# An Assessment of Healthcare Workers Knowledge about COVID-19

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## Abstract

**Introduction**: Coronavirus disease 2019 (COVID-19) is caused by a viral infection and considered the third coronavirus emerging among human beings over the past two decades. Healthcare Workers (HCWs) are at high risk of acquiring this serious infection during providing care to patients. Therefore, it's crucial to assess the knowledge of the HCWs about COVID-19. **Methods**: A multicenter cross-sectional study was conducted on HCWs working at public hospitals and Primary Healthcare (PHC) centers in the Najran region, KSA to evaluate the staff's knowledge toward COVID-19. The questionnaire consisted of two parts, the first part included the demographic data, and the second part involved questions related to the COVID-19. **Results**: 451 HCWs participated in this study and the median of overall knowledge score was 67%. Most HCWs properly identified symptoms (82.9%), mode of transmission (78.5%), the incubation period (96.4%), the way of preventing the infection (91.5%), the COVID-19 is not same as MERS-CoV (74.3%) and availability of a vaccine against the COVID-19 (82%). However, HCWs were less likely to identify the source of COVID-19 when it was discovered in China (22.5%), the mortality rate (44.6%), and the presence of treatment (32.1%). Overall knowledge score was statistically significantly associated with profession ($P = 0.034$), educational level ($P = 0.033$), and availability of the infection control in the workplace ($P = 0.006$). **Conclusion**: The findings of this study demonstrated an intermediate level of knowledge of HCWs about COVID-19. Intervention programs are urgently needed to raise the knowledge of HCWs about this global public health issue.

## Keywords

COVID-19, Knowledge, Healthcare Worker, Assessment, Najran

## 1. Introduction

The human coronavirus (HCoV) was discovered in 1965 and was named as B814 [1]. HCoVs are classified within the family Coronaviridae (genus, Coronavirus) in the order Nidovirales. They are the largest RNA viruses, enveloped, nonsegmented, positive-sense, single-stranded RNA viruses, and named after their corona-like or crown-like surface projections seen on electron microscopy that correspond to large surface spike proteins [2] [3] [4].

HCoVs are widely distributed among birds and mammals as well as humans [5] [6]. There are six species of coronavirus that cause human illness. 229E, OC43, NL63, and HKU1 are typically associated with common cold symptoms [7]. The other two species are originally zoonotic, including severe acute respiratory syndrome (SARS-CoV) which was the related pathogen for SARS-CoV in Guangdong Province, China in 2002 and 2003 [8] [9] [10], and the Middle East respiratory syndrome (MERS-CoV) that was the causative agent for MERS-CoV in the Middle East, which was first diagnosed in Saudi Arabia in 2012 [11] [12].

In late December 2019, clusters of sick people with pneumonia of unknown reasons were discovered in Wuhan, Hubei Province, China. These cases were epidemiologically linked to the seafood wholesale market in Wuhan [13]. A new virus was identified and initially called the 2019 novel coronavirus (2019-nCoV) [6]. International Committee on Taxonomy of Viruses eventually changed the name of the virus to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) [14]. On January 30, 2020, the World Health Organization (WHO) named the disease as "COVID-19" which is coronavirus disease 2019 [15]. Although COVID-19 outbroke in December 2019 in Wuhan (China), soon it spreads worldwide and in a couple of weeks the number of confirmed cases was reported by the majority of countries around the world, therefore, on March 11, 2020, the WHO officially described the COVID-19 outbreak as a pandemic [16].

In the Kingdome of Saudi Arabia (KSA), the first confirmed COVID-19 case was reported on 2nd March 2020 from Qatif, eastern region, a Saudi national person coming back from Iran across Bahrain. His companion was reported the second case on the 4th of March 2020 [17]. Since then and till now, about 35,000 positive cases were reported in almost all KSA cities [Saudi Ministry of Health] [18].

