

Assessment of the Awareness, Perception, Attitudes, and Preparedness of Health-care Professionals Potentially Exposed to COVID-19 in the United Arab Emirates

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Background: Since COVID-19 surfaced in December 2019, health-care organizations across the globe have struggled to maintain the safety and well-being of health-care professionals (HCPs).

Purpose: This study investigates the HCPs' general understanding of the health risks of COVID-19 and to what extent they are equipped with the knowledge to protect themselves and others against this contagion.

Methods: This cross-sectional study used a web-based structured questionnaire posted on the UAE government electronic survey portal. A collection of 941 HCPs from diverse general and specialty hospitals in the UAE responded to an electronic participation invite.

Results: Our analysis showed that the majority of HCPs (97.6%) had updated information about COVID-19 modes of transmission, risks of contamination, high-risk groups, and the potential consequences of testing positive. Furthermore, the results of the chi-squared testing revealed that the HCPs' confidence and vigilance of the COVID-19 threats were significantly increased ($p < 0.01$) by being experienced, having had infection control training, or/and having undergone COVID-19 education.

Conclusion: We conclude that HCPs have an evidence-based understanding of the ways their own health is at risk while they are performing their duties in hospital setups. Further, the study found that HCPs who undergo special infection control training and who are kept posted on the official updates on COVID-19 are more likely to remain vigilant at all times to minimize the risks to themselves and their patients. Although the generalizability of the study findings should be considered with caution, the results could be generalizable to health-care professionals who received similar COVID-19 related training in the UAE or other regional countries.

Keywords: vigilance, pandemic, attitude, COVID-19, infection control, health-care professionals

Introduction

At the end of December 2019, COVID-19 appeared and threatened the health and lives of millions of people around the world. According to ongoing updates of the World Health Organization (WHO), COVID-19 has exceeded 23 million cases worldwide with more than 800,420 lives lost (as of August 23, 2020 WHO Coronavirus Disease (COVID-19) Dashboard).¹ The WHO announcement of the

pandemic status of COVID-19 instilled fear into populations throughout the world and horrified the global medical community only two-and-a-half months after the outbreak of the disease.²

COVID-19 is reported to be highly contagious with the possibility of causing severe respiratory disease, which progresses to severe fatal multisystem failures.³ The impact of COVID-19 extends to the multiple sectors of governments and public health systems. Accordingly, a public health emergency was declared at the national and international levels calling for the enacting of extraordinary measures to prevent the contagion and limit the outbreak.³

After applying appropriate measures, the United Arab Emirates (UAE) successfully dealt with and controlled the spread of COVID-19. According to the Ministry of Health and Prevention (MOHAP) (2020) as of August 23, 2020, COVID-19 infections reached 67,007 confirmed cases with 58,488 cases recovered and 375 deaths.⁴

To stave off the pandemic, UAE public health authorities took action to protect the safety and well-being of citizens, residents, and visitors. Strict guidelines were imposed to control the spread of the disease as healthcare workers in hospitals prepared to deal with confirmed cases of COVID-19 patients in isolation units distributed in the specified hospitals across the country.^{5,6}

As the pandemic continued, the effects of COVID-19 were felt on the health, well-being, and economic stability of individuals, families, communities, and countries worldwide.⁷ The risk of the pandemic problem lies in the unavailability of treatment, rapid outbreak, and the high possibility of human-to-human transmission. Therefore, prevention is still the best way to combat the disease.⁸ Thus, the WHO and Center for Disease Control and Prevention (CDC) announced recommendations to contain the infection including increasing public awareness, frequent washing of hands, using personal protective equipment, and admitting patients to quarantine in hospitals.^{9,10}

Health-care professionals (HCPs), as the frontline caregivers dealing with infected patients, play a crucial role in limiting the outbreak of the disease by implementing safety and prevention practices. Otherwise they aggravate the problem, for example, it was reported that 0.3–20.9% of the Middle East Respiratory Syndrome-Coronavirus (MERS-CoV) could arise among HCPs who have contact with infected patients.¹¹ Another study reported that factors contributing to increasing numbers of cases of MERS and coronavirus included

insufficient knowledge among HCPs of the diseases and lack of infection prevention and control measures in hospitals.¹² This emphasizes that HCPs are at risk of being infected and spreading the disease, so they must adhere to the infection prevention and control guidelines. Studies revealed that HCPs' knowledge and attitudes affected their adherence to the required safety measures.^{13,14}

