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## Knowledge Level of Intensive Care Unit and Operating Room Employees During the Early Days of Coronavirus Disease-2019: A Cross-sectional Survey from Turkey

### Koronavirüs Hastalığı-2019'un Erken Döneminde Yoğun Bakım Ünitesi ve Ameliyathane Çalışanlarının Bilgi Düzeyi: Türkiye'den Kesitsel Anket

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**ABSTRACT Objective:** Since the coronavirus is very infectious, preventive measures are at the forefront in the fight against coronavirus disease-2019 (COVID-19). High disease prevalence, rapid increase in the number of patients and high additional workload increase the risk of transmission for health care workers (HCWs). This study aimed to evaluate the knowledge level of intensive care unit (ICUs) and operating room (ORs) employees about COVID-19.

**Materials and Methods:** This study analysed questionnaires of 480 HCWs in the ICU and/or OR. The participants completed a survey consisting of 29 questions that measured the level of knowledge of HCW on COVID-19 through manual methods or online.

**Results:** Our survey involved a total of 480 HCWs who comprised nurses (38.2%), doctors (27.7%), anaesthesia technicians (18.1%) and cleaning personnel (15.8%). For the question "What are high-risk factors of COVID-19?" the respondents answered age 61-80 years (90.6%), comorbidities (89.2%) and being a HCW (85.6%). On-the-job training on COVID-19 was given to only 46.9% of all participants. Moreover, 61.6% of the participants stated that they had hospital procedures on COVID-19. Social media (81.9%) was the most common source of information. In addition, 74.8% of the participants were anxious about COVID-19, and 63.4% said that they wear a surgical mask only when they contact patients.

**Conclusion:** To ensure continuity in health care, HCWs, especially cleaning personnel who are often in contact with patients suspected with or patients with confirmed COVID-19, should use personal protective equipment, undergo on-the-job training programmes on the pandemic at regular intervals and be screened routinely.

**Keywords:** COVID-19, surveys and questionnaires, knowledge, health care, on-the-job training

**ÖZ Amaç:** Koronavirüs çok bulaşıcı olduğu için koronavirüs hastalığı-2019 (COVID-19) ile mücadelede önleyici tedbirler ön plandadır. Yüksek hastalık prevalansı, hasta sayısındaki hızlı artış ve artan ek iş yükü, sağlık çalışanlarına bulaşma riskini artırır. Bu çalışmada, yoğun bakım ünitesi (YBÜ) ve ameliyathane çalışanlarının COVID-19 hakkındaki bilgi düzeylerini değerlendirmeyi amaçladık.

**Gereç ve Yöntem:** Çalışmada YBÜ ve/veya ameliyathanede 480 gönüllü sağlık çalışanlarının cevapladığı sorular analiz edildi. Katılımcılar COVID-19'da sağlık çalışanlarının bilgi düzeyini ölçen, 29 sorudan oluşan anketi elle veya internet üzerinden tamamladılar.

**Bulgular:** Anketimize hemşire (%38,2), doktor (%27,7), anestezi teknisyeni (%18,1) ve temizlik personeli (%15,8) olmak üzere toplam 480 sağlık çalışanı katıldı. "Koronavirüsün bulaşma riskleri nelerdir?" sorusu: 61-80 yaş arasında olmak (%90,6), ek hastalıklara sahip olmak (%89,2) ve sağlık çalışanı olmak (%85,6) olarak yanıtlandı. Tüm katılımcıların sadece %46,9'una COVID-19 hakkında kurum içi eğitim verildiği belirlenmiştir. Katılımcıların %61,6'sı COVID-19'da hastane prosedürü olduğunu belirtmiştir. Sosyal medya (%81,9) bilgi almanın en yaygın yolu oldu. Katılımcıların %74,8'i COVID-19 konusunda endişeliydi. Katılımcıların %63,4'ü sadece hasta ile temas ettiklerinde cerrahi maske taktıklarını söylemiştir.