During the outbreak of coronaviruses such as SARS-CoV, MERS-CoV in the past, and COVID-19 in these days, many HCWs in the affected nations risked and lost their lives by treating patients. HCWs represent the frontline against any outbreak of endemic disease. The health authorities of China notified the WHO about the SARS-CoV outbreak on 10 February 2003, reporting 305 cases including 105 HCWs and five deaths [19]. On Feb 26, 2003, Carlo Urbani, an infectious diseases specialist in WHO's country office in Vietnam, was called to the French Hospital in Hanoi to examine a grievously ill Chinese-American businessman. Within days, nearly 40 people of the HCWs had fallen ill, and

about seven of them died including Carlo Urbani [20]. On March 15, 2003, the WHO reported that the majority of SARS cases have occurred in people who have had very close contact with other cases and over 90% of cases have occurred in HCWs (WHO Report 16 March 2003) [21]. In 2004, Robert reported that there was a rapid spread of SARS in HCWs most notably in Toronto hospitals during the global outbreak of SARS in 2002-2003 contributed to dozens of identified cases, some of them fatal [22].

Despite the belief that HCoV has been transmitted from animals, it was anticipated that the first affected patients had been gotten the infection with SARS-CoV-2 via human to human infection [23]. Studies have demonstrated that human to human transmission of COVID-19 occurred via the droplet and direct contact with infected persons [24] [25] [26] [27]. Asymptomatic individuals cause a possibility of transmission of the COVID-19 infection [28].

Currently, there are no medical treatments for COVID-19 with proven effectiveness. Novel treatments and/or vaccines will take time to be developed and distributed to patients all over the world. In light of this, there has been growing interest in the urgent implementation of effective preventive strategies to lower the risk of transmission, [29] [30] [31]. Such preventive strategies include health information and advice for the general social population [32], vaccines against SARS-CoV-2 infection [29] [33] [34] preventive drugs therapy [35] [36], and improve knowledge and awareness among HCWs [37] [38] [39] [40].

Despite the availability of an enormous amount of information from different resources to community members as well as HCWs, a huge volume of this information is not evidence-based nor the best available resources. Therefore, it becomes very important to assess HCWs' knowledge of the pandemic against the best available information.

This study aims to assess the knowledge of HCWs in Najran, KSA about COVID-19.

## 2. Methods

A multicenter cross-sectional study conducted over 15 days period (1-15 April 2020) which surveyed staff working at public hospitals and PHCs in the Najran region, KSA. The HCWs included in this study were Physicians, Dentists, Pharmacists, Nurses, Laboratory staff, Radiologists, Respiratory therapists, EMTs, Ophthalmologists, Physiotherapists, Public health staff, infection prevention and control (IPC) staff, Social workers, psychologists and Dental technicians. All members of the above-mentioned staff categories in all public hospitals and PHC centers were invited via electronic link (SurveyMonkey), 451 HCWs participated in this study.

Inclusion and exclusion criteria:

Students, trainees, and administrative staff were excluded from this study. We included HCWs who work in the public hospitals and PHC centers such as Physicians, Dentists, Pharmacists, Nurses, Laboratory staff, Radiologists, Respiratory

therapists, EMTs, Ophthalmologists, Physiotherapists, Public health staff, infection prevention and control (IPC) staff, Social workers, psychologists and Dental technicians.

### Ethical approval:

This study was approved by the Institutional Review Board (IRB) committee of King Fahad Medical City, Riyadh, KSA (29.03.2020).

### Study tool:

A validated questionnaire was adapted and modified to evaluate the healthcare staff's knowledge about COVID-19 [41]. A pilot study was done to ensure two things; applicability and time frame that is needed to complete the questionnaire (a group of 10 staff was tested). The questionnaire contained two parts. The first part included demographic data (age, gender, years of experience, profession, settings, educational level, and availability of infection control in their settings). The second part was composed of multiple-choice questions assessing HCWs knowledge about COVID-19 (what is COVID-19, mode of transmission, symptoms, incubation period, source of COVID-19 when was discovered, way of prevention, similarity to MERS-CoV, mortality rate, treatment, and vaccination).