Questions arose exploring how well, or to what extent do HCPs who are assigned to take care of confirmed COVID-19 cases in hospitals are fully prepared with the knowledge, skills, attitudes, and self-preparedness. The international health-care system seemed to be caught off guard by COVID-19 without satisfactory preparations in any region of the world, including China, the first country to declare the high incidence and high mortality rate of COVID-19. Thus, a nursing research team from the Higher Colleges of Technology (HCT) with health-care experts from the MOHAP headquarters decided to conduct a hospital-based, national, multicenter study to assess the preparedness and responsiveness of hospital HCPs to care properly for COVID-19 patients. This study measures the awareness of hospital HCPs about the crisis and how they respond to limit and prevent further transmission. We believe that the information provided in this study will provide evidence to guide policy makers and health administrators on how best to guide clinical practice in the context of COVID-19 given its continuous existence; hence, to increase the awareness and preparedness of HCPs against COVID-19 at local, regional, and global levels.³

Study Purpose

This study investigates the HCPs' general understanding the health risks of COVID-19 and to what extent they are equipped with the knowledge to protect themselves and others against COVID-19.

Research Objectives

- (A) To assess the level of awareness, risk perception, and attitude of HCPs about COVID-19.
- (B) To assess the extent of organizational measures taken to educate HCPs about COVID-19 threats.
- (C) To identify the relationship between the organizational measures taken to educate HCPs and the awareness and perceptions of HCPs and ultimately, their compliance to COVID-19 safety measures.

Methodology

Study Design

A cross-sectional design was utilized in this study. All MOHAP hospitals took part in the study via electronic survey. Participants responded to an electronic questionnaire posted on the UAE government electronic survey platform. This platform gives access to all HCPs registered in UAE governmental hospitals and ensures an equal chance for participation among all registered HCPs.

Sample

Participants were included in the study if they were HCPs 20 years of age or older, currently working at a MOHAP hospital, and able to read and write English. Hospital HCPs included registered nurses, physicians, pharmacists, respiratory therapists, laboratory technicians, and radiologists who worked in the Emergency Department Intensive Care Unit, Outpatient Department, Infectious Disease Clinic, Respiratory Disease Clinic, or any department designed to treat COVID-19 patients. HCPs who were on leave on the day of the survey were excluded. In this study, the authors ensure they have included participants from MOHAP affiliated hospitals who reside in almost all emirates in the country to maximize the generalizability of the results and allow for cross comparisons with other contexts.

Sample Size Calculation

The survey included 42 items in the questionnaire and the rule of thumb of having 10 subjects per each item, then a minimum of 400 participants would be needed to fulfill the study aims. Currently, the total number of HCPs in MOHAP hospitals is 8684. Indeed, the inclusion of responses from 941 HCPs exceeded the target considered satisfactorily proportionate to the total number of HCPs and help making the study results generalizable across the participating hospitals in the UAE to promote further studies of comparisons.

Study Questionnaire

The study tool comprised of a web-based questionnaire which was previously validated by Khader et al in another context and reported with modest evidence of reliable and valid results.¹⁵ Further, the study tool has gone through another review by health-care experts in MOHAP for feasibility and use in this study context.¹⁵ The survey was developed based on questions gleaned from

a systematic review of literature and the international guidelines.^{16–18}

The questionnaire was designed in English and consisted of a questions relating to sociodemographic characteristics, the knowledge of nurses, and their attitudes and perceptions toward COVID-19 and infection control in MOHAP settings. The survey was a structured multiple-choice questionnaire divided into sections: demographic and profession-related characteristics; awareness of incubation period, the symptoms of the disease, the mode of transmission of COVID-19, and infection control measures for preventing COVID-19, HCPs attitude toward treating patients with COVID-19, and finally a section about preparedness of hospital HCPs about their confidence in providing care to confirmed cases with COVID-19.

Data Collection Procedure and Ethical Approvals

Upon approval from the Ethical Committee at MOHAP (approval reference no: MOHAP/DXB-REC/AAM/No.42/2020) and the Emirates Institutional Review Board for COVID-19 Research Committee (ref: DOH/CVDC/2020/1419), the electronic questionnaire was sent to MOHAP employees by the MOHAP study co-investigator who arranged with the concerned departments and obtained the necessary ethical approvals from MOHAP departments.

Data collection completed by MOHAP co-investigators under their guidance and following-up with different departments and groups. An online questionnaire using UAE government electronic survey platform that limits one-time participation per unique IP address. The survey questionnaire was anonymous, and participant identification numbers were used rather than any personal identifiers.

All the respondents of the survey completed a written informed consent embedded on the first page of the online questionnaire. If the participant answered “YES” to the first question of the form, he/she was automatically forwarded to the study questions page. Participation was completely voluntary and participants had the right to leave specific questions unanswered or withdraw from the survey any time if they felt uncomfortable answering any question. The collected electronic data remained confidential, and only authorized team members had access to it. In addition, data were completely encrypted and coded for use, mainly in statistical analysis using computer software.

