



Preparedness Assessment of Physicians during Coronavirus Disease-19 Pandemic: A Cross-sectional Study

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Abstract

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BACKGROUND: Since first confirmed case of coronavirus disease (COVID)-19 in December 2019 by Chinese health authorities and subsequent World Health Organization (WHO) declaration that COVID-19 is a global public health crisis, radical changes have occurred all over the world associating massive lockdown with increased numbers of infected cases and related mortalities. As health care workers (HCWs) are at a great risk to get COVID-19 infection and hence can be a dangerous source of spreading it to the community, it was important to assess HCWs knowledge, attitude, and practice toward COVID-19 infection prevention and control (IPC) to help limit the outcomes of COVID-19.

AIM: The objectives of the study were to assess the knowledge, attitudes, and practices of physicians regarding COVID-19 IPC.

METHODS: Research setting is “Kasr Al-Ainy” Faculty of Medicine, Cairo University Hospital. Design: A cross-sectional analytical observational hospital-based research in June 2020. Population: A convenient sample of 50 physicians working at Cairo University Hospital was included. Data collection: Self-administered questionnaires derived from the WHO IPC guide during health care when COVID-19 is suspected were used.

RESULTS: Mean age of studied group was 30.5 ± 3.97 , while their mean years of practice were 4.7 ± 3.55 . Mean knowledge score among physicians was $5.6 (\pm 0.56)$, two-thirds of them had sufficient knowledge regarding COVID-19 IPC as their mean attitude score among $24.9 (\pm 2.8)$. While mean practice scores $5.6 (\pm 1.05)$, yet only 68% of the participating physicians use a new set of personal protective equipment when care is given to a different patient.

CONCLUSION: Physician's moderate knowledge, poor attitude, and modest practice toward COVID-19 IPC were found to be not sufficient, not favorable nor safe enough to expected standards.

Introduction

The World Health Organization (WHO) announced on February 2020 that the disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is named coronavirus disease 2019 “COVID-19.” One month later, the WHO declared COVID-19 as a pandemic status worldwide and as a global public health threat [1].

Egypt scaled up preventive actions and procedures after the first COVID-19 case was diagnosed by mid-February 2020 with a partial lockdown applied on March 25 [2], [3]. By the first of June, a remarkable increase in the number of COVID-19 cases was recorded to reach 26,384 cases and by July 10, it exceeded 80,000 cases [4], [5]. Due to several reasons, it is presumed that there were a much high number of unreported COVID-19 cases [3].

The most common route for transmission of SARS-CoV-2 is from person to person in a close contact through respiratory secretions droplets, ranging from larger “respiratory droplets” to smaller “aerosols,” in

sneezes, coughs, speaking, singing, or even breathing heavily or by direct contact with virus-contaminated objects or surfaces [6].

Health care workers (HCWs) worldwide, as well as in Egypt, being the most subjected to these viral aerosol droplets in several work settings are most likely to catch the infection and to be significantly affected by the pandemic [7], [8]. Moreover, exposure to higher viral loads, mainly when dealing with severely ill patients, may negatively impact the severity of disease in HCWs [9]. Therefore, reporting a positive COVID-19 test, among frontline HCWs, was estimated to have a 3.4-fold higher risk than people living in the general community [10]. It has been recorded by June 2020 that nearly 600 frontline HCWs in the USA have died as a result of COVID-19 infection and the number is expected to rise [11]. The International Council of Nurses has collected data from 30 countries and has reported on May 2020 that around 90,000 HCWs have been infected with COVID-19 and hundreds of them have died during the pandemic. Almost 6% of all confirmed cases of COVID-19 were among HCWs [11]. On the other hand, it was found that a

decreased infection risk and a lower disease severity were reported among HCWs as a result of the strict use of proper personal protective equipment (PPE) [12]. While poor hand hygiene, longer working hours and coming in close contact with high-risk infected patients were identified as the main factors to be associated with COVID-19 infection among 72 HCWs working in a large hospital in Wuhan [13]. Moreover, it has been noted that crowding, contaminated environment, shortage of isolation facilities, and lack of sufficient knowledge and negative attitudes and poor infection prevention and control (IPC) practices among HCWs can all accelerate the spread of COVID-19 disease [14], [15], [16].