Participants' knowledge was evaluated against published evidence and guidelines [17]-[22]. We calculated a total score for each participant according to their response. The total score was 12.

### Statistical analysis:

Median (inter-quartile range) and frequency (percent) were used to present the data. Mann-Whitney test and Kruskal Wallis were used to compare the data. Robust regression analysis was used to identify the factors associated with the overall knowledge score. For analyzing the data, statistical packages IBMSPSS (Version 20) was employed.

## 3. Results

There was a total of 451 participants in this study. The majority of the respondents were male (61.2%), and 47% of the total participants were 25 to 34 years old, however, no one of them was 65+ years old. Most of the respondents were nurses (40.5%) while the least were IPC staff. The median of the participant's experience was 9 (5 - 14) years, and nearly 86% of respondents reported that they work at the hospital. Roughly 50% of the study respondents hold a bachelor's degree and only 2.2% of them had Ph.D. While 91.3% of participants reported that the IPC department is available at their workplace, about 5% of them did not know. The demographic data of the respondents are presented in Table 1.

Responses of HCWs about the COVID-19 are presented in Table 2. Most of the participants identified COVID-19 as coronavirus disease 2019 and 1.8% didn't have an idea of what does COVID-19 mean. While there was small variation among respondents in terms of the mode of transmission of the virus, the

**Table 1.** Demographic characteristics of study participants.

| Variable | | N | % |
|---|---|---|---|
| **Experience, Median (Q1 - Q3)** | | 9 | (5 - 14) |
| **Age group** | 18 - 24 | 2 | 0.4 |
| | 25 - 34 | 212 | 47 |
| | 35 - 44 | 173 | 38.4 |
| | 45 - 54 | 48 | 10.6 |
| | 55 - 64 | 16 | 3.5 |
| | 65+ | 0 | 0 |
| **Gender** | Male | 276 | 61.2 |
| | Female | 175 | 38.8 |
| **Profession** | Physician | 92 | 20.7 |
| | Dentist | 21 | 4.7 |
| | Nurse | 180 | 40.5 |
| | Pharmacist | 26 | 5.9 |
| | IPC | 12 | 2.7 |
| | Other | 113 | 25.5 |
| **Place of work** | Primary Health Care | 37 | 8.3 |
| | Hospital | 384 | 85.7 |
| | Regional Directorate | 27 | 6 |
| **Educational-Level** | Diploma | 127 | 28.3 |
| | Bachelor | 222 | 49.6 |
| | Master | 57 | 12.7 |
| | PhD | 10 | 2.2 |
| | Board | 18 | 4 |
| | Fellowship | 14 | 3.1 |
| **Availability IPC at your settings** | Yes | 408 | 91.3 |
| | No | 18 | 4 |
| | Don't know | 21 | 4.7 |

**Table 2.** Responses of participants about COVID-19.

| | Question | N | % |
|---|---|---|---|
| | **Corona virus disease 2019** | 306 | 68.5 |
| | **Viral respiratory illness** | 11 | 2.5 |
| **COVID-19** | **All answers are correct** | 122 | 27.3 |
| | **No idea** | 8 | 1.8 |
| | **Droplet** | 55 | 12.3 |
| | **Contact** | 23 | 5.1 |
| **Transmission** | **Droplet & Contact** | 351 | 78.5 |
| | **Don't know** | 18 | 4.0 |

