AWARENESS OF PRECAUTIONARY MEASURES AGAINST COVID-19 IN HEALTHCARE WORKERS

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ABSTRACT

Objective: To study the perception of COVID-19 and awareness of necessary precautionary measures against COVID-19 among health care workers.

Study Design: Cross-sectional study.

Place and Duration of Study: The study was conducted amongst the health care workers, working across Pakistan, from Apr 2020 to Jun 2020.

Methodology: An online questionnaire was made on Google Forms Inc®. The survey forms were distributed online. The response obtained was entered and analyzed on SPSS version 23.

Results: A total of 210 healthcare workers, 130 males (61.9%) and 80 females (38.1%), participated in our study, of which 120 were doctors (57%) and 76 were dentists (36%). The participants were questioned about certain precautionary measures against COVID-19, of which majority were answered correctly. However, only 18.6% participants chose the correct sequence of donning of Personal Protective Equipment (PPE) according to the Centers for Disease Control and Prevention (CDC) guidelines, while 41% and 29.2% individuals correctly stated scrubs as the dress code of choice while treating a COVID-19 and non-COVID patient respectively. Among dentists, gloves (17.8%) were considered an important part of gear to treat/consult any patient whereas among doctors, when treating non-COVID patients, gloves (31.6%) while when treating COVID-19 patients, everything, except for surgical masks, was considered a significant part of Personal Protective Equipment (PPE). Chi-square test was applied and p-value <0.05 was achieved.

Conclusion: Participants showed adequate awareness regarding the necessary preventive measures of COVID-19. However, we identified a gap of information in some protocols that need to be emphasized more.

Keywords: Awareness, COVID-19, Health care workers, Precautionary measures.

INTRODUCTION

The "coronavirus diseases 2019", more commonly known as COVID-19 was initially identified in Huanan Seafood Wholesale Market in Wuhan, China, in December 2019, hence suggesting a zoonotic origin[1]. At the time, its major impact on global healthcare and economies could not have been predicted. On 30th January 2020, WHO classified the outbreak as Public Health Emergency of International Concern and later, on 11th March 2020, a global pandemic. In Pakistan, the disease was first identified on 26th February 2020 and by 18th March, cases had been identified in all states of Pakistan, which eventually resulted in a lockdown that extended, from 1st April till 9th May 2020.

The causative agent of COVId-19 was isolated from the lower respiratory tract of the infected patients and was, therefore, named as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) by the International Committee of Taxonomy of Viruses (ICTV)[2]. Other than SARS-CoV-2, there are six known coronaviruses in humans[3]. Structurally, coronaviruses are enveloped, positive-stranded RNA viruses belonging to Coronaviridae family[4]. Though its transmissibility rate is higher, COVID-19 was found to have a lower mortality rate as compared to SARS[5,6]. The typical symptoms of a patient infected with SARS-CoV-2 include fever, dry cough, dyspnea,

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headache, loss of sense of smell, and hypoxemia. However, it can also cause complications like pneumonia and acute respiratory distress syndrome which may prove fatal[7]. Rarely, the infected individual may be asymptomatic. The incubation period of the virus is estimated to be 5 days but it can vary from 2-14 days[8]. The mode of spread of the virus has been identified to be via small droplets between individuals in close contact mainly as a result of coughing, talking, and sneezing. However, some evidence also indicates feco-oral transmission[9]. The virus cannot travel long distances, as a result, it falls onto the surfaces or on the ground, therefore spreading the disease when an individual touches that surface. It can also remain on different surfaces for varying amounts of time.

Currently, there is no vaccine or antiviral treatment available for SARS-CoV-2. Thus, the main treatment modality that is recommended, is symptomatic and supportive therapy[10]. The most critical intervention is to adapt the recommended preventive measures to control the spread of COVID-19. These include hand washing, covering one's mouth while sneezing or coughing, wearing facemask where required, social distancing, and self-isolation for 14 days, in suspected cases.