In addition, the HCWs during COVID-19 pandemic are working under continuous distress, due to the extreme situations they face such as scarcity of PPE, the need to follow strict precautions while dealing with all patients, and the fear of getting infected or infecting a family member or a relative, which all add huge psychological burdens on HCWs [17], [18], and therefore, they may experience a suboptimal health-related quality of life, less caring performances, and more practice errors which leads to worsen the condition [19], [20].

With reference to the foregoing facts, protecting HCWs against the increased exposure and the high risk of infection with SARS-CoV-2 have become a priority under the current circumstances, with associated regular health surveillance of the HCWs, periodic risk assessment measures, and obligatory use of proper PPE [21]. The WHO has its own recommendations for the application of primary preventive measures such as practicing social distancing, proper hand washing technique, and following respiratory hygiene/cough etiquette to contain respiratory secretions [22].

Since lack of awareness and training to apply IPC guidelines is one of the main factors involved in spreading the infection in health-care settings [23], this study aimed at investigating the knowledge, attitudes, and practices (KAP) of physicians regarding COVID-19 IPC measures at "Kasr Al-Ainy" Faculty of Medicine, Cairo University Hospital.

Methods

Study design

The present study is an observational analytic cross-sectional hospital-based study.

Study sampling and setting

A convenient sample of 50 physicians working at Faculty of Medicine, Cairo University Hospital.

Data collection technique

Data were collected using self-administered pre-designed questionnaire derived from the WHO IPC guide during health care when COVID-19 is suspected [22]. The questionnaire was pre-tested on a random sample of five physicians from Faculty of Medicine, Cairo University Hospitals, to ensure practicability and validity in questions and interpretation of responses.

Data analysis and management

For every correct response to knowledge and practice questions, one point was given and zero point for an incorrect answer. Consequently, knowledge score ranged from 0 to 6 scores and practice score ranged from 0 to 7 scores, while attitude questions were assessed using a 5-point Likert scale with responses including; strongly agree, agree, neutral, disagree, and strongly disagree. A score from 4 to 0 was given to each item respectively. Consequently, attitude score ranged from 0 to 32 scores.

The cutoff point used for knowledge score was set at the mean of 5.6 out of 6. Where physicians with knowledge score equal to and above 5.6 were considered as having satisfactory knowledge while those with a score less than 5.6 were considered as having unsatisfactory knowledge. For attitude score, it was set at the median of 24.9 out of 32 where physicians with attitude score equal to and above 24.9 were considered as having positive attitude while those with attitude score below 24.9 were considered as having negative attitude. For practice score, it was set at the mean of 5.6 out of 7 where physicians with practice score equal to and above 5.6 were considered as having a favorable practice and those with practice score below 5.6 were considered as having unfavorable practice.

Participants' overall KAP were categorized using modified Bloom's cutoff point, as good (i.e., satisfactory, positive, and favorable) if the score was between 80 and 100%, moderate if the score was between 50% and 79%, and poor (i.e., unsatisfactory, negative, and unfavorable) if the score <50% [24].

All collected questionnaires were revised for completeness and consistency. Pre-coded data were entered into Statistical Package for the Social Sciences software program, version 21 (SPSS-21) to be statistically analyzed.

Ethical considerations

Ethical approvals for the proposed study and data collection tools were fulfilled. Informed consents were obtained from the respondents to participate in the study. The objectives of the study were described and approval to conduct the research was acquired.

Moreover, the questionnaire forms were anonymous to allow free expression of opinions.

Results

A total of 50 working physicians responsible for providing care for COVID-19 infected patients, 25 males and 25 females, participated in the study. Their mean age years were 30.5 ± 3.97 , while their mean years of practice were 4.7 ± 3.55 .

Table 1 shows that the majority of the study respondents were knowledgeable about the facts that COVID-19 is transmitted by close contact with an infected person, both hand hygiene and respiratory hygiene/cough etiquette can help in preventing COVID-19 infection and that the strict use of proper PPE reduces the spread of COVID-19 virus among HCWs which are at a higher risk of infection. Only 40 participants knew that people who have contact with someone infected with the COVID-19 virus should be immediately isolated in a proper place and observed for 2 weeks period. The mean knowledge score among physicians was calculated to be $5.6 (\pm 0.56)$. Almost two-thirds of the study subjects had sufficient knowledge regarding COVID-19 IPC shown in (Figure 1).