Continued

| | | | |
|---|---|---|---|
| Symptoms | Severe acute respiratory illness | 25 | 5.6 |
| | Fever, cough | 41 | 9.1 |
| | Gastrointestinal symptoms | 1 | 0.2 |
| | Shortness of breath | 5 | 1.1 |
| | All answers are correct | 372 | 82.9 |
| | No idea | 5 | 1.1 |
| Incubation period | 2 - 14 days | 433 | 96.4 |
| | 3 weeks | 11 | 2.4 |
| | 1 month | 3 | 0.7 |
| | 3 month | 2 | 0.4 |
| Source of COVID-19 when it was discovered in China. | Bats | 251 | 56.0 |
| | Camels | 13 | 2.9 |
| | Domestic animal | 29 | 6.5 |
| | Seafood wholesale market | 101 | 22.5 |
| | No idea | 54 | 12.1 |
| Prevention | Washing hands with alcohol-based hand sanitizer | 29 | 6.5 |
| | Cover nose, mouth with tissue when coughing or sneezing | 5 | 1.1 |
| | Avoid personal contact (kissing, sharing cup etc.) | 4 | 0.9 |
| | All answers are correct | 408 | 91.5 |
| IS COVID-19 same as MERS? | Yes | 115 | 25.7 |
| | No | 333 | 74.3 |
| Mortality rate | 50 | 45 | 10.1 |
| | 30 | 56 | 12.6 |
| | 5 | 73 | 16.4 |
| | 3 | 199 | 44.6 |
| | No idea | 73 | 16.4 |
| Treatment | Yes | 216 | 48.1 |
| | No | 144 | 32.1 |
| | No idea | 89 | 19.8 |
| Vaccination | No idea | 65 | 14.5 |
| | No need | 16 | 3.6 |
| | No vaccine | 368 | 82.0 |

vast majority (78.5%) reported droplet and contact are the way of the transmission. Approximately 83% of the respondents reported severe acute respiratory illness, cough, fever, gastrointestinal symptoms and shortness of breath are the symptoms, but 1.1% of them were unable to mention the symptoms. Between 2 and 14 days of the incubation period was reported by roughly 97% of the HCWs.

Respondents were asked about the source of COVID-19 when it was discovered in China and over 55% of them reported Bats. The HCWs were also asked regarding the way of prevention and the vast majority of them (91.5%) mentioned washing hands with alcohol-based hand sanitizer, cover nose and mouth with a tissue when coughing or sneezing, and avoiding personal contact is the ways to prevent the infection.

Regarding similarity between COVID-19 and MERS-CoV, 25% of the respondents stated that both viruses are same. The HCWs showed a variation with respect to mortality rate caused by COVID-19.

In terms of availability of treatment and vaccination, 48.1 said there is a treatment and 82% stated that there is no vaccination against COVID-19.

Correct answers on the different questions regarding the HCWS knowledge about COVID-19 are shown in Table 3. The HCWs have rarely considered coronavirus disease 2019 and viral respiratory illness are denoted the meaning COVID-19 (27.3%). However, coronavirus disease 2019 had the highest percentage (68.5%) as solely the meaning of COVID-19. 78.5% of the HCWs identified the mode of transmission. Most HCWs were able to identify the correct answers to the symptoms and incubation period of the virus 82.9% and 96.4%, respectively. Only 22.5% of participants reported the correct source of COVID-19 when discovered in China, Seafood wholesale market. The participants identified correctly the way of prevention, availability of vaccine against COVID-19, and COVID-19 is the same as MERS-CoV, in a percent of 91.5%, 82%, and 74.3% respectively.

Table 4 demonstrates the difference in the median of the overall score for correct responses of the HCWs knowledge about COVID-19 by demographic factors. The median of the overall score varied significantly by Profession (P.

**Table 3.** Correct answers on different questions regarding the HCWS knowledge about COVID-19.

| Question | Correct answer | % |
|---|---|---|
| | Coronavirus disease 2019 | 68.5 |
| What is COVID_19 | Viral respiratory illness | 2.5 |
| | All answers are correct | 27.3 |
| Mode of transmission | Droplet & Contact | 78.5 |
| Symptoms | All answers are correct | 82.9 |
| Incubation period | 2 - 14 days | 96.4 |
| Source of COVID-19 when it was discovered in China | Seafood wholesale market | 22.5 |
| Prevention | All answers are correct | 91.5 |
| Is COVID-19 same as MERS-CoV? | No | 74.3 |
| Mortality rate | 3 | 44.6 |
| Availability of treatment | No | 32.1 |
| Availability of Vaccination | No vaccine | 82.0 |

