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Knowledge about COVID-19 and its Precautionary Measures among Healthcare Workers at the National Cancer Institute, Cairo University

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Abstract

BACKGROUND: The core of the healthcare system is healthcare workers (HCWs). A skilled and healthy workforce is essential during a health emergency like the coronavirus disease 2019 (COVID-19) epidemic.

AIM: This study evaluated knowledge of COVID-19, its preventive measures, and factors affecting it among HCWs at the National Cancer Institute (NCI), Cairo University to determine their desire to obtain the available COVID-19 vaccines in addition to the factors that may affect it.

METHODS: This descriptive cross-sectional study included 151 HCWs in Egypt using a self-administered questionnaire created by the researchers after examining the information supplied by the Egyptian Ministry of Health and Population, World Health Organization, and the relevant research regarding knowledge assessment. Initially, demographic data were collected. Participants were asked their source of knowledge about COVID-19 and their intent to receive the available vaccines. Knowledge about COVID-19 and preventive measures was compared between different HCWs in NCI. In addition, knowledge score was compared according to different factors to determine factors affecting knowledge.

RESULTS: Physicians represented about 40% of the total number of participants. HCWs' knowledge of COVID-19 was higher among physicians, with a higher percentage of correct answers than the other two groups (nurses and pharmacists and employees and technicians). Younger age groups had a significantly higher median knowledge score than the older groups. Physicians had significantly higher median scores than employee and technician groups.

CONCLUSION: The overall knowledge about COVID-19 and its preventive measures among HCWs was generally good, especially among physicians more than allied health professionals. However, some of the virus-related knowledge was less advanced than expected for the HCWs position.

Introduction

It is known that infections with coronaviruses can lead to symptoms between the common cold and severe acute respiratory syndrome [1]. The cause of numerous episodes of pneumonia in Wuhan, China, at the end of 2019 was determined to be a novel coronavirus [2]. The coronavirus disease 2019 (COVID-19) outbreak was classified by the World Health Organization (WHO) as an international public health emergency in January 2020 and as a pandemic in March 2020, prompting all nations to take steps to stop further viral spread [3].

The COVID-19 virus can be spread from one person to another through close contact (within about 6 feet), respiratory secretions from coughs and sneezes, or by touching infected objects or surfaces. The elderly and those with underlying chronic conditions were at a higher risk of increased severity [4]. The best defense against the virus is to limit exposure to it [5]. Preventive measures recommended are washing hands frequently, social distancing, and covering 1 mouth and nose when coughing or sneezing [5]. Healthcare workers (HCWs) are at the forefront of the COVID-19 pandemic defense. They are vulnerable to physical violence, psychological distress, long working hours, fatigue, and COVID-19 infection due to their regular contact with infected individuals [6], [7].

The contaminated environment, lack of isolation facilities, crowding, and perhaps the lack of understanding and knowledge of infection prevention techniques all serve to increase disease transmission among HCWs [8]. HCWs lacking knowledge of the illness may fail to recognize or treat it correctly, which could hasten the infection's spread. A web-based, cross-sectional study of HCWs found that a sizable portion of HCWs (61.0%) had an inadequate understanding of COVID-19 transmission and symptom onset (63.6%) [9].

In addition to the main preventive measures for COVID-19, vaccines can stop people from becoming fatally ill or dying from this virus. The WHO has assessed some COVID-19 vaccines and declared that they satisfied the essential standards for effectiveness and safety (For instance, Johnson and Johnson, Moderna,

Pfizer/BioNTech, Sinopharm, and AstraZeneca/Oxford Vaccine). It emphasizes the need to receive the vaccine (whatever type is available) [10].

This study intended to evaluate the awareness of COVID-19 and its preventive measures in addition to factors affecting it among HCWs at the National Cancer Institute (NCI), Cairo University (CU) and to determine their desire to get the available vaccines for COVID-19 in addition to the factors that could have an impact on it. This can clarify for the concerned administration the intervention strategies required to protect the safety of NCI medical professionals.

Methods

This cross-sectional study included 151 HCWs at the NCI, CU. Participants were selected using a form of convenience sampling, and data collection lasted 2 months (from the May 1 to the July 1, 2021). Institutional Review Board at NCI, CU approved the study (IRB approval number 2101-2P04-001). The researchers created a self-administered questionnaire after examining the information given by the Ministry of Health and Population of Egypt (MOHP) [11], WHO [12], and the relevant research regarding knowledge assessment [13], [14], [15].

