. Mantovani C. Over 90,000 health workers infected with COVID-19 worldwide: nurses group. *Reuters*. 2020 MAY 6, 2020.
17. Geo.tv. COVID-19 outbreak: 440 doctors, 111 nurses and 215 paramedics infected so far 2020 [Available from: <https://www.geo.tv/latest/287375-increasing-number-of-health-professionals-testing-positive-for-the-coronavirus-across-pakistan>].
18. Pakistan Go. PAKISTAN CASES DETAILS 2020 [updated 11 May, 2020; cited 2020 11 May]. Available from: <http://www.covid.gov.pk/stats/pakistan>.
19. Gulzar F. Coronavirus: Young doctor commits suicide in Pakistan due to lack of protective measures 2020 [cited 2020 May 07,]. Available from: <https://gulfnews.com/world/asia/pakistan/coronavirus-young-doctor-commits-suicide-in-pakistan-due-to-lack-of-protective-measures-1.1588844318582>.
20. Xiang Y-T, Yang Y, Li W, Zhang L, Zhang Q, Cheung T, et al. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *The Lancet Psychiatry* 2020;7(3):228-9.
21. Neto MLR, Almeida HG, Esmeraldo JDa, Nobre CB, Pinheiro WR, de Oliveira CRT, et al. When health professionals look death in the eye: the mental health of professionals who deal daily with the 2019 coronavirus outbreak. *Psychiatry Research*. 2020:112972.
22. Ashtari S, Vahedian-Azimi A, Moayed M, Rahimibashar F, Shojaei S, Pourhoseingholi M. Compare the severity of psychological distress among four groups of Iranian

- society in COVID-19 pandemic. Research Square; 2020 DOI: 10.21203/rs.3.rs-23828/v1. 2020.
23. Jeong H, Yim HW, Song Y-J, Ki M, Min J-A, Cho J, et al. Mental health status of people isolated due to Middle East Respiratory Syndrome. *Epidemiology health* 2016;38.
 24. Chua SE, Cheung V, Cheung C, McAlonan GM, Wong JW, Cheung EP, et al. Psychological effects of the SARS outbreak in Hong Kong on high-risk health care workers. *The Canadian Journal of Psychiatry*. 2004;49(6):391-3.
 25. Chan SMS, Chiu FKH, Lam CWL, Leung PYV, Conwell Y, sciences a. Elderly suicide and the 2003 SARS epidemic in Hong Kong. *International Journal of Geriatric Psychiatry: A journal of the psychiatry of late life*. 2006;21(2):113-8.
 26. Bai Y, Lin C-C, Lin C-Y, Chen J-Y, Chue C-M, Chou P. Survey of stress reactions among health care workers involved with the SARS outbreak. *Psychiatric Services*. 2004;55(9):1055-7.
 27. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. *Jama*. 2020;323(13):1239-42.
 28. McEachan R, Taylor N, Harrison R, Lawton R, Gardner P, Conner M. Meta-analysis of the reasoned action approach (RAA) to understanding health behaviors. *Annals of Behavioral Medicine* 2016;50(4):592-612.
 29. Lancet T. 2020: unleashing the full potential of nursing. *Lancet (London, England)*. 2019;394(10212):1879.
 30. Smith GD, Ng F, Li WHC. COVID-19: Emerging compassion, courage and resilience in the face of misinformation and adversity. *Journal of Clinical Nursing* 2020;29(9-10):1425.
 31. Mo Y, Deng L, Zhang L, Lang Q, Liao C, Wang N, et al. Work stress among Chinese nurses to support Wuhan for fighting against the COVID-19 epidemic. *Journal of nursing management* 2020.
 32. Wong TW, Yau JK, Chan CL, Kwong RS, Ho SM, Lau CC, et al. The psychological impact of severe acute respiratory syndrome outbreak on healthcare workers in emergency departments and how they cope. *European Journal of Emergency Medicine*. 2005;12(1):13-8.
 33. Chiang Y-M, Chang Y. Stress, depression, and intention to leave among nurses in different medical units: Implications for healthcare management/nursing practice. *Health Policy*. 2012;108(2-3):149-57.