**Sonuç:** Sağlık hizmetlerinde sürekliliği sağlamak için, şüpheli/kesin COVID-19 ile temas halinde olan sağlık çalışanlarının özellikle de temizlik personellerinin kişisel koruyucu ekipmanları etkin bir şekilde kullanmaları, pandemi hakkında düzenli aralıklarla kurum içi eğitim programlarına katılmaları ve rutin olarak taranmaları gerektiğini düşünüyoruz.

**Anahtar Kelimeler:** COVID-19, anketler ve sorular, bilgi, sağlık hizmetleri, kurum içi eğitim

## Introduction

Coronaviruses (CoVs) are a family of viruses that can cause simple colds and more serious infections (1,2). The World Health Organization (WHO) has declared coronavirus disease-2019 (COVID-19) infection as a pandemic because of increasing cases and mortality rates worldwide (3). In our country, the Ministry of Health has rapidly planned prevention and treatment protocols for COVID-19.

Hospitals, especially operating rooms (ORs) and intensive care units (ICUs), are areas with high contagious risk in terms of airway and patient contact. High disease prevalence, the rapid increase in the number of patients, and increased additional workload increase the risk of transmission for health care workers (HCWs). The fact that HCWs have insufficient awareness of COVID-19 prevention or have wrong information increases the risk of transmission (4). The literature reports that lack of information and misunderstandings among HCWs lead to delayed diagnosis, increased disease spread, and decreased infection control. Therefore, the levels of knowledge and education of HCWs play an important role in the effective control of pandemics (5,6).

The primary purpose of this study was to evaluate the knowledge level of ICU and OR employees of COVID-19. The secondary aim was to raise awareness among HCWs and to assist health authorities in the prevention of occupational exposure in combating COVID-19.

## Materials and Methods

This survey, which was approved by the Local Ethics Committee of the University of Health Sciences Turkey, Bursa Yüksek İhtisas Training and Research Hospital (decision no: 2011-KAEK-25 2020/03-17, date: 18.03.2020), began on March 21, 2020, and was completed in 15 days. Four hundred eighty three volunteer HCWs in the ICU and/or OR were included in the study. Those who had worked in the OR or ICU for less than 3 months and those who did not speak Turkish were excluded. A questionnaire consisting of 29 questions, measuring the level of knowledge of HCWs on COVID-19, was completed by the participants by hand or via the internet (<https://docs.google.com/forms/d/1Nkuykhg5XGsCL2oAWrVFGOWGATa6Rac1zv06Ou4YDXM/edit>). Informed consent forms were obtained before data collection by the researchers and were emailed to the participants of the study via the internet. Six questions of 29

are about demographic data and others are for measuring the level of knowledge of HCWs on COVID-19.

## Statistical Analysis

Data was analyzed using the IBM SPSS 21 Windows (Statistical Package for the Social Sciences, Armonk, NY, USA) program. While categorical variables are expressed as number and percentage, differences between groups were analyzed with the chi-square test. The results were evaluated within the 95% confidence interval and  $p < 0.05$  was considered significant. Post-hoc Tukey multiple comparison test was performed for comparisons of independent groups.

## Results

Three questionnaires were not included in the study because they were completed less than 25%. A total of 480 volunteer HCWs' questionnaires were analyzed statistically. Demographic data, methods for obtaining current information about COVID-19, and anxiety levels are given in Table 1. Only 46.9% of the respondents stated that they received training by their institutions and 61.6% stated that they had hospital procedures for COVID-19 (Table 1). The responses to the questions measuring the level of knowledge of the participants are given in Table 2. The most frequent answers in the questionnaire were droplets (93.1%) for the question "What are COVID-19 transmission routes?", respiratory failure (97.7%) for the question "What are the symptoms of COVID-19?", age 61-80 (90.6%) for the question "Who are the high-risk groups?", for 14 days following contact (63.9%) for the question "What is the time of infectiousness?", fever (96.9%) for the question "What symptoms should be suspected in COVID-19?". 63.4% of the participants preferred to wear a surgical mask only in contact with patients. "Endotracheal intubation should be performed by trained and experienced HCWs" was selected by 91.4% of participants.