Table 1: Knowledge of COVID-19 IPC among sample of physicians at Faculty of Medicine, Cairo University Hospitals, 2020

Knowledge questions	Number	%
COVID-19 is transmitted by close contact with the infected person?		
Yes	48	96
No	2	4
Hand hygiene help to prevent COVID-19 infection?		
Yes	49	98
No	1	2
Respiratory hygiene and cough etiquette help to prevent COVID-19 infection?		
Yes	47	94
No	3	6
Use of PPE reduces the spread of COVID-19 virus?		
Yes	49	98
No	1	2
People who have contact with COVID-19 infected patients should be immediately isolated in a proper place and observed for 14 days?		
Yes	40	80
No	10	20
Health care workers are at a higher risk of COVID-19 infection?		
Yes	49	98
No	1	2

IPC: Infection prevention and control, PPE: Personal protective equipment.

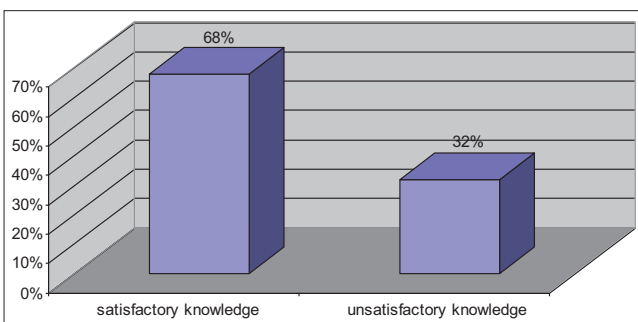


Figure 1: Level of knowledge of COVID-19 infection prevention and control among sample of physicians at Faculty of Medicine, Cairo University Hospitals, 2020

Regarding assessment of the physicians' attitude toward COVID-19 IPC, it was found that half of the participants showed a positive attitude demonstrated in (Figure 2). The majority of the study subjects expressed worries about a family member getting infected with COVID-19 and agreed that infected patients should be kept in isolation. Around three-quarters agreed that transmission of COVID-19 can be prevented by washing hands with soap frequently, would take COVID-19 vaccine if available and believed that medical staffs are ready to participate in epidemic infection and control activates in the community when needed. Almost two-thirds of them thought that they will probably get infected and if so they will accept isolation in health facilities as demonstrated in (Table 2). The mean attitude score among physicians regarding COVID-19 IPC was $24.9 (\pm 2.8)$.

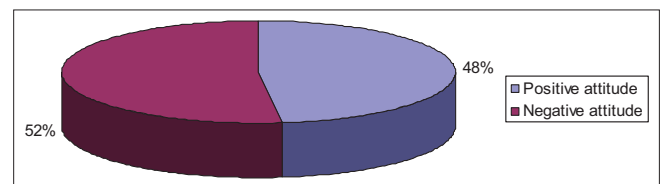


Figure 2: Level of attitude toward COVID-19 infection prevention and control among sample of physicians at Faculty of Medicine, Cairo University Hospitals, 2020

As regards physicians' responses to their actual practice of COVID-19 IPC measures, it was shown that 58% of the participating subjects had a favorable practicing IPC procedures, (Figure 3), as per the mean practice score regarding COVID-19 IPC was $5.6 (\pm 1.05)$. Table 3 reveals that the majority of the study subjects were found to be performing hand hygiene after contact with respiratory secretions, avoiding to touch their eyes, nose, or mouth with potentially contaminated gloves or bare hands, offering a medical mask to patients with suspected COVID-19, avoiding to transport patients out of their rooms, and finally placing known or suspected patients in adequately ventilated single rooms. However, only 68% of the participating physicians use a new set of PPE when care is given to a different patient.