**Table 4.** The difference in the median of the overall score for correct responses of the HCWs knowledge about COVID-19 by demographic factors.

| Demographic | | Score | | |
|---|---|---|---|---|
| | | Median | (Q1 - Q3) | P. Value |
| Age group | 18 - 24 | 70.50 | (58 - 83) | 0.11* |
| | 25 - 34 | 67.00 | (58 - 75) | |
| | 35 - 44 | 67.00 | (58 - 75) | |
| | 45 - 54 | 75.00 | (62.5 - 83) | |
| | 55 - 64 | 75.00 | (71 - 79) | |
| Gender | Male | 75.00 | (58 - 79) | 0.27# |
| | Female | 67.00 | (58 - 75) | |
| Profession | Physician | 75.00 | (67 - 83) | **0.004*** |
| | Dentist | 67.00 | (67 - 75) | |
| | Nurse | 67.00 | (58 - 75) | |
| | Pharmacist | 67.00 | (58 - 75) | |
| | IPC | 62.50 | (58 - 79) | |
| | Other | 67.00 | (58 - 75) | |
| Settings | Primary Health Care | 75.00 | (67 - 75) | 0.19* |
| | Hospital | 67.00 | (58 - 75) | |
| | Regional Directorate | 75.00 | (58 - 83) | |
| Educational-Level | Diploma | 67.00 | (58 - 75) | **0.001*** |
| | Bachelor | 67.00 | (67 - 75) | |
| | Master | 75.00 | (67 - 83) | |
| | PhD | 75.00 | (67 - 83) | |
| | Board | 75.00 | (67 - 83) | |
| | Fellowship | 75.00 | (67 - 83) | |
| Availability of IPC at your settings | Yes | 75.00 | (62.5 - 75) | **0.001*** |
| | No | 58.00 | (50 - 67) | |
| | Don't know | 58.00 | (50 - 67) | |

*Kruskal-Wallis, Test # Mann-Whitney Test, Q1-Q3: first and third quartiles.

value = 0.004), educational level (P. value = 0.001), and availability of the IPC department at the work of place (P. value = 0.001).

Variables associated with an overall score of knowledge were analyzed using Robust regression analysis, Table 5. Profession, educational level, and availability of the IPC department were statistically significant factors associated with the overall score in Univariate analysis. In multivariate analysis, Profession (P = 0.033), educational level (P = 0.034) and availability of IPC department (P = 0.006) were also statistically significant. The score of physicians was 4.45 times higher than the score of other HCWs (B = 4.45, CI = 0.36 - 8.52, P = 0.033).

Table 5. Variable associated with the overall knowledge score.

| Factor | N (%) | B | (95% CI) | P. Value | B | (95% CI) | P. Value |
|---|---|---|---|---|---|---|---|
| | | | Univariate analysis | | | Multivariate analysis | |
| **Profession** | | | | | | | |
| Physician | 92 (20.7) | 6.909 | (2.78, 11.03) | **0.001** | 4.448 | (0.36, 8.52) | **0.033** |
| Dentist | 21 (4.7) | 4.256 | (−0.66, 9.18) | 0.090 | 2.815 | (−2.12, 7.75) | 0.264 |
| Nurse | 180 (40.5) | 2.259 | (−1.07, 5.58) | 0.185 | 1.662 | (−1.53, 4.86) | 0.309 |
| Pharmacist | 26 (5.9) | 0.329 | (−5.89, 6.55) | 0.917 | 1.018 | (−5.36, 7.40) | 0.755 |
| IPC | 12 (2.7) | −4.696 | (−15.82, 6.43) | 0.408 | −4.127 | (−14.28, 6.02) | 0.426 |
| Other | 113 (25.5) | 1 | | | 1 | | |
| **Educational Level** | | | | | | | |
| Fellowship | 14 (3.1) | 11.420 | (5.59, 17.24) | **0.000** | 6.665 | (0.51, 12.81) | **0.034** |
| Board | 18 (4) | 9.578 | (3.95, 15.20) | **0.001** | 5.769 | (−0.74, 12.28) | 0.083 |
| PhD | 10 (2.2) | 9.134 | (2.64, 15.61) | **0.006** | 5.866 | (−1.05, 12.78) | 0.097 |
| Master | 57 (12.7) | 7.186 | (2.34, 12.02) | **0.004** | 3.974 | (−1.20, 9.15) | 0.133 |
| Bachelor | 222 (49.6) | 4.566 | (1.38, 7.75) | **0.005** | 2.656 | (−0.25, 5.56) | 0.073 |
| Diploma | 127 (28.3) | 1 | | | 1 | | |
| **Availability of IPC at your settings** | | | | | | | |
| Yes | 408 (91.3) | 14.113 | (6.20, 22.01) | **0.000** | 10.927 | (3.20, 18.65) | **0.006** |
| No | 18 (4) | 2.778 | (−8.18, 13.74) | 0.620 | 1.269 | (−9.53, 12.07) | 0.818 |
| Don't know | 21 (4.7) | 1 | | | 1 | | |