The spread of the virus at an alarming rate has caused worldwide social and financial disturbances, with delay or cancellation of political and cultural events all around the globe, cancellation of exams in global universities, panic buying leading to a widespread shortage of supplies, circulation of conspiracy theories and rumors around social media as well as a major impact on the mental health of the common man. Amidst the catastrophe, health care workers, all around the globe, proved themselves as the frontline warriors as they come in direct contact with the patients and are at high risk of infection. World Health Organization (WHO) and Centre for Disease Control and Prevention (CDC) have published protocols for prevention and control of COVID-19 among health care workers and several online courses are also available for creating awareness regarding COVID-19. However, negligence of health care workers and the general population have led to increase in the number of infections. As of today, a large number of health care workers have contracted the virus in Pakistan and all over the world. With the continuing ease of lockdown, the number of cases and mortality rates has further increased considerably.

Part of tackling an infectious disease outbreak is to create awareness regarding its prevention and control. The knowledge and perception of health care workers during this pandemic play a key role in its prevention. Adopting strict precautionary measures, proper use of personal protective equipment, and exercising the recommended precautionary measures would help in flattening the infectious curve. Keeping this in mind, the main aim of our research project was to study and evaluate the perception and awareness of precautionary measures against COVID-19 among health care workers to help the policy-makers and health departments to coordinate and plan awareness programs and courses for adopting precautionary measures against COVID-19.

METHODOLOGY

We performed a cross-sectional survey to quantify knowledge and awareness of COVID-19 among healthcare workers currently employed and working in Pakistan. The study was approved by the Ethical Committee, Armed Forces Institute of Dentistry (IRB form no.905/Trg-ABP 1K2). The cross-sectional study was conducted amongst the health care workers, working across Pakistan in different hospitals between the period of 19th April to 7th June 2020. Since this survey did not involve any patients hence consent form was not required. The questionnaire was made online on Google Forms Inc®. and was reviewed by two senior consultants to assess accuracy. Convenient sampling technique was used and the questionnaire was distributed online through different social media platforms like WhatsApp®, Face-book®, Instagram® and was also emailed to several healthcare workers thereby reaching an

estimated 500 individuals. WHO calculator was used to finalize the sample size. With margin of error of 5%, confidence interval of 90%, estimated population size of 1500 and response distribution of 50%, a sample size of 230 was calculated. Participation was anonymous and voluntary. Of the 230 responses, 20 were discarded due to wrongly filled responses, and our final sample of 210 was finalized. The filled responses were entered in and analyzed on SPSS version 23. Inclusion criteria included; healthcare workers (Doctors, Dentists, Nurses, Pharmacists, Medical Students, Dental students, Medical assistants, and Dental assistants) working across Pakistan, during this pandemic. Exclusion criteria were all of the health care workers who are currently not working. The questionnaire was divided into two sections. First section comprised of personal and demographic data while the second section compromised questions related to perception and awareness of necessary precautionary measures adopted by the HCWs during this pandemic. Descriptive analysis was carried out and the knowledge of all participants was judged through close-ended questions.

Table-I: Distribution of participants on the basis of age, gender and profession.

Age		Category (n) %							
		Dentist	**Doctor**	**Nurse**	**Medical Student**	**Dental Student**	**Medical Assistant**	**Dental Assistant**	**Pharmacist**
>25 years	Males	(5) 17.2	(20) 69	-	(2) 6.9	-	(2) 6.9		
	Females	(22) 55	(13) 32.5	(1) 2.5	(2) 5	(2) 5	-		
25-35 years	Males	(13) 28.3	(33) 71.7		-			(1) 2.7	
	Females	(19) 51.4	(16) 43.2		(1) 2.7			-	
>35 years	Males	(15) 27.8	(37) 68.5				(1) 1.9		(1) 1.9
	Females	(2) 50	(1) 25				(1) 25		

Table-II: Distribution of questions related to precautionary measures and the selected options (corrects answers given in bold).