Participants were informed that participation was voluntary and that the response to the questionnaire would indicate consent. After explaining the study's purpose, those who accepted to participate were requested to respond to the survey, which was composed of two parts: The first included participants' data, including sociodemographic (age, sex, marital status, and the highest level of education reached and occupation), comorbidities, direct contact with patients, previous COVID-19 infection, the previous attendance of lectures or seminars about COVID-19, and sources of information on COVID-19. Participants' intent to receive the COVID-19 vaccine (any type available) was evaluated through a question with three answers (I will take it immediately or have already received it, I will wait until clinical trials for all available types are completed, or I will never receive it). These responses were sorted into two categories (intended for rapid vaccination and no intent for rapid vaccination) to examine factors affecting the intent to be vaccinated. The second included questions to assess knowledge about COVID-19 infection (14 questions about the nature of COVID-19, mode of transmission, incubation period, risk factors, symptoms, treatment, and complications, and nine questions about the preventive measures to avoid it. Questions about knowledge and preventive measures were answered by either yes, no, or don't know. The correct answer was scored 1, while a wrong or don't know answer was scored 0. The maximum score was 23.

The questionnaire was written in Arabic and revised for content and relevance by a panel of professors of cancer epidemiology at the NCI. It was available as a printed and Google form. The links were distributed through emails or WhatsApp. It was implemented in a pilot study involving 20 HCWs to determine its clarity, time, and feasibility, and they were subsequently excluded from the analysis. Internal consistency of the questionnaire was evaluated using Cronbach's alpha which was 0.734, indicating that it is a reliable tool for knowledge assessment.

Sample size estimation

As stated by a prior study by Wahed *et al*. [15], the correct answer rate about COVID-19 infection among HCWs was 80.4%. At a level of confidence of 95% and precision of 8%, the sample size was 95 participants. This sample was increased to 125 to overcome the 30% refusal rate. The software Epi Info 7 was employed to calculate the sample size.

Statistical analysis

Utilizing version 23 of the Statistical Package for Social Sciences, data management and analysis were carried out. Age was summarized as median (range), whereas categorical variables were shown as percentages and numbers. Using the Shapiro—Wilk test and the Kolmogorov–Smirnov test, numerical data were examined for normality. The Mann–Whitney test was utilized to compare the two groups' knowledge scores, while more than two groups were compared using the Kruskal–Wallis test. When comparing groups based on categorical data, Fisher's tests or Chi-square were used (as appropriate). Every test was two-sided. P-values less than 0.05 were considered significant.

Results

One hundred and fifty-one HCWs participated in this study. More than half (53.0%) completed the hard copy of the questionnaire. The participants' median age was 34, ranging from 20 to 60 years. About 61% were females. Most were married (72.2%), and about 35% had postgraduate studies. Physicians represented 40% of the total participants, followed by employees representing 28%. About one-third (32%) of the participants had encountered COVID-19 infection, and 2/3 were in direct contact with patients. The majority did not attend any lecture or seminar about COVID-19. For almost half of the study participants, television or radio were their primary sources of knowledge on COVID-19. More than 70% reported that they would postpone their vaccination against COVID-19 until the clinical trials of

the available vaccines are completed, while 17% stated that they would not receive vaccination (Table 1).

Table 1: Characteristics and sources of information about coronavirus disease 2019 of healthcare workers (n = 151)

Characteristics	n (%)
Method of data collection	
Hard copy	80 (53)
On line	71 (47)
Sex	
Female	92 (60.9)
Male	59 (39.1)
Age	34 (20–60)[a]
Marital status	
Divorced	2 (1.3)
Married	109 (72.2)
Single	35 (23.2)
Widow	5 (3.3)
Education (n = 149)	
Bachelor	48 (32.2)
Middle certification	49 (32.9)
Postgraduate	52 (34.9)
Occupation (n = 151)	
Employee	42 (27.8)
Nurse	17 (11.3)
Pharmacist	13 (8.6)
Physician	61 (40.4)
Technician	18 (11.9)
Comorbidities[b]	28 (18.5)
Direct contact with patients	100 (66.2)
Previous COVID-19 infection	48 (31.8)
Previous attendance of lectures/seminars about COVID-19	39 (25.8)
Sources of information about COVID-19 (*n* = 148)[c]	
Scientific websites[d]	53 (35.8)
Social media	55 (37.2)
Newspapers	8 (5.4)
Television/radio	71 (48)
Family and relatives	17 (11.5)
Colleagues	58 (39.2)
Others	12 (8.1)
Intent to receive COVID-19 vaccine when it is available (whatever type) (n = 146)	
I will take it immediately or have already received it	18 (12.3)
I will wait until clinical trials for all available types are completed	103 (70.5)
I will never receive it	25 (17.1)

[a]Variable is presented as median (range), [b]59% diabetes and/or hypertension others include asthma, osteoarthritis, hypothyroidism, and esophageal reflux, [c]Most participants chose more than one source, [d]Like WHO, CDC, IDSA, and MOHP. COVID-19: Coronavirus disease 2019, WHO: World Health Organization, CDC: Centers for Disease Control, MOHP: Ministry of Health and Population, IDSA: Infectious Diseases Society of America.