According to professional titles, statistical analysis was done by dividing participants into five groups: Doctor (D), ICU nurse (IN), surgery nurse (SN), anesthesia technician (AT), and hospital cleaning personnel (CP). Group IN had significantly fewer years of work than group D, group SN, group AT ( $p < 0.001$ ), and group CP ( $p = 0.006$ ).

Wearing gloves was significantly less in group CP compared to group D ( $p = 0.004$ ) and group AT ( $p = 0.004$ ). Using a face shield was significantly lower in group CP than group D, group AT, and group IN ( $p < 0.001$ ). The use of N95/97

<b>Table 1. Demographic data</b>	
Participation in the survey (n=480)	n (%)
<b>Gender</b>	
Female	292 (60.8)
Male	188 (39.2)
<b>Age</b>	
21-30	202 (42.1)
31-40	141 (29.4)
41-50	110 (22.9)
51-60	24 (5.0)
>60	3 (0.6)
<b>Working years</b>	
1-5	151 (31.9)
6-10	111 (23.5)
11-15	78 (16.5)
16-20	61 (12.9)
>20	72 (15.2)
<b>Profession</b>	
Doctor	133 (27.7)
Surgery nurse	49 (10.2)
ICU nurse	135 (28.1)
Anesthesia technician	87 (18.1)
Cleaning personnel	76 (15.8)
<b>Institution</b>	
University hospital	29 (6.0)
Training and research hospital	341 (71.0)
City/public hospital	84 (17.5)
Private hospital	26 (5.4)
<b>Study unit</b>	
General ICU	96 (20.0)
OR	197 (41.0)
Together with general ICU and OR	81 (16.9)
Other ICU	106 (21.1)
<b>On-the-job training</b>	225 (46.9)
<b>Hospital procedure</b>	282 (61.6)
<b>Presence of negative pressure in ICU</b>	211 (48.0)
<b>Presence of negative pressure in OR</b>	165 (38.6)
<b>Ways to get updated information</b>	
Not following	10 (2.1)
Social media	393 (81.9)
Newspaper	86 (17.9)
Television	375 (78.1)
Radio	74 (15.4)
People around	150 (31.3)
Original articles	140 (29.2)

<b>Table 1. Continued</b>	
Participation in the survey (n=480)	n (%)
<b>Anxiety level</b>	
None	4 (0.8)
Mild	117 (24.4)
Moderate	177 (36.9)
Severe	182 (37.9)
ICU: Intensive care unit, OR: Operating room	

<b>Table 2. Questions and answers related to the level of knowledge</b>	
Participation in the survey (n=480)	Yes, n (%)
<b>What are the transmission routes for COVID-19?</b>	
Droplet	447 (93.1)
Respiratory	387 (80.6)
Close contact	392 (81.7)
Blood	128 (26.7)
Body fluids	236 (49.2)
Sexual contact	131 (27.3)
<b>What are the clinical conditions caused by COVID-19?</b>	
Simple colds	272 (56.7)
Respiratory failure	469 (97.7)
Kidney failure	164 (34.2)
Liver failure	106 (22.1)
Neurological failure	102 (21.3)
Gastrointestinal system dysfunction	126 (26.3)
<b>Who are the high-risk groups in COVID-19?</b>	
Healthcare workers	411 (85.6)
<11 age	33 (6.9)
11-20 ages	27 (5.6)
21-40 ages	64 (13.3)
41-60 ages	136 (28.3)
61-80 ages	435 (90.6)
>80 age	417 (86.9)
Comorbidities	428 (89.2)
Being abroad	390 (81.3)
Contact with a person who was abroad	375 (78.1)
<b>When is COVID-19 infectious?</b>	
One week previous	163 (34.2)
1-2 days previous	130 (27.3)
For one week	67 (14.1)
For 14 days	304 (63.9)
For 1 month	78 (16.4)