 34. Maharaj S, Lees T, Lal S. Prevalence and risk factors of depression, anxiety, and stress in a cohort of Australian nurses. *International journal of environmental research public health* 2019;16(1):61.
 35. Nemati M, Ebrahimi B, Nemati F. Assessment of Iranian nurses' knowledge and anxiety toward COVID-19 during the current outbreak in Iran. *Archives of Clinical Infectious Diseases*. 2020;15(COVID-19).
 36. Bernard H, Fischer R, Mikolajczyk RT, Kretzschmar M, Wildner M. Nurses' contacts and potential for infectious disease transmission. *Emerging infectious diseases*. 2009;15(9):1438.
 37. Shioyama A, Uemoto M, Shinfuku N, Ide H, Seki W, Mori S, et al. The mental health of school children after the Great Hanshin-Awaji Earthquake: II. Longitudinal analysis. *Seishin shinkeigaku zasshi= Psychiatria et neurologia Japonica* 2000;102(5):481-97.
 38. Ahmed N, Shakoor M, Vohra F, Abduljabbar T, Mariam Q, Rehman MA. Knowledge, Awareness and Practice of Health care Professionals amid SARS-CoV-2, Corona Virus Disease Outbreak. *Pakistan Journal of Medical Sciences*. 2020;36(COVID19-S4).
 39. Saqlain M, Munir MM, ur Rehman S, Gulzar A, Naz S, Ahmed Z, et al. Knowledge, attitude, practice and perceived barriers among healthcare professionals regarding COVID-19: A Cross-sectional survey from Pakistan. *Journal of Hospital Infection*. 2020.
 40. Giao H, Han NTN, Van Khanh T, Ngan VK, Van Tam V, Le An P. Knowledge and attitude toward COVID-19 among healthcare workers at District 2 Hospital, Ho Chi Minh City. *Asian Pac J Trop Med*. 2020;13.
 41. Kamineni SRT, Balu P, Sivagananam P, Chellapandian P, Chelladurai UM, Jayasheelan VP, et al. Knowledge of COVID-19 among nursing and Allied health care professionals working in tertiary care hospital. *International Journal of Research in Pharmaceutical Sciences*. 2020;11(SPL1):103-9.
 42. Khan S, Khan M, Maqsood K, Hussain T, Zeeshan M. Is Pakistan prepared for the COVID-19 epidemic? A questionnaire-based survey. *Journal of Medical Virology*. 2020.
 43. Cinelli M, Quattrocioni W, Galeazzi A, Valensise CM, Brugnoli E, Schmidt AL, et al. The covid-19 social media infodemic. *arXiv preprint arXiv:2005.05004*. 2020.
 44. Chan A, Nickson C, Rudolph J, Lee A, Joynt G. Social media for rapid knowledge dissemination: early experience from the COVID-19 pandemic. *Anaesthesia*. 2020.
 45. Giao H, Han NTN, Van Khanh T, Ngan VK, Van Tam V, Le An P. Knowledge and attitude toward COVID-19 among healthcare workers at District 2 Hospital, Ho Chi Minh City. *Asian Pac J Trop Med*. 2020;13.
 46. Karasneh R, Al-Azzam S, Muflih S, Soudah O, Hawamdeh S, Khader Y. Media's effect on shaping knowledge, awareness risk perceptions and communication practices of pandemic COVID-19 among pharmacists. *Research in Social Administrative Pharmacy* 2020.
 47. Zhong B-L, Luo W, Li H-M, Zhang Q-Q, Liu X-G, Li W-T, et al. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online

- cross-sectional survey. *International journal of biological sciences*. 2020;16(10):1745.
48. Catton H. ICN calls for data on healthcare worker infection rates and deaths 2020 [cited 2020 6th May]. Available from: <https://www.icn.ch/news/icn-calls-data-healthcare-worker-infection-rates-and-deaths>.
49. Kimball A. Asymptomatic and presymptomatic SARS-CoV-2 infections in residents of a long-term care skilled nursing facility—King County, Washington, March 2020. *MMWR Morbidity mortality weekly report*. 2020;69.
50. CGTN. Nurses dying from COVID-19 in Brazil 2020 [Available from: <https://newsus.cgtn.com/news/2020-05-28/Nurses-dying-from-COVID-19-in-Brazil-QQom54EAjS/index.html>].