Table 2 shows knowledge about COVID-19, mode of transmission, incubation period, risk factors, symptoms, treatment, and complications among HCWs. The percentage of correct answers was significantly higher among physicians than the other two groups (nurses, pharmacists and employees, and technicians).

Table 3 shows knowledge about preventive measures against COVID-19 among the three groups. Physicians achieved the highest percentage of correct answers regarding covering the nose and mouth while coughing, avoiding crowdedness in public places, and social distancing.

Table 4 shows the knowledge score concerning different participants' characteristics. Younger age groups exhibited a significantly higher median knowledge score than the older groups. Single participants had significantly higher median knowledge scores than widows. Postgraduate participants had significantly higher scores as opposed to the middle certification and the bachelor groups. Regarding occupation, physicians had significantly higher median scores than employee and technician groups. Those who had direct access to patients had significantly greater median scores compared to those who did not. Participants who were free of comorbidities had significantly higher median scores than those with comorbidities.

The previous attendance of lectures or seminars about covid-19 was significantly associated with a higher median knowledge score. Using scientific websites like the WHO and the Egyptian ministry of health was linked to having a greater median score compared to using social media and TV/radio (Table 4). Intent to get COVID-19 vaccination in the form of two categories (intent & no intent for rapid vaccination) was tested in relation to different participants' characteristics, and no significant associations were reported.

Discussion

All industries are affected by the growing, rapidly evolving COVID-19 [16]. In addition to leading the fight against this extremely infectious disease, HCWs are directly or indirectly impacted by it, and their risk of acquiring the illness is higher than that of the general population. Therefore, it is crucial that HCWs globally possess sufficient knowledge of all facets of the illness, including its clinical manifestation, diagnosis,

Table 2: Knowledge about coronavirus disease 2019 among healthcare workers at National Cancer Institute Cairo University (n = 151)

Knowledge items	Physicians (n = 61), n (%)*	Nurses and pharmacists (n = 30), n (%)*	Employees and technicians (n = 60), n (%)*	χ²	p-value
Nature of COVID-19					
It is a viral disease	61 (100.0)	30 (100.0)	58 (96.7)	3.074	0.215
Mode of transmission					
Through direct contact with the infected person	57 (93.4)	28 (93.3)	53 (88.3)	1.183	0.553
Through dealing with pets	49 (80.3)[a]	13 (43.3)[b]	17 (28.3)[b]	33.991	< 0.001
Through sneezing or transmission of droplets from patients	58 (95.1)	28 (93.3)	57 (95.0)	0.396	1
Through mosquitoes and flies	47 (77.0)[a]	10 (33.3)[b]	16 (26.7)[b]	34.124	< 0.001
Through contaminated food and food packaging	39 (63.9)[a]	14 (46.7)[a]	13 (21.7)[b]	22.097	< 0.001
Incubation period					
The incubation period of the disease ranges from 2 to 14 days	57 (93.4)	28 (93.3)	49 (81.7)	4.988	0.083
Risk factors					
COVID-19 infection is more severe for patients with chronic diseases	61 (100.0)	30 (100.0)	58 (96.7)	3.074	0.215
COVID-19 infection is more severe for elderly persons	59 (96.7)	27 (90.0)	55 (91.7)	2.161	0.363
Healthcare workers are more prone to be infected with COVID-19	60 (98.4)	27 (90.0)	55 (91.7)	3.853	0.117
Symptoms					
Fever, headache, sore throat and tiredness are symptoms of COVID-19 infection	61 (100.0)[a]	28 (93.3)[a,b]	53 (88.3)[b]	8.025	0.013
Treatment					
Antibiotics is the drug of choice for treating COVID-19	57 (93.4)[a]	14 (46.7)[b]	20 (33.3)[b]	48.53	< 0.001
Complications					
Infection with COVID-19 can lead to respiratory failure and death	61 (100.0)[a]	27 (90.0)[b]	51 (85.0)[b]	11.057	0.002
COVID-19 infection always causes death	59 (96.7)[a]	24 (80.0)[b]	47 (78.3)[b]	9.703	0.008

*n (%) of correct answers, factors with different letters are statistically different from each other. Chi-square test. p value set significant ≤ 0.05. COVID-19: Coronavirus disease 2019.