Q No.	Questionnaire	Options (n) %					
		A	**B**	**C**	**D**	**E**	**Q. N/A**
1	What is the recommended duration of use of hand-sanitizers and hand soaps respectively after every patient?	**(118) 56.2**	(73) 34.8	(14) 6.7	(5) 2.4		
2	What is the correct sequence of DONNING of Personal Protective Equipment (PPE)?	(28) 13.3	(80) 38.1	(30) 14.3	(33) 15.7	**(39) 18.6**	
3	What is the correct sequence of DOFFING of Personal Protective Equipment (PPE)?	(12) 5.7	(37) 17.6	(37) 17.6	**(124) 59**		
4	According to you, what dress code is the most appropriate for a healthcare worker while consulting/treating a suspected/confirmed COVID-19 patient?	**(86) 41**	(115) 54.8	-	(7) 3.3	(2) 1	
5	According to you, what dress code is the most appropriate for a healthcare worker while consulting/treating a non-COVID patient?	**(62) 29.2**	(100) 47.6	(11) 5.2	(22) 10.5	(15) 7.1	
6	How frequently should a dental surgery/ clinic be disinfected?	(72) 34.3	(12) 5.7	**(79) 37.6**	(47) 22.4		
7	According to you, which of the following is the best diagnostic test for COVID-19?	**(171) 81.4**	(21) 10	(2) 1	(2) 1		(14) 6.7
8	How frequently should the COVID-19 detection test be prescribed?	(27) 12.9	**(172) 81.9**	(2) 1	(2) 1		(7) 3.3

RESULTS

A total of 210 healthcare workers, 130 (61.9%) males and 80 (38.1%) females, participated in study (table-I). Highest number of participants were from Punjab 127 (60%), followed by Federal Territory 32 (15%) (see figure). Amongst healthcare workers, 120 (57%) doctors and 76 (36%) dentists participated in our survey (table-I). On the basis of years of experience, our participants were classified into the following: [1] 1-5 years 135 (64.3%) [2] 5-10 years 20 (9.5%) [3] 10-20 years 13 (6.2%) [4] 20-30 years 20 (9.5%) [5] >30 years 22 (10.5%).

When asked about the WHO handwashing protocol, 196 (93.3%) responders stated that they knew the protocol. Table-II displays the questions that were asked in our survey to evaluate the awareness of precautionary measures against COVID-19 among healthcare workers and also indicates the correct answers in bold. Table-II also shows the frequency and percentages of individuals who chose each option. The majority of the participants were able to correctly answer most of the questions. However, only 39 (18.6%) participants chose the correct sequence of donning of Personal Protective Equipment (PPE) according to the Centers for Disease Control and Prevention (CDC) guidelines, 86 (41%) individuals correctly stated that scrubs should be the dress code while consulting/treating a COVID-19 patient while only 62 (29.2%) stated that scrubs should also be the dress code of choice while consulting/treating a non-COVID patient (table-II).

Table-III cross-tabulates the frequency and percentages of correct answers with the different sectors of healthcare workers. Cross-tabulation was done between different sectors of healthcare workers and the questions that were asked. Chi-

Table-III: Distribution of correct answers according to profession.

Questions	Correct Answers (n) %								*p*-value
	Dentist	Doctor	Nurse	Medical Student	Dental Student	Medical Assistant	Dental Assistant	Pharmacist	
What is the recommended duration of use of hand-sanitizers and hand soaps respectively after every patient?	(43) 56.6	(69) 57.5	(1) 100	(2) 40	(1) 50	(1) 25	-	(1) 100	0.001
What is the correct sequence of DONNING of Personal Protective Equipment (PPE)?	(10) 13.2	(23) 19.2	-	(2) 40	(1) 50	(3) 75	-	-	0.022
What is the correct sequence of DOFFING of Personal Protective Equipment (PPE)?	(49) 64.5	(68) 56.7	-	(1) 20	(2) 100	(2) 50	(1) 100	(1) 100	0.114
According to you, what dress code is the most appropriate for a healthcare worker while consulting/treating a suspected/confirmed COVID-19 patient?	(23) 30.3	(60) 50	-	(3) 60	-	-	-	-	0.000
According to you, what dress code is the most appropriate for a healthcare worker while consulting/treating a healthy patient?	(30) 39.5	(31) 25.8	-	(1) 20	-	-	-	-	0.000
How frequently should a dental surgery/ clinic be disinfected?	(57) 75	(21) 17.5	-	-	(1) 50	-	-	-	0.000
According to you, which of the following is the best diagnostic test for COVID-19?	(69) 90.8	(102) 85	-	-	-	-	-	-	0.000
How frequently should COVID-19 detection test be prescribed?	(45) 59.2	(120) 100	Not Asked	(5) 100	Not Asked	Not Asked	Not Asked	Not Asked	0.000