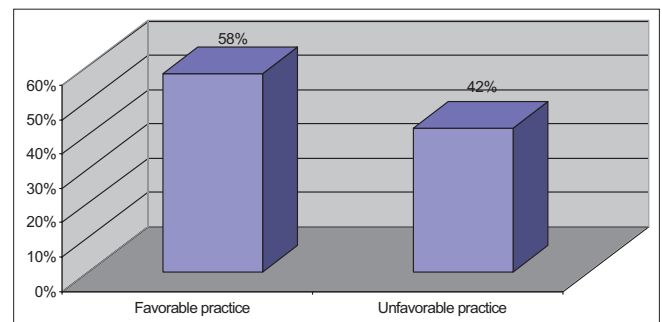


Figure 3: Level of practice of COVID-19 infection prevention and control among sample of physicians at Faculty of Medicine, Cairo University Hospitals, 2020

Table 2: Attitude toward each COVID-19 IPC item among sample of physicians at Faculty of Medicine, Cairo University Hospitals, 2020

Attitude questions	Strongly agree, n (%)	Agree, n (%)	Neutral, n (%)	Disagree, n (%)	Strongly disagreed, n (%)
Probability of getting the COVID-19 infection myself	15 (30)	16 (32)	18 (36)	1 (2)	0 (0)
Worrying that one of my family members may get the COVID-19 infection	25 (50)	21 (42)	3 (6)	1 (2)	0 (0)
Acceptance of isolation in a health facility if I got infected with COVID-19	17 (34)	17 (34)	10 (20)	5 (10)	1 (2)
Transmission of COVID-19 can be prevented by washing hands with soap frequently	13 (26)	24 (48)	10 (20)	2 (4)	1 (2)
Prevalence of COVID-19 can be reduced by the active participant of HCWs in hospital infection control programs	16 (32)	25 (50)	9 (18)	0 (0)	0 (0)
When a COVID-19 vaccine is available, I would have it	23 (46)	16 (32)	9 (18)	2 (4)	0 (0)
COVID-19 patients should be kept in isolation	30 (60)	19 (38)	1 (2)	0 (0)	0 (0)
Readiness of medical staffs to participate in epidemic infection and control activities in the community	8 (16)	30 (60)	10 (20)	2 (4)	0 (0)

Table 3: Practice of sample of physicians concerning COVID-19 IPC measures at Faculty of Medicine, Cairo University Hospitals, 2020

Practice Question	Number	%
Performing hand hygiene after contact with respiratory secretions?		
Yes	47	94
No	3	6
Wearing PPE when in contact with patients in recent days?		
Yes	34	68
No	16	32
Using a new set of PPE when care is given to a different patient?		
Yes	13	26
No	37	74
Avoiding touching eyes, nose, or mouth with potentially contaminated gloved or bare hands?		
Yes	47	94
No	3	6
Offering a medical mask to patients with suspected COVID-19 while they are in waiting/public areas or in closed areas?		
Yes	44	88
No	6	12
Avoiding moving and transporting infected patients out of their room unless medically necessary?		
Yes	48	96
No	2	4
Placing known or suspected patients in adequately ventilated single rooms?		
Yes	44	88
No	6	12

IPC: Infection prevention and control, PPE: Personal protective equipment.

Discussion

The present study was conducted during the last week of June 2020, in the midst of the events of COVID-19 pandemic, where the officially announced confirmed cases, on June 15, were 47,856 cases and 1766 deaths. Moreover, on the other hand, the Egyptian Medical Syndicate reported that about 430 doctors were infected with 68 deaths [25], [26], [27].

Understanding HCWs' KAP toward COVID-19 IPC helps to predict the outcomes of COVID-19 in Egypt. The purpose of the current study was to evaluate the KAP toward COVID-19 IPC among a sample of 50 physicians working in Faculty of Medicine, Cairo University Hospital, who were responsible for providing medical care for COVID-19 infected patients.

Regarding COVID-19 infection mode of transmission and the higher risk of HCWs to get infected, the majority of the study subjects correctly answered the related questions. These findings come in accordance with what was found in Fayoum governorate by Wahed *et al.*, at different hospital types, where almost all of their study respondents knew those two facts, however, the mode of transmission question response is considered higher than that found by Huynh *et al.*, at District 2 Hospital, Ho Chi Minh City in Vietnam, where

only two-thirds of their study subjects knew the same fact and yet around 90% of them were knowledgeable about the fact that they are at a higher risk of getting COVID-19 infection. This high level of knowledge about COVID-19 infection transmission among HCWs in this study is probably due to the intensive role of mass media in raising public awareness and knowledge considering COVID-19 and its modes of transmission [28], [29].