Data Analysis

Descriptive statistics performed, frequencies, percentages and chi-squared testing provided for the various items enclosed in the survey. The data on categorical variables are shown as n (% of respondents) and the data on continuous variables is presented as mean and SD. The correlation and statistical comparison of the study variables was tested using Pearson's chi-squared test. In the entire study, *p*-values less than 0.05 were considered to be statistically significant. The entire data was statistically analyzed using Statistical Package for Social Sciences (SPSS v 22.0, IBM Corporation, Armonk, NY, USA) for MS Windows.

Results

Participants' Demographics

A total of 941 healthcare providers participated in the current study. The data presented in Table 1 shows that the majority of participants were female 754 (80.1%). Their age ranged from <30 years old to ≥50 years old with almost 50% of the respondents in the age bracket 31–39 years old. More than 50% (n=551) of the participants have more than 10 years of experience. Almost half of the respondents (n=525) were working at Sharjah. Four hundred and seventy-two (50.2%) of the staff participants completed a study/residency program while the majority of the respondents (80.9%) have infection control training. A total of 785 (83.4%) received training pertaining to COVID-19, 402 (42.7%) received rapid response team training RRT, and 489 (49.8%) participated in response to disease outbreak.

Participants' Knowledge About COVID-19

Table 2 reflects the information obtained from respondents regarding their knowledge about COVID-19. When we asked about the symptoms of COVID-19, the majority of the respondents correctly reported fever (99%), cough (98.5%), sore throat (93.7%) and shortness of breath (96.8%). Red eyes and rash was reported by few respondents 34.2% and 29.1%, respectively. Of the health-care providers who participated in the current study 852 (90.5%) reported that patients with COVID-19 infection may be present without symptoms. When the participants were asked about the mode of transmission of COVID-19, the majority of them reported correctly.

According to COVID-19 testings, 922 (97.9%) of participants correctly reported that real-time-polymerase chain reaction (RT-PCR) with respiratory material (nasopharyngeal or oropharyngeal swab/sputum/endotracheal

Table 1 Participants' Demographics (n=941)

Variables	n (%)
Gender	
Male	187 (19.9)
Female	754 (80.1)
Age	
<30 years old	105 (11.2)
31–39 years old	420 (44.6)
40–49 years old	281 (29.9)
≥50 years old	135 (14.3)
Years of practice	
<5 years	145 (15.4)
6–10 years	245 (26)
>10 years	551 (58.6)
Region of practice	
Abu Dhabi	3 (0.3)
Ajman	4 (0.4)
Dubai	117 (12.4)
Fujairah	151 (16)
Ras Al-Khaimah	114 (12.1)
Sharjah	525 (55.8)
Umm al-Quwain	27 (2.9)
Working department	
Emergency room	113 (12)
Intensive care unit	156 (16.6)
Ward	168 (17.9)
Infectious disease clinic	54 (5.7)
Respiratory disease clinic	7 (0.7)
Others	443 (47.1)
Completed a postgraduate study/residency program	
Yes	472 (50.2)
No	469 (49.8)
Training in infection control	
Yes	761 (80.9)
No	180 (19.1)
Training regarding COVID-19	
Yes	785 (83.4)
No	156 (16.6)
Received Rapid Response Team training (RRT)	
Yes	402 (42.7)
No	539 (57.3)
Participated in response to disease outbreaks	
Yes	469 (49.8)
No	472 (50.2)

aspirate or bronchoalveolar lavage) test should be performed to diagnose COVID-19. When health-care providers were asked about aspects that should be considered to

Table 2 Participants' Knowledge About COVID-19 (n=941)

Question	n (%)
Which of the following are symptoms of the COVID-19 infection?	
• Fever	934 (99.2)
• Cough	927 (98.5)
• Runny nose	656 (69.7)
• Sore throat	882 (93.7)
• Shortness of breath	911 (96.8)
• Joint/muscle pain	670 (71.2)
• Red eyes	322 (34.2)
• Rash	274 (29.1)
• Diarrhea	799 (84.9)
• May present with no symptoms	852 (90.5)
How can COVID-19 be transmitted?	
• Via coughing and sneezing	931 (98.9)
• Hand shaking	891 (94.6)
• Touching surfaces as doorknobs and tables	886 (94.1)
Which of the following tests should be performed for the diagnosis of COVID-19 infection?	
• Real-time-polymerase chain reaction (RT-PCR) with respiratory material (nasopharyngeal or oropharyngeal swab/sputum/endotracheal aspirate or bronchoalveolar lavage)	922 (97.9)
• Real-time PCR with serum sample	446 (47.3)
• Chest X-ray	547 (58.1)
Which of the following should be considered at high risk of having COVID-19?	
• The presence of symptoms of diarrhea	304 (32.3)
• The presence of symptoms of a respiratory infection	834 (88.6)
• History of travel to areas experiencing transmission of COVID-19	821 (87.2)
• History of contact with possible infected patients	48 (5.1)
Which of the following measures should be taken to prevent transmission from suspected COVID-19 patients?	
• Clean hands frequently by using alcohol-based hand rub or soap and water	932 (99)
• Eat boiled and cooked food	494 (52.4)
• Put face mask on known or suspected patients	905 (96.1)
• Place known or suspected patients in adequately ventilated single rooms	759 (80.6)
• Wear proper personal protective equipment (PPE) for all health-care providers	910 (96.7)
• Avoid moving and transporting patients out of their area unless necessary	840 (89.2)
• Clean and disinfect surfaces in contact with known or suspected patients routinely	907 (96.3)