square test was applied and *p*-value <0.05 was observed for most of the questions.

Participants were also asked some multiple response questions as seen in table-IV. Among dentists, gloves (17.8%), protective gown (16.6%) and face masks (16.6%) were considered the most important gear that should be worn before consulting or treating any dental patients whereas among doctors, while treating non-COVID patients, gloves (31.6%) followed by surgical masks (23.6%) were considered most important. In the case of COVID-19 patients, however, everything, except for surgical masks, was considered a significant part of Personal Protective Equipment (PPE).

Table-IV: Distribution of required gear on the basis of professions.

Categories	Question	Gear Options (n) %						
		Protective Gown	Face Mask	Surgical Mask (single/Double)	N-95 mask	Protective goggles	Shoe Covers	Gloves (Single/Double)
Dentists	Which of the following gear is necessary for a dentist before any dental procedure?	(66) 16.6	(66) 16.6	(43) 10.8	(63) 15.8	(64) 16.1	(25) 6.3	(71) 17.8
Doctors	Which of the following gear is necessary for a doctor before any medical consultation/ procedure of a non-COVID patient?	(60) 17.7	(19) 5.6	(80) 23.6	(31) 9.1	(24) 7.1	(18) 5.3	(107) 31.6
	Which of the following gear is necessary for a doctor before any medical consultation/ procedure of a confirmed/suspected COVID-19 case?	(116) 17.3	(99) 14.8	(37) 5.5	(114) 17	(103) 15.4	(86) 12.9	(114) 17

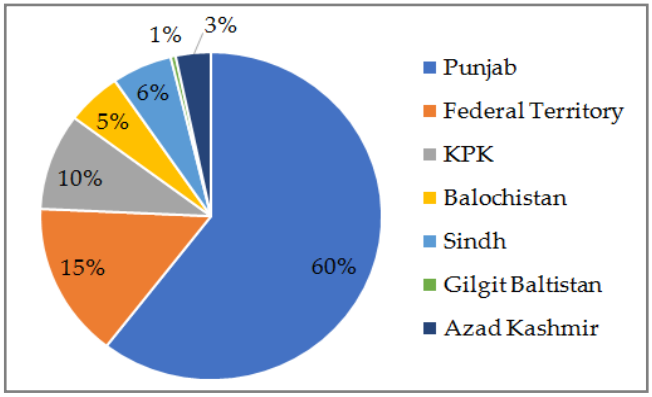

Figure: Distribution of Participants on the basis of provinces.

DISCUSSION

With each passing day, the number of COVID-19 cases is increasing at an alarming rate in Pakistan. This rapid rise in the number of cases can be attributed to several factors such as lack of preventive measures taken by government and public, lack of awareness with regards to COVID as well as lack of protective equipment. According to an estimate by the government of Pakistan, about 0.2 million people were affected till the middle of June, in the pandemic sparked by the novel SARS-CoV-2, that first emerged in Wuhan, China in December 2019[1]. Many healthcare workers in Pakistan have also contracted the disease and some have even lost their lives in the process. The biggest cause of the high mortality rate associated with COVID-19 is respiratory failure. Since there is no vaccine and only supportive therapy is available, the only way to combat this virus is by exercising strict precautionary and preventive measures.