<b>Table 2. Continued</b>	
Participation in the survey (n=480)	Yes, n (%)
<b>How long does COVID-19 stay in the environment?</b>	
Does not survive	23 (4.8)
A few minutes	11 (2.3)
A few hours	108 (22.6)
1 day-1 week	142 (29.7)
Unknown	176 (36.8)
Variable according to the environment	315 (68.3)
<b>What are the suspected symptoms and conditions for COVID-19?</b>	
Cough	446 (92.9)
Fever	458 (96.9)
Weakness	349 (72.7)
Respiratory distress	452 (94.2)
Diarrhea	203 (42.3)
Nausea/vomiting	169 (35.2)
Cannot be explained by any other clinical situation	179 (37.3)
Being abroad	426 (88.8)
Close contact with the patient	424 (88.3)
Worsening of the clinical situation	280 (58.3)
Does the presence of another respiratory infection eliminate the suspicion of COVID-19?	39 (8.1)
<b>Where is a COVID-19 sample taken from?</b>	
Mouth	332 (70.5)
Nose	329 (69.9)
Sputum	252 (53.5)
Tracheal aspirates	254 (53.9)
Bronchoalveolar lavage	138 (29.3)
Blood	173 (36.7)
Urine	36 (7.6)
<b>When should a surgical mask be worn in hospital?</b>	
All time	164 (34.2)
In contact with patients	305 (63.4)
Never	12 (2.5)
Continuously since the pandemic started	123 (25.6)
<b>Which should be used for PPE and disinfection for COVID-19?</b>	
Surgical mask	241 (50.2)
Gloves	456 (95.0)
Faceshield	405 (84.4)
N95/99 mask	440 (91.7)
Liquid soap	290 (60.4)
Alcohol based hand disinfectant	378 (78.8)
1:10 dilution sodium hypochlorite	140 (29.2)
Apron	414 (86.3)

<b>Table 2. Continued</b>	
Should any preventive action be taken for a person who has been in close contact with a possible COVID-19 case?	434 (90.4)
Should people who are in close contact with a definitive COVID-19 case be followed up at home for 14 days?	421 (87.7)
<b>When should PPE be worn in COVID-19?</b>	
Close contact with a patient's body fluids and secretions	434 (90.6)
Contact with a patient closer than 1 meter	389 (81.0)
Being in the same room with a patient for more than 15 minutes	330 (68.8)
Accompanying the transport of suspicious cases	404 (84.2)
<b>What should be the procedure with medical equipment to be used for a COVID-19 positive patient?</b>	
Should not be used in common	435 (90.6)
Should not be taken out of the room	413 (86.0)
If it is to be taken out of the room, it must be disinfected	378 (78.9)
<b>How should endotracheal intubation be performed?</b>	
It should be done by educated and experienced people	352 (91.4)
Rapid serial intubation should be done	299 (77.5)
Positive pressure should be ventilated after the cuff is inflated	250 (64.8)
Closed suction system should be used	294 (76.2)
Non-invasive ventilation should be avoided when secretions can't be controlled	251 (65.0)
Balloon mask ventilation should not be used if possible	193 (50.0)
PPE: Personal protective equipment, COVID-19: Coronavirus disease-2019	

masks was significantly less in group CP compared to group D (p=0.010), group IN (p=0.004), group SN (p=0.001), and AT (p<0.001). Apron/overall use was significantly lower in group CP than group D, group IN, group SN, and group AT (p<0.001, p<0.001, p=0.029, p=0.001, respectively). The use of liquid soap was significantly lower in group AT compared to group IN (p=0.056, Table 3).