Almost all of the current study subjects were aware of the essential role of hand hygiene, respiratory hygiene, and cough etiquette in preventing COVID-19 infection. This result is supported by other studies, one study conducted by Alshammari *et al.* who aimed to assess HCWs awareness and perceptions of COVID in Kuwait hospitals where they included 28 HCWs, another study by Acharya *et al.* who aimed to assess the KAP of Nepali medical and dental practitioners on infection control during the COVID-19 pandemic through an online circulated questionnaire, and one more conducted by Bhagavathula *et al.* who conducted a survey among 453 HCWs to assess knowledge and perceptions towards COVID-19 infection where almost all of the participants in the three studies were knowledgeable that hand hygiene, covering the nose and the mouth while coughing reduces the risk of transmission of COVID-19 infection. It is worth noting that this high level of knowledge regarding prevention of COVID-19 infection would help in combatting the current pandemic among HCWs in particular and the public in general [30], [31], [32].

Nearly all of the present study subjects correctly knew that the use of the proper PPE reduces the spread of COVID-19 infection. This is considered higher than what was found by Rabbani and Al Saigul who aimed to assess KAPs of 398 HCWs about COVID 2019 in Saudi Arabia where only three-quarters of them had sufficient knowledge that HCWs should wear mask all the time at work [33]. The high knowledge level in the current study about the importance of PPE is most probably related to the Ministry of Health and Population and the WHO tremendous efforts in providing reliable information regarding the role of PPE (especially face masks) in preventing COVID-19 infection through mass media and improving accessibility to PPE since the beginning of the pandemic [33].

In the present study, 20% of the study respondents were not aware that people who had

contact with someone infected with COVID-19 virus should be immediately isolated in a proper place for observation period of 2 weeks, this result is considered lower than what was reported by Olum *et al.* in their study among HCWs in Makerere University College of Health Sciences in Uganda where all their study subjects knew that fact [34]. This discrepancy in results may be related to the various and continuously changing guidelines regarding control measures of COVID-19 contacts and the availability and accessibility to health-care services and facilities [34].

The current study subjects had sufficient knowledge level toward COVID-19 IPC, where almost two-thirds of them scored above the cutoff point set at the mean which was 5.6 out of 6. Similar findings were revealed by a number of studies conducted to determine the KAP among different medical professionals; physicians, nurses, and other paramedics working in the frontline in hospitals, where their study respondents were considered to have sufficient knowledge toward COVID-19 IPC [35], [36], [37].

Around two-thirds of the current study subjects perceived themselves as susceptible to COVID-19 infection and agreed that if they get COVID-19 infection, they will accept isolation in a health facility. These results are considered lower than that of Huynh *et al.* in Vietnam where the majority of their study subjects agreed with the same facts [29]. This may be explained in the light of the limited availability and accessibility to quality health care in Egypt and the wide practice of home isolation for COVID-19 mild and moderate cases. In the same context, the majority of this study participants were worried that one of their family members may get infected, which was in accordance with what Maleki *et al.* reported in their study at Taleghani Hospital in Iran [38].

The existing study revealed that about three-quarters of the participants agreed that transmission of COVID-19 can be prevented by washing hands with soap frequently and by the active participation of HCWs in hospital infection control programs such as health education and infection control training. Once more these results are considered lower than that of Huynh *et al.* in Vietnam where almost all of their study subjects agreed with the same facts [29]. This may be explained that the perceived severity of the COVID-19 virus making some HCWs deny the fact that the virus could be easily destroyed through washing hands with soap for at least 20 s and briefer the use of sanitizer. On the other hand, considering COVID-19 vaccine, 78% of the present study subjects agreed that whenever there is available vaccine against COVID-19 infection, they would take it. This result is considered higher than that found in Greece by Papagiannis *et al.* where around half of their study participants mentioned that they would be vaccinated against SARS-CoV-2 in their study aiming to assess KAPs toward new coronavirus (SARS-CoV-2) among health-care professionals from five public hospitals from Thessaly [39]. The lack of

demand for COVID-19 vaccine may be related to lack of information about COVID-19 vaccine's importance and its effectiveness and also the concerns about the side effects that may arise later.