According to the Centers for Disease Control and Prevention (CDC), hand hygiene before donning and after doffing of Personal Protective Equipment (PPE) is of utmost significance because it can help to remove any pathogens that might have transferred to the hands. For this purpose, alcohol-based hand rub (ABHR) with

more than 60% ethanol or 70% isopropanol is recommended for hands if they aren't visibly soiled for approximately 20 seconds[11]. Alternatively, hand washing with soap and water for 20-30 seconds is recommended[11]. Our survey reflected that majority healthcare workers claimed that they knew the proper WHO handwashing protocol while more than half of the responders (56.2%) knew the correct duration of washing with hand sanitizer and hand soap.

According to Wong *et al*, for any healthcare worker caring for a confirmed / suspected COVID-19 patient, the Personal Protective Equipment (PPE) must include properly fitted, NIOSH-certified N-95 respirators along with protective eye goggles or face shield, cap, gown and double gloves (with the change of outer gloves repeatedly)[12]. An important strategy to reduce the spread of COVID-19 is to educate healthcare personnel on proper technique for donning and doffing the Personal Protective Equipment (PPE) per the guidelines stated by Centers for Disease Control and Prevention (CDC)[13,14]. However, it is quite common to observe incorrect techniques among healthcare workers[14]. This lack of awareness with regards to proper usage of Personal Protective Equipment (PPE) amid COVID-19 has caused great damage to the healthcare system[14]. In a study conducted by John *et al*, he assessed the level of training of 222 healthcare workers in his institution, on the correct use of Personal Protective Equipment (PPE) and found that PPE training was sub-optimal[14]. Meanwhile, our survey highlighted that less than 20% of healthcare workers were able to correctly state the proper technique for donning Personal Protective Equipment (PPE) while around 60% of healthcare workers correctly identified the proper technique for doffing of Personal Protective Equipment (PPE). This calls for proper awareness programs for all healthcare workers in Pakistan with regards to proper usage of Personal Protective Equipment (PPE), to reduce the chances of contamination among our front liners in this fight against COVID-19.

Surface contamination with the virus has been linked to infection transmission. In particular, dentists are at high risk for contamination with aerosol-generating dental procedures, thus such procedures should be avoided at all costs. In cases of essential procedures, proper dress code should be observed, high evacuation suction and dental dams should be used[15] and after the procedure, disinfection should be done. Surface disinfection could be carried out with 0.1% sodium hypochlorite or 62%-71% ethanol for 1 minute[16]. Results of our survey showed that approximately 37% of responders agreed that clinic/surgery should be disinfected after every patient.

Globally, extensive testing on the general public has played a major role in eliminating/ reducing cases in several countries. Therefore, ideally, testing of all asymptomatic or mildly symptomatic individuals should be done, and especially in suspected cases, testing for COVID-19 should not be delayed by additional testing. However, in Pakistan, due to limited testing kits, it is not possible to carry out countrywide testing therefore only testing of suspected cases is recommended, which was supported by almost 80% responders in this survey. Additionally, PCR was considered the best diagnostic test for SAR-COV-2, but HRCT should be considered where testing kits are limited. In our survey, approximately 82% of individuals chose PCR as the best diagnostic test.

A major issue that has been observed globally is the shortage of medical supplies such as gloves, N-95 masks, gowns, etc. The coronavirus diseases 2019 has posed itself as an occupational health risk for healthcare workers such as in China and Italy, where many healthcare workers have been infected due to shortages of Personal Protective Equipment (PPE)[17]. In many developing countries, because of the lack of N-95 masks, many healthcare workers had to make use of substandard options, such as surgical masks, cloth masks, etc. The benefit of the mask has been more associated with its use[18]. The widespread use of facemask in community settings has also limited the supplies for health care workers thus

surgical facemask and N-95 mask is only compulsory for healthcare workers and symptomatic patients[19]. In Pakistan, due to the increasing number of cases, wearing face masks has been made compulsory in some cities, by the government. However, proper handling of facemask should be exercised to avoid the spreading of infection.