Table 3: Preventive measures against coronavirus disease 2019

Preventive measure	Physicians (n = 61), n (%)*	Nurses and pharmacists (n = 30), n (%)*	Employees and technicians (n = 60), n (%)*	χ^2	p-value
Wash hands with soap, water, or alcohol	61 (100.0)	29 (96.7)	59 (98.3)	2.088	0.354
Avoid touching eyes, nose, and mouth	61 (100.0)	30 (100.0)	59 (98.3)	1.629	0.596
Putting on a face mask	61 (100.0)	28 (93.3)	59 (98.3)	3.753	0.054
Covering nose and mouth while coughing	58 (95.1)[a]	23 (76.7)[b]	42 (70.0)[b]	14.405	0.001
Avoid crowdedness in public places	61 (100.0)[a]	26 (86.7)[b]	55 (91.7)[a,b]	8.256	0.008
Frequently cleaning and disinfecting surfaces	61 (100.0)	28 (93.3)	58 (96.7)	3.645	0.110
Keep at least one-meter distance between people	61 (100.0)[a]	26 (86.7)[b]	58 (96.7)[a,b]	7.721	0.004
Washing nose with a salty solution	24 (39.3)	6 (20.0)	15 (25.0)	4.694	0.096
Avoid direct contact with colleagues (others)	56 (91.8)	24 (80.0)	52 (86.7)	2.598	0.273

*n (%) of correct answers, factors with different letters are statistically different from each other. Chi-square test p value set significant ≤ 0.05.

recommended treatments, and recognized preventative measures [17].

In the current study, 151 HCWs were enrolled, and about 61% were females. Physicians represented about 40% of the total number of participants. The majority did not attend any lectures or seminars about COVID-19. Television or radio, colleagues, and social media were regarded as the main sources of knowledge about COVID-19 for about half of the participants in the study.

Table 4: Factors affecting knowledge

Variables	Knowledge score, median (minimum–maximum)	p-value
Age group		
20–29[a]	20.50 (11.0–23.0)	< 0.001
30–39[a]	20.00 (13.0–23.0)	
40–49[b]	17.50 (13.0–23.0)	
≥50[b]	18.00 (12.0–22.0)	
Sex		
Male	19.00 (13.0–23.0)	0.468
Female	20.00 (11.0–23.0)	
Marital status		
Single[a]	21.00 (14.0–23.0)	0.017
Married[a,b]	19.00 (11.0–23.0)	
Divorced[a,b]	19.50 (18.0–21.0)	
Widow[b]	17.00 (12.0–19.0)	
Education		
Bachelor[b]	19.00 (12.0–23.0)	< 0.001
Middle certification[b]	18.00 (11.0–22.0)	
Postgraduate[a]	21.00 (14.0–23.0)	
Occupation		
Employee[b]	18.00 (12.0–22.0)	< 0.001
Nurse[a]	18.00 (17.0–21.0)	
Pharmacist[a,b]	18.00 (14.0–23.0)	
Physician[a]	21.00 (14.0–23.0)	
Technician[b]	18.00 (11.0–22.0)	
Direct contact with patients		
Yes	20.00 (14.0–23.0)	< 0.001
No	18.00 (11.0–22.0)	
Comorbidities		
Yes	18.0 (12.0–22.0)	0.026
No	20.0 (11.0–23.0)	
Previous COVID-19 infection		
Yes	19.5 (14.0–23.0)	0.543
No	19.0 (11.0–23.0)	
Previous attendance of lectures/seminars about COVID-19		
Yes	21.0 (14.0–23.0)	0.037
No	19.0 (11.0–23.0)	
Source of information		
Colleagues[a, b]	20.00 (12.0–23.0)	< 0.001
TV and radio[b]	18.00 (12.0–22.0)	
Social media[b]	18.50 (11.0–23.0)	
WHO, MOH, and any scientific website[a]	21.00 (17.0–23.0)	

Factors with different letters statistically different from each other, maximum score = 23. COVI-19: Coronavirus disease 2019, WHO: WHO: World Health Organization, MOH: Ministry of Health.