Compared with a score of HCWs who hold diploma degree, HCWs who have fellowship were 6.66 higher (B = 6.66, CI = 0.51 - 12.81, P = 0.034). The score of HCWs who have the IPC department and aware about it was 10.92 times higher than those who either didn't have or didn't know (B = 10.92, CI = 3.20 - 18.65, P = 0.006).

The source of information where the respondents heard about COVID-19 is demonstrated in Figure 1. Approximately 33.2% of the HCWs have heard about COVID-19 from MOH information channels, which represent the majority. Media (30.5%) ranked the second more source of information about COVID-19. Social media and place of work showed 22.9% and 12.2%, respectively as another source of information. However, only 1.1% of the respondents reported the source of the information was from their colleagues.

## 4. Discussion

To the best of our knowledge, this is the first study that evaluates the knowledge level of HCWs regarding the current public health issue COVID-19 in Najran city, the southern province of Saudi Arabia. Our study found that the overall knowledge in the HCWs was intermediate (moderate), however, their knowledge
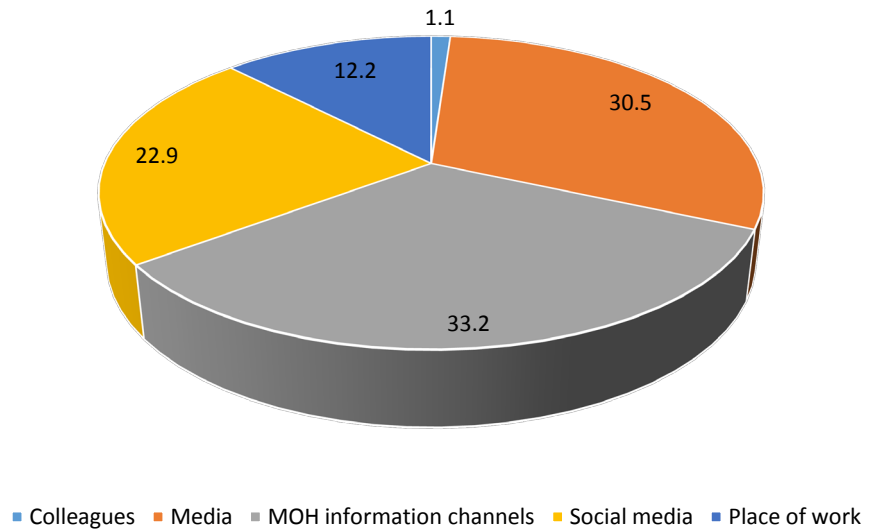
Figure 1. The source of information where did the participants heard about COVID-19.

was low about the source of COVID-19 when it was discovered in China, the mortality rate, and the presence of the treatment. Variability in the knowledge was found among the HCWs based on the profession, educational level, and presence of the IPC department in their healthcare facilities. Therefore, these results demonstrated that the HCWs are still in need of more efforts to increase their knowledge about COVID-19 as they represent the frontline against this disease.