As COVID-19 has put a massive strain on the healthcare system worldwide, with an increasing number of cases, limited beds in hospitals, and no approved treatment modalities, the duties of HCWs have increased. This has led to burnout among healthcare professionals which have led to emotional, physical, and mental exhaustion[20]. The main causes of this are long working hours, increased risk of infection, fatigue, shortages of Personal Protective Equipment (PPE), and separation from family[21]. This calls for urgent steps to be taken to safeguard the mental health of our healthcare workers. This includes shorter working hours, rotating duties in areas of high risk, and breaks. Urgent strategies should be developed to prevent the spread of infection, and this requires pre-exposure and post-exposure prophylaxis and steps to formulate a treatment modality.Various antimalarial, antiviral drugs, and plasma therapy trials are being carried out in the country.

In a study conducted amongst Iranian medical students, high level of COVID-19 related knowledge and self-reported preventive behaviors were reported by Tagrir *et al*[22] while another research conducted amongst healthcare workers in Mumbai Metropolitan stated an adequate level of knowledge with 71.2% correct answers[23]. Another research carried out amongst healthcare workers in Pakistan stated that 93.2% healthcare workers had good knowledge with regards to COVID-19 in which 50.7% and 40.6% stated that limited infection control materials and poor knowledge regarding transmission were the main causes of poor infection control respectively[24]. A study conducted by Samea Khan *et al* further concluded that Pakistani healthcare workers were not adequately knowledgeable about COVID-19 and precautionary measures against it[25]. A similar survey carried out amongst healthcare workers in UAE also proposed poor knowledge levels and a significant gap in information regarding COVID-19.

Pakistan is now at a unique standpoint as it is currently in the top 10 of the most affected counties with COVID-19, according to WHO. Thus, essential steps must be undertaken to address the gap of knowledge amongst healthcare workers. This requires policy changes, staff training, highlighting strict guidelines, as well as strict implementation of these guidelines and rules. According to our knowledge, this study is the first in our country that essentially deals with awareness of precautionary measures against COVID-19 amongst healthcare workers and highlights our areas of strengths and weaknesses with respect to this pandemic. The findings of this study are essential to the government and health care sector to implement infection control practices for COVID-19 amongst the health care workers.

CONCLUSION

Health care workers from Pakistan showed adequate awareness regarding the necessary preventive measures of COVID-19. However, we identified a gap of information in some protocols that need to be emphasized more. It was concluded that additional training regarding the practice of preventive and precautionary measures is required to protect our healthcare workers and hence the population from contracting the virus.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

REFERENCES

1. Lau SKP, Luk HKH, Wong ACP, Li KSM, Zhu L, He Z, et al. Possible Bat Origin of Severe Acute Respiratory Syndrome Coronavirus 2. Emerg Infect Dis 2020; 26(7): 1-5.
2. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020; 395(10223): 497-506.
3. Adhikari SP, Meng S, Wu YJ, Mao YP, Ye RX, Wang QZ, et al. Epidemiology, causes, clinical manifestation and diagnosis, prevention and control of coronavirus disease (COVID-19)