These results agree with other research [10] stating that most HCWs rely on social media and television to learn about COVID-19. In addition, similar results were reported by Saqlain et al. [18], who reported that HCWs' primary information source is social media, followed by television and radio, then seniors/other colleagues. HCWs should obtain information about COVID-19 from trustworthy sources, such as the guidelines and reports issued by the WHO

and the US Centers for Disease Control and Prevention. In contrast, Wahed et al. [15] studied 407 Egyptian HCWs to evaluate their knowledge, perception, and perspective on the COVID-19 disorder. They stated that men predominated over women, and colleagues (29%), the MOHP website (27%), and social media (20.6%) are the key information sources regarding COVID-19, while other sources include courses (11.8%) and friends and family (5.2%).

Regarding the COVID-19 knowledge and preventive measures against it, the level of HCWs' knowledge was high, and the percentage of true answers was significantly higher among physicians than the other two groups. Wang et al. [19] and Huynh et al. [20] reported similar findings. Furthermore, Wahed et al. [15] stated that doctors have the highest level of knowledge, followed by nurses and pharmacists. Olum et al. [16] indicated that regardless of their occupations or qualifications, HCWs have an equivalent level of understanding about COVID-19. According to an Emirati study, many HCWs lack knowledge about disease transmission and its symptoms [9].

Interestingly, Saqlain et al. [18] found that nurses (90.5%) and doctors (93.3%) had less knowledge than pharmacists (94.7%), but the difference was not statistically significant. Due to their active responsibilities in enhancing the efficacy of treatment for COVID-19 patients, doctors and pharmacists are actively interested in gathering knowledge, and this might explain the knowledge gaps among HCWs.

In the current study, using scientific websites such as the WHO and the Egyptian ministry of health was significantly associated with a higher median knowledge score than social media and TV/radio. In addition, several studies [15], [21], [22] revealed that HCWs who learn about the illness online through social media or the MOHP/WHO website have higher levels of knowledge. This might be explained by the widely available internet access through different devices such as laptops, tablets, and mobiles, allowing many individuals to get reliable information with a simple search.

In the present study, younger age groups had higher knowledge scores than the older groups by a significant margin. According to several findings, younger individuals with greater education are more knowledgeable [19], [21], [23]. Furthermore, Wahed et al. [15] and Abdelhafiz et al. [21] reported that the

younger HCWs in the age groups (20–30) and (30–39) have considerably higher mean knowledge scores than the older age groups.

Our study revealed that doctors had much greater median knowledge scores than employee and technician groups. Wahed *et al.* [15] stated that doctors and pharmacists have the highest knowledge scores among all professions. The increased number of physicians with higher knowledge over other employees, such as pharmacists, nurses, and technicians, could be due to using evidenceher employeeest knowledge scores among all professionblets, and mobilesedian knowledge score thanal popCOVID-19 patients. Hence, it is recommended that the ministry of health should offer all HCWs up-to-date information to raise their COVID-19 knowledge.

As mentioned in our findings, postgraduate participants had a substantially better score than the middle certification and the bachelor groups. Several trials confirmed that the knowledge scores significantly correlate with education level and knowledge source. Participants with a university degree or higher had higher knowledge scores than participants with less education [15], [16], [18], [21].

Those who interacted with patients directly had a median knowledge score much higher than those who did not. In line with this finding, several studies reported that those who work directly with patients have higher knowledge scores than other groups [15], [21], [24], [25].

Finally, more than 70% reported that they would postpone their vaccination against COVID-19 until the clinical trials of the available vaccines are completed, while 17% reported that they would not receive a vaccination. Al-Qerem and Jarab [26] revealed that 26.4% of participants answered "Not sure" when asked if they would use the vaccine on availability, and 36.8% answered "would not." The participants' hesitation or refusal to receive the vaccine was most frequently due to worries about vaccine safety and side effects, according to studies performed in the United States [27], Europe [28], and China [29].

There are some limitations to this study. It was a cross-sectional study carried out throughout a lockdown. Being a survey study, the replies were prone to recall bias since they depended on respondents' honesty and recall capacity.

Conclusion

The majority of HCWs possessed outstanding knowledge and a positive attitude regarding COVID-19. Young age, being single, postgraduate education, being a physician, having direct access to patients, absence of co-morbidities, attending lectures about COVID-19,

and using scientific websites were factors associated with better knowledge about COVID-19. Understanding these factors may help improve knowledge for all health workers and therefore minimizing the infection rate among them. HCWs are the first line of defense against COVID-19 and other potential pandemics, and protecting them and raising their knowledge is crucial.

Acknowledgment

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