(Continued)

Table 2 (Continued).

Question	n (%)
High-risk groups include:	
• Healthcare providers	716 (76.1)
• Elderly	917 (97.4)
• Male gender	200 (21.2)
• Children	588 (62.4)
• People with immune system deficiency	922 (97.9)
• Travelers	630 (66.9)
• People with chronic diseases	913 (97)
There is a vaccine available for COVID-19	
• Yes	14 (1.5)
• No	927 (98.5)
Antibiotics are useful for the treatment of COVID-19	
• Yes	319 (33.9)
• No	622 (66.1)
In case of contact with suspected COVID-19 patients, do you know how to use personal protective equipment (PPE)?	
• Yes	910 (96.7)
• No	31 (3.3)
In case of contact with confirmed COVID-19 patients, do you know how to perform isolation procedures on the patients to minimize chances for exposure?	
• Yes	851 (90.4)
• No	90 (9.6)

identify patients at risk of having COVID-19, 834 (88.6%) mentioned the presence of symptoms of a respiratory infection, 821 (87.2%) mentioned history of travel to areas experiencing transmission of COVID-19, while 304 (32.3%) and 48 (5.1%) mentioned presence of symptoms with diarrhea and history of contact with possible infected patients, respectively, as risk factors of having COVID-19. In addition, the majority of the respondents correctly reported the measures that should be implemented to prevent the transmission of COVID-19.

When asked about the high-risk groups, respondents reported that the elderly, people with immune system deficiency, and people with chronic diseases are the most vulnerable with 917 (97.4%), 922 (97.9%), and 913 (97%), respectively. The majority of respondents 927 (98.5%) reported that up to now there is no vaccine available for COVID-19, while two thirds of the respondents 622 (66.1%) reported that antibiotics are not useful in

treating COVID-19. The vast majority of respondents 910 (96.7%) reported that they know how to use personal protective equipment PPE while dealing with COVID-19 patients. Eight hundred and fifty-one (90.4%) reported that they are familiar with the isolation procedures for COVID-19 patients.

When we asked respondents “to what extent do you have confidence in handling suspected COVID-19 patients,” 402 (42.7%) reported “to a considerable extent” and 319 (33.9%) “to some extent”. Nine hundred and fourteen (97.1%) health-care providers who participated in the current study reported that PPE are useful in protecting themselves from a patient suspected to have COVID-19 patients, while 88.3 (93.8%) reported “very important” that they need to change both masks and gloves regularly in order to decrease the possibility of transmitting infections to themselves and to patients.

Participants' Source of Information About COVID-19

Table 3 shows the information obtained from respondents regarding source of information about COVID-19. Nearly all participants (n=901, 95.7%) reported they were updated with relevant information about COVID-19. Regarding the source of information pertaining to COVID-19, respondents reported that governmental organizations, such as MOHAP, were the main source (n=919, 97.6%) while media and academic training courses were the second and third sources with 634 (67.3%) and 604 (64.1%), respectively.

Participants' Risk Perception and Attitude Toward COVID-19

The data presented in Table 4 shows that the majority of HCPs perceived COVID-19 as very dangerous (n=60, 64.2%) while 323 (34.3%) reported it as moderately dangerous. When asked about how they perceived COVID-19, participants compared to SARS and MERS, almost two thirds reported both diseases are more dangerous 637 (67.4%) and 634 (67.4%) respectively, while 154 (16.4%) and 158 (16.8%) perceived it as less dangerous.