Questions on endotracheal intubation were asked to the four groups except group CP (Table 4). "Should endotracheal intubation be done by educated and experienced people?" was answered correctly by group D (group SN p<0.001, group IN p=0.001), and group AT (group SN p=0.001, group IN p=0.015). "Should rapid serial intubation be performed?" was more correctly replied by group D (group SN p<0.001, group IN p=0.028), by group AT (group SN p<0.001, group

IN  $p=0.035$ ), and by group IN (group SN  $p<0.001$ ). Group D responded correctly to the question "Should positive pressure ventilation be initiated after inflation of the cuff?" compared to the other groups (group SN  $p<0.001$ , group IN  $p=0.001$ , group AT  $p=0.004$ ). There was a significant difference between group D and the other groups (group SN  $p<0.001$ , group IN  $p<0.001$ , and group AT  $p=0.001$ ) to the question "Should a closed system aspiration system be used?". For the question "Should non-invasive ventilation be avoided in cases where secretions cannot be controlled?", group D answered significantly more correctly compared to group SN and group IN ( $p<0.001$ ), and group SN had significantly less accurate answers (group AT  $p<0.001$ , and group IN  $p=0.012$ ). Group D and group AT gave correct answer to the question "Should balloon mask ventilation be used if possible?" compared to the other groups ( $p<0.001$ ).

It was observed that group IN received significantly more on-the-job training than the other groups. Among the ways of obtaining up to date information about COVID-19, social media follow-up was found to be significantly higher

in group IN than in group CP ( $p=0.012$ ). Compared to group D, the other groups were significantly higher in obtaining information from television. In follow-up from original articles, group D was significantly higher than the other groups ( $p<0.001$ , Table 5).

## Discussion

To best of our knowledge, this is the first study that has thoroughly assessed the knowledge of HCWs on COVID-19, in Turkey. In our country, the first case of COVID-19 was seen on March 11, 2020, and the first death occurred on March 17, 2020. On March 21, 2020, the total number of cases was 947 and the total number of people who died was 21. On April 5, 2020, the total number of cases was 27,069 and the number of people who lost their lives was 574. At the beginning of April, the number of patients who died daily ranged from 60 to 100. We performed this survey during the early stage of COVID-19, 10 days after the first case was seen in Turkey. The biggest problem in the pandemic

**Table 3. Distribution of the use of personal protective equipment and disinfection material for coronavirus disease-2019 by groups**

	Grup D n (%)	Grup IN n (%)	Grup SN n (%)	Grup AT n (%)	Grup CP n (%)	P
<b>Surgical mask</b>	72 (54.1)	68 (50.4)	24 (49.0)	44 (50.6)	33 (43.4)	0.689
<b>Gloves</b>	130 (97.7)	128 (94.8)	46 (93.9)	86 (98.9)	66 (86.8)	0.004
<b>Face shield</b>	123 (92.4)	116 (85.9)	38 (77.6)	79 (90.8)	49 (64.4)	<0.001
<b>N95/99 mask</b>	122 (91.7)	125 (92.6)	48 (98.0)	85 (97.7)	60 (78.9)	<0.001
<b>Liquid soap</b>	83 (62.4)	91 (67.4)	34 (69.4)	43 (49.4)	39 (51.3)	0.020
<b>Alcohol based hand disinfected</b>	106 (79.7)	109 (80.7)	42 (85.7)	69 (79.3)	52 (68.4)	0.154
<b>1:10 dilution sodium hypochlorite</b>	47 (35.3)	36 (26.7)	16 (32.7)	22 (25.3)	19 (25.0)	0.352
<b>Apron</b>	125 (94.0)	123 (91.1)	41 (83.7)	75 (86.2)	50 (65.8)	<0.001

COVID-19: Coronavirus disease-2019, D: Doctor, SN: Surgery nurse, AT: Anesthesia technician, CP: Cleaning personnel, IN: ICU nurse