The overall knowledge score in the HCWs of this study was 67% which is very close to the recent study assessing the awareness of COVID-19 diseases among healthcare professionals and students in the Mumbai Metropolitan Region in India which was 71.2% [38]. In 2019, Asaad and colleagues reported that the HCWs in PHC and hospitals at Najran in Saudi Arabia showed a high level of knowledge and positive attitude toward the MERS-CoV [39], nevertheless, the results of a similar survey carried out in HCWs from MOH suggested poor knowledge about MERS-CoV disease [40].

MOH posts guidelines and evidence-based information to educate the staff and guide them to follow the safe and proper strategies during such a public health crisis. Depending on the MOH as the main source of information, is expected to provide staff with adequate knowledge. However, the overall knowledge of staff suggests more efforts are needed to educate staff about this pandemic. This could be explained by the fact that only one-third of the study participants reported that their most source of the information was MOH information channels out of five various sources. In contrast, other studies revealed that their participants used social media and other sources as the main sources of the information [39] [41] [42] [43].

In the present study, most participants had high knowledge about the mode of transmission (78.5%), symptoms (82.9%), the incubation period (96.4%), the way of prevention (91.5%), is the MERS-CoV same as COVID-19 (74.3%) and

availability of vaccine (82.0%). Similar findings have reported previously [39] [44].

On the other hand, the level of the knowledge level among HCWs was low on only three questions. Just 22.5% of the study participants were able to identify the source of COVID-19 when it was first found in China. The reasons behind this were; various sources of information the HCWs were followed and; some pictures that were posted in the social media showing bats and some animals as a source of the infection. Approximately 44.5% of HCWs answered the question related to the mortality rate correctly, whereas it was reported that the global mortality rate was about 3% [45]. In KSA, the mortality rate was less than 1% since the emerging COVID-19. Besides, nearly 32% of participants knew that there was no treatment to cure the infection caused by COVID-19. Similarly, in a study conducted in the north region of KSA found that roughly 35% of the study participants identified there was no drug treatment for MERS-CoV [46].

This study revealed that the knowledge level of participants was variable. Physicians, for example, had high median scores of knowledge (75%) compared to Dentists (67%), Nurse (67%), Pharmacists (67%), IPC staff (62%), and other HCWs (67%). HCWs who had post-graduate qualifications showed better knowledge than those who had a bachelor or diploma degree. Furthermore, the median scores of HCWs who knew availability of IPC department in their settings were higher than those who reported that they did not have IPC department in their working place and those who had not known If the IPC available at their settings, 75%, 58%, and 58%, respectively. Similar findings have been reported before [39].

It is important to ensure the availability of the HCWs mentioned above during implementation of the intervention programs.

In terms of demographic variables that were statistically significantly associated with an overall median score of healthcare staff's knowledge toward the COVID-19; profession, educational level, and availability of the IPC department in the workplace were the only three significant variables. A study conducted in the Al Jouf region reported similar variables (gender, educational level, and occupation) associated with an overall score [46]. However, Khan *et al.* stated that gender and experience were the only two statistically significant demographic variables associated with the overall mean score of the knowledge of the HCWs. [44]. Although other research does not support the association of gender with the knowledge and attitude of HCWs [47], which agrees with our results.

This study has some limitations. First, the possibility of recall and misclassification bias, because it was questionnaire based study. Second, this study was conducted in a single region in the KSA, thus we can't generalize our findings to the entire KSA.

## 5. Conclusion

The findings of this study demonstrated an intermediate level of the knowledge

of HCWs about COVID-19. Yet there are areas where the HCWs have low level of knowledge regarding COVID-19 such as the mortality rate, the source of COVID-19 and the availability of the treatment. Intervention programs are urgently needed to raise the knowledge of HCWs about this global public health issue. National wide study assessing the knowledge of the healthcare providers is also important to ensure that the HCWs are knowledgeable about the COVID-19, and ensuring the HCWs are receiving the information from MOH which is evidence-based source.

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## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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