Almost 837 (88.9%) HCPs believed that COVID-19 is a serious health problem. More than half of the respondents (n=549, 58.3%) reported that COVID-19 symptoms were not resolved with time and did not require any special treatment while 392 (41.7%) reported that COVID-19 symptoms were resolved with time and did not require any special treatment. The majority (n=929,

Table 3 Participants' Source of Information About COVID-19 (n=941)

Question	n (%)
Are you up to date on the latest information of case definitions for COVID-19?	
• Yes	901 (95.7)
• No	40 (4.3)
What are your sources of information about the COVID-19?	
• Media (newspaper, television, radio, etc)	634 (67.3)
• Social network (Facebook, Twitter, blog, etc)	434 (46.1)
• Family members and friends	229 (24.3)
• Medical doctors or routinely visited physicians	388 (41.2)
• Academic training courses	604 (64.1)
• Colleagues	354 (37.6)
• Government organization such as Ministry of Health and Prevention	919 (97.6)
To what extent do you have confidence in handling suspected COVID-19 patients?	
• Not at all	49 (5.3)
• To a little extent	68 (7.2)
• To some extent	103 (10.9)
• To a considerable extent	319 (33.9)
• To a great extent	402 (42.7)
Personal protective equipment such as face shields, goggles, masks, and gloves are useful in protecting myself from a patient suspected to have COVID-19 patients.	
• Yes	914 (97.1)
• No	27 (2.9)
How important is changing both masks and gloves in decreasing the possibility of transmitting infections to myself and to patients?	
• Very important	883 (93.8)
• Important	52 (5.5)
• Little important	3 (0.3)
• Not important	3 (0.3)

98.7%) reported that it was important to educate people about COVID-19 to prevent the spread of the disease.

Regarding HCPs precautionary action in dealing with COVID-19 patients, nearly two thirds of respondents (n=650, 69.1%) were willing to work with COVID-19 patients, while 291 (30.9%) preferred to avoid working with a patient who is suspected of having COVID-19. In the case of COVID-19 patients sneezing or coughing, respondents reported different attitudes. For instance, 739 (78.5%) mentioned that they would refer the patient to the attending physician and report symptoms, 473 (50%)

Table 4 Participants' Risk Perception and Attitude Toward COVID-19 (n=941)

Question	n (%)
How do you perceive COVID-19?	
• Very dangerous	604 (64.2)
• Moderately dangerous	323 (34.3)
• Not dangerous	14 (1.5)
How do you perceive COVID-19 compared to SARS?	
• Less dangerous	154 (16.4)
• More dangerous	637 (67.7)
• The same	150 (15.9)
How do you perceive COVID-19 compared to MERS?	
• Less dangerous	158 (16.8)
• More dangerous	634 (67.4)
• The same	149 (15.8)
I believe COVID-19 is not currently a serious public health issue.	
• Yes	104 (11.1)
• No	837 (88.9)
COVID-19 symptoms often resolve with time and do not require any special treatment.	
• Yes	392 (41.7)
• No	549 (58.3)
Educating people about COVID-19 is important to prevent the spread of the disease	
• Yes	929 (98.7)
• No	12 (1.3)
I prefer to avoid working with a patient who is a suspect of COVID-19	
• Yes	291 (30.9)
• No	650 (69.1)
In case a patient was sneezing or coughing, what would you do?	
• Refuse treating the patient and ask him/her to leave the clinic	8 (0.8)
• Treat the patient and ask him/her to go to the hospital	473 (50.2)
• Refer the patient to the hospital without treating him/her	93 (9.8)
• Refer the patient to the attending physician and report symptoms	739 (78.5)
I believe that asking patients to sit from a distance, wear mask while in the waiting room, and wash hands are:	
• Necessary to help decreasing disease transmission	938 (99.7)
• Not necessary and could cause panic	12 (1.3)

(Continued)

Table 4 (Continued).

Question	n (%)
Would you allow a healthcare staff to work with patients if they have flu-like symptoms?	
• Yes	225 (23.9)
• No	716 (76.1)
The role of healthcare staff in teaching others about COVID-19 is:	
• Very significant	896 (95.2)
• Moderately significant	41 (4.4)
• Mildly significant	2 (0.2)
• Not significant at all	2 (0.2)

mentioned that they treat the patient and ask him/her to go to the hospital, while 93 (9.8%) refuse to treat the patient and refer him/her to the hospital.

A total of 939 (99.7%) of HCPs believed that it was obligatory to ask patients to sit far from each other, wear masks in the waiting room, and wash hands to decrease disease transmission, while 12 (1.3%) believed that this was not necessary and could cause panic. In addition, a total of 716 (76.1%) reported that they would not allow any of their HCPs to work with patients if they have flu-like symptoms. As a part of their educational role and disseminated knowledge, 896 (95.2%) of respondents reported that their crucial role in teaching others about COVID-19 was very significant while 41 (4.4%) reported it is moderately significant.