**Table 4. Approach for endotracheal intubation according to groups**

	Grup D n (%)	Grup IN n (%)	Grup SN n (%)	Grup AT n (%)	Grup CP n (%)	P
<b>Trained and experienced people</b>	129 (98.5)	103 (85.1)	36 (78.3)	84 (96.6)	-	<0.001
<b>Fast serial intubation</b>	116 (88.5)	92 (75.4)	13 (28.3)	78 (89.7)	-	<0.001
<b>Positive pressure ventilation with cuff being inflated</b>	107 (81.7)	73 (59.8)	18 (39.1)	52 (59.8)	-	<0.001
<b>Using closed suction system</b>	123 (93.9)	88 (72.1)	19 (41.3)	64 (73.6)	-	<0.001
<b>Avoiding NIV when secretions cannot be controlled</b>	110 (84.0)	66 (54.1)	14 (30.4)	61 (70.1)	-	<0.001
<b>Do not ventilate with balloon mask if possible</b>	91 (69.5)	42 (34.4)	7 (15.2)	53 (60.9)	-	<0.001

D: Doctor, SN: Surgery nurse, AT: Anesthesia technician, CP: Cleaning personnel, NIV: Non-invasive ventilation, IN: ICU nurse

**Table 5. Ways of obtaining information, on-the-job training, and anxiety level distribution by groups**

	Grup D n (%)	Grup IN n (%)	Grup SN n (%)	Grup AT n (%)	Grup CP n (%)	p
<b>On-the-job training</b>	54 (40.6)	87 (64.4)	19 (38.7)	40 (45.9)	25 (32.8)	<0.001
<b>Obtaining information</b>						
Social media	106 (79.6)	118 (87.4)	42 (85.7)	74 (85.0)	53 (69.7)	0.019
Newspaper	26 (19.5)	26 (19.3)	10 (20.4)	13 (14.9)	11 (14.4)	0.782
Television	82 (61.6)	110 (81.5)	43 (87.7)	73 (83.9)	67 (88.1)	<0.001
Radio	18 (13.53)	16 (11.9)	11 (22.4)	12 (13.7)	17 (22.3)	0.163
People around	45 (33.8)	48 (35.6)	19 (38.7)	21 (24.1)	17 (22.3)	0.103
Orginal articles	68 (51.1)	32 (25.0)	10 (20.4)	23 (26.4)	7 (9.2)	<0.001
Not follow	5 (3.7)	2 (1.5)	0 (0)	2 (2.2)	1 (1.3)	0.501
<b>Anxiety level</b>						
None	2 (1.5)	1 (0.7)	0 (0)	0 (0)	1 (1.3)	0.603
Mild	31 (23.3)	37 (27.4)	10 (20.4)	18 (20.7)	21 (27.6)	
Moderate	52 (39.1)	53 (39.3)	13 (26.5)	33 (37.9)	26 (34.2)	
Severe	48 (36.1)	44 (32.6)	26 (53.1)	36 (41.4)	28 (36.8)	
D: Doctor, SN: Surgery nurse, AT: Anesthesia technician, CP: Cleaning personnel, IN: ICU nurse						

all over the world is that the health sector and professionals are unprepared, not having enough knowledge on the new CoV. A high incidence of CoV transmission in HCW has been observed in the world due to the lack of personal protective equipment (PPE) and information, and some HCW cases have been fatal. 3.8% of COVID-19 cases in China are HCW (4). The late start of COVID-19 cases in Turkey has been a significant advantage for providing PPE to the health care sector compared to China and some European countries.

COVID-19 has no specific symptoms or clinical course that can be distinguished from other viral respiratory infections. In one study, 138 patients with an average age of 56 had fever (99%), dry cough (59%), fatigue (70%), and nausea-vomiting (10%) (7). While the WHO has described the most common symptoms as fever, fatigue, and dry cough, other symptoms include dyspnea, muscle pain, sore throat, and diarrhea (8). In our survey, fever (96.9%), respiratory distress (94.2%), and cough (92.9%) were answered as the most common symptoms, showing us that the participants had sufficient knowledge on symptoms of COVID-19.