51. M S. High COVID-19 infection rates among doctors and nurses in Germany 2020 [cited 2020 30th May]. Available from: <https://www.wsws.org/en/articles/2020/05/25/doct-m25.html>.
52. A MA. 138 nurses test Covid-19 positive in KP. *The News*. 2020 May 30, 2020.
53. E E. COVID-19 cases among health care workers top 62,000, CDC reports. *NBC NEWS*. 2020 27th May 2020.
54. Mukhtar PS. Mental Wellbeing of Nursing Staff during the COVID-19 Outbreak: A Cultural Perspective. *Journal of Emergency Nursing*. 2020.
55. Hetland B, Lindroth H, Guttormson J, Chlan LL. 2020- The Year that Needed the Nurse: Considerations for Critical Care Nursing Research and Practice Emerging in the Midst of COVID-19. *Heart Lung: The Journal of Cardiopulmonary Acute Care*. 2020.
56. Zhou M, Tang F, Wang Y, Nie H, Zhang L, You G, et al. Knowledge, attitude and practice regarding COVID-19 among health care workers in Henan, China. *Journal of Hospital Infection*. 2020.
57. Taghizadeh F, Hassannia L, Moosazadeh M, Zarghami M, Taghizadeh H, Dooki AF, et al. Anxiety and Depression in Health Workers and General Population During COVID-19 Epidemic in IRAN: A Web-Based Cross-Sectional Study. *medRxiv* 2020.
58. Kang L, Li Y, Hu S, Chen M, Yang C, Yang BX, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *The Lancet Psychiatry* 2020;7(3):e14.
59. Maunder R, Hunter J, Vincent L, Bennett J, Peladeau N, Leszcz M, et al. The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital. *Cmaj* 2003;168(10):1245-51.
60. Bukhari EE, Tamsah MH, Aleyadhy AA, Alrabiaa AA, Alhboob AA, Jamal AA, et al. Middle East respiratory syndrome coronavirus (MERS-CoV) outbreak perceptions of risk and stress evaluation in nurses. *The Journal of Infection in Developing Countries*. 2016;10(08):845-50.
61. Rajkumar RP. COVID-19 and mental health: A review of the existing literature. *Asian journal of psychiatry*. 2020;102066.
62. Li S, Li L, Zhu X, Wang Y, Zhang J, Zhao L, et al. Comparison of characteristics of anxiety sensitivity across career stages and its relationship with nursing stress among female nurses in Hunan, China. *BMJ open*. 2016;6(5):e010829.
63. Cai H, Tu B, Ma J, Chen L, Fu L, Jiang Y, et al. 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. *Medical science monitor: international medical journal of experimental and clinical research*. 2020;26:e924171-1.
64. Kim JS, Choi JS. Factors influencing emergency nurses' burnout during an outbreak of Middle East Respiratory Syndrome Coronavirus in Korea. *Asian nursing research*. 2016;10(4):295-9.
65. Chou L-P, Li C-Y, Hu SC. Job stress and burnout in hospital employees: comparisons of different medical professions in a regional hospital in Taiwan. *BMJ open*. 2014;4(2):e004185.
66. Khamisa N, Oldenburg B, Peltzer K, Ilic D. Work related stress, burnout, job satisfaction and general health of nurses. *International journal of environmental research public health*. 2015;12(1):652-66.
67. Xiao H, Zhang Y, Kong D, Li S, Yang N. 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. *Medical science monitor: international medical journal of experimental clinical research* 2020;26:e923549-1.
68. Dsouza DD, Quadros S, Hyderabadwala ZJ, Mamun M. Aggregated COVID-19 suicide incidences in India: Fear of COVID-19 infection is the prominent causative factor. *Psychiatric Research*. 2020.
69. Kang L, Li Y, Hu S, Chen M, Yang C, Yang BX, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *The Lancet Psychiatry*. 2020;7(3):e14.
70. Xiang Y-T, Yang Y, Li W, Zhang L, Zhang Q, Cheung T, et al. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *The Lancet Psychiatry*. 2020;7(3):228-9.