Participants' Preparedness for COVID-19

Table 5 describes the participants' preparedness to the COVID-19 outbreak, where the majority (n=827, 87.9%) of participants reported that they considered themselves prepared for the COVID-19 outbreak. On the same note, almost all of the participants (n=898, 95.4%) reported that they considered the UAE prepared for the COVID-19 outbreak. As to the participants' satisfaction with the UAE preparedness to the COVID-19 outbreak, almost two thirds of the participants (n=732, 77.8%) have reported satisfaction with the UAE's preparedness to deal with the COVID-19 outbreak, while almost a quarter (n=153, 16.2%) of participants have reported their dissatisfaction with the UAE's preparedness in dealing with the COVID-19 outbreak. The majority of participants (n=877, 93.2%) reported that they knew who to contact in case of an unprotected exposure to suspected COVID-19 patient

Table 5 Participants' Preparedness to COVID-19 (n=941)

Question	n (%)
Do you consider yourself prepared for the COVID-19 outbreak? <ul style="list-style-type: none"> • Yes • No 	827 (87.9) 114 (12.1)
Do you consider United Arab Emirates prepared for the management of the COVID-19 outbreak? <ul style="list-style-type: none"> • Yes • No 	898 (95.4) 43 (4.6)
Please rate how satisfied you are with the preparedness of United Arab Emirates to deal with COVID-19 outbreak: <ul style="list-style-type: none"> • Very unsatisfied • Unsatisfied • Neutral • Satisfied • Very satisfied 	133 (14.1) 20 (2.1) 56 (6) 391 (41.6) 341 (36.2)
Do you know whom to contact in case there has been an unprotected exposure to a suspected COVID-19 patient? <ul style="list-style-type: none"> • Yes • No 	877 (93.2) 64 (6.8)
Do you know what to do if you have signs and/or symptoms of COVID-19 infection? <ul style="list-style-type: none"> • Yes • No 	914 (97.1) 27 (2.9)

and what to do if they had signs and/or symptoms of COVID-19 infection (n=914, 97.1%).

Table 6 shows the differences in frequency of participants' preparedness based on their demographics. A chi-squared test of independence was performed to examine the relation between aging and participants' preparedness for the COVID-19 outbreak. The relation between the two variables was statistically significant, χ^2 (3, n=941)=10.6, $p=0.01$). Participants aged between 31 and 49 were more likely to consider themselves prepared for COVID-19 outbreak than younger or older participants. There was also a significant relation between the same age populations of between 31 and 49 and participants' consideration of the UAE's readiness to manage the COVID-19 outbreak and their satisfaction with the UAE's preparedness to the COVID-19 outbreak. The relation between the variables was significant, χ^2 (3, n=941)=8.3, $p=0.04$ and χ^2 (12, n=941)=34.1, $p=0.001$) respectively.

The participants who reported their satisfaction with the UAE's preparedness to deal with COVID-19 outbreak

did differ by gender, where females were more likely to be satisfied with the UAE's preparedness to deal with the COVID-19 outbreak, χ^2 (4, n=941)=13.1, $p=0.011$). It was also found that the participants' years of experience had a significant relation with participants preparedness for the COVID-19 outbreak, where the higher the experience the more prepared they were for COVID-19 outbreak, χ^2 (2, n=941)=6.3, $p=0.04$.

The relation between participants' training in an infection control unit and training about COVID-19 was also examined, with participants preparedness for the COVID-19 outbreak and was found significant where participants who completed infection control training and COVID-19 training were more prepared for the COVID-19 outbreak, χ^2 (1, n=941)=40.9, $p<0.001$, and χ^2 (1, n=941)=14.3, $p<0.001$, respectively. It was also found that participants who had the COVID-19 training considered the UAE more prepared to manage the COVID-19 outbreak than participants who did not perform the COVID-19 training and were able to recognize the correct contact in case there was an unprotected exposure to a suspected COVID-19 patient, χ^2 (1, n=941)=0.9, $p=0.001$ and χ^2 (1, n=941)=6.6, $p=0.01$).

Discussion

COVID-19 is still a life-threatening infection spread worldwide and continues to be an international concern. A total of 23,025,622 infected cases and 800,420 deaths were reported globally as of August 23, 2020. In the UAE, a total number of 67,007 infected cases, 58,488 recovered cases, and 375 deaths were reported (as of August 23, 2020).⁴ Therefore, there is still a need to assess and improve hospital HCPs awareness and preparedness against COVID-19 in the UAE. Due to the crucial role of hospital HCPs in controlling and preventing the spread of COVID-19 outbreak,^{8,15,19,20} this research provides an insight into the level of awareness, perception, attitude, and self-preparedness of hospital HCPs against COVID-19 during the outbreak in the UAE, 2020. In this section, the significance of the study findings will be discussed and compared with the most recent studies.