Approximately all of the current study participants agreed that COVID-19 infected patients should be kept in isolation. This goes with Kumar *et al.* who aimed to assess the knowledge and perception of health professionals through a web-based study across India where 780 health professionals participated and almost all of them agreed that COVID-19 patients should be kept in special COVID-19 hospital [40].

Among the present study subjects, 76% agreed that medical staffs are ready to participate in COVID-19 epidemic IPC activities in the community. However, among the subjects participated in two other studies – one in Libya and the other in Ghana – which were both conducted to assess levels of preparedness regarding COVID-19 among HCWs, only one-quarter of each of their study subjects perceived themselves as prepared to manage the COVID-19 outbreak [41], [42]. A possible cause is that all of the 50 physicians included in this study were working in “Kasr Al-Ainy” Faculty of Medicine, Cairo university Hospital, which is considered the largest tertiary hospital in Egypt, and the region.

Accordingly, almost half of the physicians had positive attitude toward COVID-19 IPC as their mean attitude score was 24.9 (± 2.8). Positive attitudes toward COVID-19 IPC among HCWs varied in similar studies, where two researches conducted at Nepal and Nigeria revealed that almost half of their study subjects and around two-thirds of their study population, respectively, had positive attitude toward COVID-19 IPC [34], [37]. However, in a different study conducted in Uganda, only one-quarter of the study subjects had positive attitude toward COVID-19 IPC [43]. This variability in attitude toward COVID-19 IPC may be related to the level of knowledge since in this pandemic situation, attitude and practices depend on the information HCWs get and subsequently act accordingly.

Concerning practice of physicians in the existing study, the majority of the respondents reported that after they have contact with any respiratory secretions, they perform hand hygiene and that they avoid touching their eyes, nose, or mouth with potentially contaminated gloved or bare hands. Many of the participants also reported that they offer medical masks to patients with suspected COVID-19, place known or suspected cases in adequately ventilated single rooms, and avoid moving patients out of their room unless medically necessary. This is in agreement with the WHO recommendations concerning IPC during health care when COVID-19 is suspected [22].

As regard the use of PPE almost two-thirds of the present study participants stated that recently during the COVID-19 pandemic, they make sure to wear proper PPE when coming in contact with patients, while only

one-quarter reported that they use a new set of PPE when medical care is given to a different patient. This goes with other studies, for example; the study conducted by Olum *et al.* in Uganda and another by Ayinde *et al.* in Nigeria where more than half of their study in both studies subjects reported using the proper PPE when dealing with patients. The current low compliance of physicians to wear proper PPE could be attributed to the increased work load with overcrowdings of health-care facilities, the extremely long periods of time spent in hospitals making PPE uncomfortable and the shortage of supplies at certain times. To optimize the use of PPE, there should be an increase in adherence to protocols for PPE use, improved PPE design, and research into the risks, benefits, and best practices of PPE use [34], [43], [44].

Consequently, the mean practice score was 5.6 (± 1.05) among the study participants with 58% had favorable practice toward COVID-19 IPC. This result may be considered close to what Asemahagn found in his study in Ethiopia, where 62% of HCWs participants had good prevention practices toward COVID-19 infection. However, it is considered much lower than that of Zhang *et al.* who aimed to assess KAP regarding COVID-19 among HCWs in Henan, China, where 89.7% followed correct practices regarding COVID-19. The moderate level of practice toward COVID-19 IPC in Africa compared to China could be attributed to the prevalence of COVID-19 infection as the infection is highly prevalent in China which is the epicenter of the disease compared to Africa [36], [45].

Conclusion

The study demonstrated that physician's moderate knowledge, poor attitude, and modest practice toward COVID-19 IPC at faculty of medicine hospitals were found to be not sufficient, not favorable nor safe enough to the expected standards. Periodic lack of PPE and resources were the leading factor impeding their infection prevention practice. Continued measures to improve health workers' knowledge and attitude and a reliable supply of PPE are critical steps to decrease the risk of COVID-19 infection among HCWs.

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