during the early outbreak period: a scoping review. Infect Dis Poverty 2020; 9(1): 29-33.
4. Li F. Structure, Function, and Evolution of Coronavirus Spike Proteins. Annu Rev Virol 2016; 3(1): 237-61.
5. Yi Y, Lagniton PNP, Ye S, Li E, Xu RH. COVID-19: what has been learned and to be learned about the novel coronavirus disease. Int J Biol Sci 2020; 16(10): 1753-66.
6. Perlman S, Netland J. Coronaviruses post-SARS: update on replication and pathogenesis. Nat Rev Microbiol 2009; 7(6): 439-50.
7. Drosten C, Gunther S, Preiser W, van der Werf S. Identification of a novel coronavirus in patients with severe acute respiratory syndrome. N Engl J Med 2003; 348(20): 1967-76.
8. Velavan TP, Meyer CG. The COVID-19 epidemic. Trop Med Int Health 2020; 25(3): 278-80.
9. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early Transmission Dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. N Engl J Med 2020; 382(13): 1199-207.
10. Bhagavathula AS, Aldhaleei WA, Rahmani J, Mahabadi MA, Bandari DK. Knowledge and perceptions of COVID-19 among health care workers: cross-sectional study. JMIR Public Health Surveill 2020; 6(2): e19160.
11. Centre of disease control and prevention. Guidance for healthcare providers about hand hygiene and COVID-19 2020 [updated 2020 17 May; cited 2020 13 June]. Available from: https://www.cdc.gov/coronavirus/2019-ncov/hcp/hand-hygiene.html.
12. Wong J, Goh QY, Tan Z, Lie SA, Tay YC, Ng SY, et al. Preparing for a COVID-19 pandemic: a review of operating room outbreak response measures in a large tertiary hospital in Singapore. Can J Anaesth 2020; 67(6): 732-45.
13. Centres of Disease Control and Prevention. Using personal protective equipment (PPE) 2022. Available from: https:// www.cdc.gov/coronavirus/2019-ncov/hcp/using-ppe.html.
14. John A, Tomas ME, Cadnum JL, Mana TS, Jencson A, Shaikh A, et al. Are health care personnel trained in correct use of personal protective equipment? Am J Infect Control 2016; 44(7): 840-42.
15. Centres of disease control and prevention. interim infection prevention and control guidance for dental settings during the COVID-19 response 2020. Available from: https:// www.cdc.gov/coronavirus/2019-ncov/hcp/dental-settings. html.
16. Fiorillo L, Cervino G, Matarese M, D'Amico C, Surace G, Paduano V, et al. COVID-19 Surface Persistence: A Recent Data Summary and Its Importance for Medical and Dental Settings. Int J Environ Res Public Health 2020; 17(9): 3132-36.
17. Ranney ML, Griffeth V, Jha AK. Critical Supply Shortages - The Need for Ventilators and Personal Protective Equipment during the COVID-19 Pandemic. N Engl J Med 2020; 382(18): e41-47.
18. Abd-Elsayed A, Karri J. Utility of Substandard Face Mask Options for Health Care Workers During the COVID-19 Pandemic. Anesth Analg 2020; 131(1): 4-6.
19. Feng S, Shen C, Xia N, Song W, Fan M, Cowling BJ. Rational use of face masks in the COVID-19 pandemic. Lancet Respir Med 2020; 8(5): 434-36.
20. Langade D, Modi PD, Sidhwa YF, Hishikar NA, Gharpure AS. Burnout syndrome among medical practi-tioners across india: a questionnaire-based survey. Cureus 2016; 8(9): e771.
21. Rajkumar RP. COVID-19 and mental health: A review of the existing literature. Asian J Psychiatr 2020; 52(1): 102066.
22. Taghrir MH. COVID-19 and Iranian Medical Students; a survey on their related-knowledge, preventive behaviors and risk perception. Arch Iran Med 2020; 23(4): 249-54.
23. Modi PD, Nair G, Uppe A, Modi J, Tuppekar B, Gharpure AS, et al. COVID-19 awareness among healthcare students and professionals in mumbai metropolitan region: A Questionnaire-Based Survey. Cureus 2020; 12(4): e7514.
24. Saqlain M, Munir MM, Rehman SU, Gulzar A, Naz S, Ahmed Z. Knowledge, attitude, practice and perceived barriers among healthcare professionals regarding COVID-19: A cross-sectional survey from Pakistan. J Hosp Infect 2020; 105(3): 419-23.
25. Khan S, Khan M, Maqsood K, Hussain T, Noor H, Zeeshan M. Is Pakistan prepared for the COVID-19 epidemic? A questionnaire-based survey. J Med Virol 2020; 92(7): 824-32.