The study findings show that the majority of hospital HCPs had the right level of knowledge towards the COVID-19 outbreak; this includes the infection symptoms, the mode of transmission, the diagnosis procedure, and the risk factors. Such a result is in line with previous studies.^{8,15,20} Knowing the symptoms helps hospital HCPs to recognize the threat and take the necessary actions and

Table 6 Differences in Frequency of Participants' Preparedness Based on Their Demographics (n=941)

Question	Do You Consider Yourself Prepared for the COVID-19 Outbreak?			Do You Consider United Arab Emirates Prepared for the Management of the COVID-19 Outbreak?			How Satisfied You are with the Preparedness of UAE to Deal with COVID-19 Outbreak?				Do You Know Whom to Contact in Case There Has Been an Unprotected Exposure to a Suspected COVID-19 Patient?		
	Yes	No	P	Yes	No	P	Very Unsatisfied and Unsatisfied	Neutral	Satisfied and Very Satisfied	P	Yes	No	P
Gender			0.096			0.831				0.011*			0.678
Male	171	16		179	8		31	5	151		173	14	
Female	656	98		719	35		122	51	581		704	50	
Age			0.014*			0.04*				0.001*			0.616
<30 years old	83	22		95	10		16	13	76		95	10	
31–39 years old	371	49		400	20		70	28	322		392	28	
40–49 years old	248	33		271	10		44	10	227		262	19	
≥50 years old	125	10		132	3		23	5	107		128	7	
Years of practice			0.041*			0.133				0.491			0.062
<5 years	119	26		134	11		18	14	113		129	16	
6–10 years	222	23		237	8		44	11	190		233	12	
>10 years	486	65		527	24		91	31	429		515	36	
Region of practice			<0.001*			0.201				0.153			<0.001*
Abu Dhabi	1	2		2	1		2	0	1		1	2	
Ajman	4	0		4	0		2	0	2		4	0	
Dubai	100	17		112	5		22	7	88		110	7	
Fujairah	119	32		141	10		22	14	115		135	16	
Ras Al-Khaimah	104	10		110	4		22	2	90		111	3	
Sharjah	477	48		504	21		81	33	411		492	33	
Umm al-Quwain	22	5		25	2		2	0	25		24	3	
Completed a postgraduate study/residency program			0.173			0.284				0.013*			0.010*
Yes	408	64		447	25		90	30	352		430	42	
No	419	50		451	18		63	26	380		447	22	
Training in infection control			<0.001*			0.758				0.446			0.117
Yes	694	67		727	28		118	47	596		714	47	
No	133	47		171	15		35	9	136		163	17	
Training about COVID-19			<0.001*			0.001*				0.471			0.010*
Yes	704	81		757	28		124	45	616		739	46	
No	123	33		141	15		29	11	116		138	18	

(Continued)

Table 6 (Continued).

Question	Do You Consider Yourself Prepared for the COVID-19 Outbreak?			Do You Consider United Arab Emirates Prepared for the Management of the COVID-19 Outbreak?			How Satisfied You are with the Preparedness of UAE to Deal with COVID-19 Outbreak?				Do You Know Whom to Contact in Case There Has Been an Unprotected Exposure to a Suspected COVID-19 Patient?		
	Yes	No	P	Yes	No	P	Very Unsatisfied and Unsatisfied	Neutral	Satisfied and Very Satisfied	P	Yes	No	P
Received Rapid Response Team training (RRT)			<0.001*			0.044*				0.241			0.055
Yes	337	25		390	12		69	16	317		382	20	
No	450	89		508	31		84	40	415		495	44	
Participated in response to disease outbreaks			<0.001*			0.859				0.7			0.041*
Yes	439	30		447	22		73	27	369		445	24	
No	388	84		451	21		80	29	363		432	40	

Note: *P value is significant at ≤ 0.05 using chi-squared test.

is considered essential in management²¹ and controlling the spread of COVID-19.¹⁷ This contradicted Bhagavathula et al's study that was conducted in the first week of March 2020, when COVID-19 had just become a global pandemic, it included 529 health-care workers globally.¹⁹ However, in the current study, there was a lack of knowledge regarding some of the risk factors that may indicate potential positive COVID-19, such as having diarrhea and contact with possible infected patients. This highlights the need to include such possible risk factors for positive COVID-19 in future training.