Although the contamination time is not known exactly for COVID-19, which is transmitted from person to person, the first days of the disease are considered to be riskier in terms of contamination (9). In the report published by the WHO on February 19, it was declared that the average incubation period was 4-5 days, but extends up to 14 days

(10). In our survey, most of the participants (78%) preferred the answer "during the first 1-2 weeks" for the contagious period of the disease. The CoV can remain alive for different periods on various surfaces in the external environment and is mainly transmitted through the mucous membrane after contact with droplets that infected people scatter on surfaces (11,12). 68.3% of the participants in our survey responded that the CoV survival time varies according to the environment. Although COVID-19 is seen in all age groups, it has been shown that especially older adults are more sensitive and that the severity of the disease is related to age (13). It is known that comorbidities such as hypertension, diabetes, and cardiovascular disease increase the severity of the disease, as well as the rate of fatality (14). In our survey, 61-80 years (90.6%), presence of additional diseases (89.2%), and being HCW (85.6%) were stated as being at high risk for COVID-19. Our government, with quick decisions about health policy, has decided not to employ high-risk HCWs who have comorbidities. In our survey, over 68% of participants responded correctly to questions about the infectiousness of the new CoV, showing that COVID-19 preparation was well planned in the early period of the pandemic in Turkey.

It is important for HCWs to quickly access accurate information throughout the pandemic. Depending on the advancement of technology, it is very easy to access

information in our era, but the reliability of information sources is controversial. Studies reported that social media as the main source of information was used by participant HCW (15,16). In our survey, 81.9% of the participants reached information on social media, while only 29.2% benefited from current original articles. Among the reasons for following-up less original articles, which are the more scientific and reliable way to access correct information, are the fact that the articles are in a foreign language.

Saqlain et al. (15) recommended that the government start well-planned training programs to increase the knowledge of all HCWs in the effective control of COVID-19. In Turkey, associations have produced online education programs and the health ministry has published a guide for COVID-19. A cross-sectional another survey analyzed a total of 1,357 HCW's knowledge, practices, and attitudes regarding COVID-19. Authors' suggestion that training regarding protection from CoV should be organized according to work experience, and educational attainment. To reduce the risk of infection among HCW, education should be implemented protection from exposure to the virus (3). Hospitals should also provide up-to-date and accurate information with on-the-job training to protect HCWs from COVID-19, and standard prevention and infection control procedures should be determined, especially for high-risk units (COVID positive service, emergency service, ICU and OR, etc.). In our study, 46.9% of the respondents stated that they received on-the-job training and 61.6% of the respondents stated that they have a procedure for COVID-19 in their hospitals. These rates are less than expected. It is an indication that chaos may occur with the first case of COVID-19 and therefore the risk of transmission to HCW will increase. In our survey, intensive care nurses received more on-the-job training on COVID-19 than other HCWs, but there was no difference in using PPE. However, it was determined that ICU and OR CP use PPE less than other groups. The reason why INs do not have a significant difference in questions evaluating the level of knowledge compared to other groups may be attributed to fewer years of work and experience in healthcare. It was observed that not all health workers were reached if the on-the-job training was given only once. To protect HCW from contamination in pandemics, the frequency of on-the-job training should be increased and it should provide correct information to all HCWs by updating training programs.