The current approach to COVID-19 is to control the source of infection; use appropriate preventive measures, and provide early diagnosis and isolation.²² This fact was reflected by the response of participants about preventive measures, as nearly all hospital HCPs were aware of the appropriate use of PPE, isolation procedures, and hand washing. The intensive training could have a primary influence on such a high level of knowledge. These findings are similar to the results of previous studies.^{15,19,20}

The majority of the hospital HCPs in the current study were aware that patients with an immune system

deficiency (97.9%), elderly patients (97.4%), and patients with chronic diseases (97%) are at a higher risk of infection and mortality. This finding is in line with previous study findings in Vietnam.²⁰ This elevated awareness plays an essential role in providing better prophylactic measures to reduce the risk of infection among these vulnerable groups. Moreover, the majority of the hospital HCPs were confident in handling patients with COVID-19. This could be due to the thoughtful, quick response of intensive training that has been conducted by MOHAP for all hospital HCPs upon the COVID-19 outbreak. However, a considerable number of participants expressed low confidence in dealing with COVID-19-confirmed cases; this could highlight the need for boosting training that targets such a group of mainly health-care teams.

The hospital HCPs have updated information about COVID-19 from different sources such as MOHAP, media, and academic training courses as such government organization source is considered a valuable resource for updated information and training for all hospital HCPs during this current pandemic. Such findings were reported

by Huynh et al, with some difference regarding reporting social media. In this study the primary source of information followed by Ministry of Health in Vietnam (82.6%), this indicates the need to update Ministry of Health website information regularly to encourage health-care workers to access this channel for all health-related issues and information.²⁰ Similarly, in an Iranian study, credible websites, WhatsApp, and TV were the primary resources for COVID-19-related information.⁸ The nature of COVID-19 disease and its associated complications or impacts requires a trustworthy standardized source of information, especially among hospital HCPs who are in direct contact with confirmed cases of COVID-19.

The current study shows that hospital HCPs were aware that no vaccine or specific treatment for COVID-19 is currently available; the treatment aims to reduce the symptoms without any specific antiviral medication for COVID-19. This result is similar to the study of Huynh et al, in which participants were aware of COVID-19 vaccine unavailability, and an antibiotic is not the appropriate treatment of COVID-19 (58.4%) yet.²⁰ Similarly, this finding was reported in a Jordanian study.¹⁵

In summary, the findings of our study show that female hospital HCPs from the middle age group 31 to 39; significantly considered themselves well prepared for COVID-19, and their satisfaction was high with the UAE's preparedness for the COVID-19 outbreak. Also, hospital HCPs with more clinical experience were significantly more prepared for the COVID outbreak and willing to care for confirmed cases of COVID-19.

The participants who have completed infection control and COVID-19 training considered themselves better prepared for COVID-19. These results pointed to the importance of an advanced and continued training education program about infection control and more specifically related to COVID-19 outbreaks and best ways to manage infection and control it. This is required as the WHO announced in different contexts that COVID-19 outbreaks might continue for a longer time than expected with no definite end, unfortunately.

Strengths and Limitations

Study limitations include having the inclusion criteria for MOHAP hospitals only which represent the federal health-care system. Including different health-care settings at the multiple local government and the private sector would have made our study more comprehensive. Moreover, the results were not providing subgroup analyses, for hospital HCPs,

such information could be useful to detect differences among the study subgroups, which might feed the research recommendations.

Nonetheless, the current study provides evidence about the preparedness of UAE hospital HCPs and their willingness to care for confirmed cases of COVID-19 having the required infection control training programs. To promote hospital HCPs' satisfaction and enhance positive attitudes toward caring for confirmed cases of COVID-19, administrators and policy makers have to maximize the effort put into staff training about COVID-19 to make them fully prepared for any future outbreaks should they occur as winter is approaching.

Conclusion

We conclude that HCPs have evidence-based understanding of the ways their own health is at risk while they are performing their duties in hospital setups. The study yields appropriate evidence that HCPs who undergo special infection control training and who are kept posted on the official updates on COVID-19 are more likely to remain vigilant at all times to keep themselves and their patients safe during the pandemic. Since the study tool has been validated by the health-care experts review in the Ministry of Health and Prevention, the findings shall be generalizable to the global health-care industry as everyone is in the same situation.

HCPs at MOHAP hospitals in the UAE were aware of COVID-19 symptoms, mode of transmission, infection control, and measures in health-care settings. Protocols and clinical guidelines related to COVID-19 best practices have to be standardized and shared across different health care settings in the UAE. This research reflected that providing educational training programs on infection control practices for COVID-19 across all health care professions have resulted in high compliance with infection control guidelines. Indeed, extending these educational programs for all HCPs including nonclinical and administrative staff could be a good practice to create more awareness.

Moreover, including health-care students from different programs would assist in improving knowledge. Preparing our future HCPs will result in more adherence to the guidelines and improve patient care and safety. In conclusion, to improve adherence to infection control practices to fight COVID19 this requires clear communication, effective leadership and management practices.

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Disclosure

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