Since the CoV is very infectious, it is important to maintain social distance, pay attention to hand hygiene and

wear a mask (17,18). N95/N97 filtration masks are used in high-risk airway intervention with higher exposure to aerosol spread such as intubation, percutaneous tracheostomy, and bronchoscopy. Many organizations, including the WHO, and European Center for Disease Control report that the types of equipment should consist of N95/97 filtration masks, glasses, apron/overalls, and double gloves for COVID-19 (19-21). However, 63.4% of the HCWs who participated in our survey stated that they preferred to wear a surgical mask only when they had contact with a patient. It has been determined that ICU and OR CP used PPE significantly less than other HCWs. A significant proportion of patients are asymptomatic in the perioperative period. It isn't possible to determine infection precisely because of the low sensitivity of laboratory tests and defects in sampling techniques. It is recommended to have 3 min preoxygenation before intubation, avoid balloon-mask positive pressure ventilation, rapid-serial intubation, and not have contact with respiratory secretions as much as possible (22). In our survey, Ds and ATs, who are more experienced in airway management, gave more appropriate answers to the recommendations of the Ministry of Health. As a result, all members of the anesthesia team fighting at the front line of COVID-19 must use PPE, especially high-risk airway interventions with higher exposure to aerosol spread (23).

Similar to other countries, in our country the anxiety associated with the uncertainty of COVID-19 is increased by the fact that the issue is handled all day in the media. "Infodemia", that is, the spread of wrong and unnecessary information besides correct information, and the high transmission and mortality rates of COVID-19, increase anxiety disorder among HCWs. In a survey conducted by Zhang et al. (3), over 85% of 1,357 HCW were afraid of self-infection with the virus. In our study, 74.8% of the participants said that they felt moderate or severe anxiety. As HCW often regard as increased risk of infection, they often worry about family transmission, especially involving family members who are elderly, immunosuppressive, or have chronic diseases (24). We believe that HCW's anxiety levels with COVID-19 will be reduced by feeling safe while providing health care if they can easily access correct information and have no problem with the supply of PPE.

In two studies similar to our study in China and Nepal, they investigated the knowledge and attitudes of healthcare workers in the early period of COVID-19 (3,25). A survey involved a total of 1,357 HCW who comprised nurses

(46.5%), Ds (36.5%), paramedics (17.0%) (3). In the other survey, a total of 353 responses was analyzed, out of which 47% were nurses, 28.9% were Ds, 11.6% were health assistants, 2% were certified medical assistants, and the remaining 10.5% were categorized as others (pharmacists, medical lab technologists, and medical microbiologists) (25). Our survey involved a total of 480 HCW who comprised nurses (38.2%), Ds (27.7%), ATs (18.1%), and ICU and OR CP (15.8%). In COVID-19, this study is the first to measure the knowledge level of hospital cleaning staff in the literature.

This study conducted by hand and online among HCWs during the period of the first cases reported in our country and we were unable to obtain later information from the participants. This was partly an online survey, responses mainly dependent on honesty and may have been subject to recall bias. A few number of participants and sample clustering might also limit the generalizability of the study.

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## Conclusion

The COVID-19 pandemic continues with unknown effects in Turkey as well as all over the world. The fact that cases started in our country later than in China and some European countries could be significant advantages that the health care capacity has not been exceeded and the relatively

young age structure of our population. In order to ensure continuity in health care, HCWs who are in contact with suspect/definitive COVID-19 should use PPEs effectively, have on-the-job training programs on the pandemic at regular intervals, and be screened routinely with polymerase chain reaction tests for diagnosis of CoV.

## Ethics

**Ethics Committee Approval:** The study were approved by the Local Ethics Committee of the University of Health Sciences Turkey, Bursa Yüksek İhtisas Training and Research Hospital (decision no: 2011-KAEK-25 2020/03-17, date: 18.03.2020).

**Informed Consent:** Informed consent forms were obtained before data collection by the researchers and were emailed to the participants of the study via the internet.

**Peer-review:** Externally peer-reviewed.

## Authorship Contributions

Concept: C.Y., A.N.B., Design: C.Y., A.N.B., Data Collection and Process: H.E.S., S.Y., Analysis or Interpretation: FA., S.Y., Ç.B., Literature Search: A.N.B., H.E.S., Ü.K., Ç.B., Writing: C.Y., FA., Ü.K., Ç.B.

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