Volume 12, Issue 3, Page 86-92, 2023 https://doi.org/10.46810/tdfd.1333479 Research Article

BİNGÖL ÜNİVERSİTESİ

Türk Doğa ve Fen Dergisi
Turkish Journal of Nature and Science

www.dergipark.gov.tr/tdfd

Methods, Equipment and Other Methods Used by Healthcare Professionals to Protect from New Type of Coronavirus (SARS-Cov-2)

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(Received: 27.07.2023, Accepted: 04.09.2023, Online Publication: 27.09.2023)

Keywords
COVID-19, Healthcare workers, Personal protective equipment, Protection methods

Abstract: In this study, it was aimed to examine the knowledge and protection levels of healthcare workers against COVID-19 disease. The study population consisted of 203 healthcare workers (Doctor: 30, Nurse: 104, Janitor: 21, Midwife: 48) who accepted to participate in the study in the Emergency Department of Malatya Training and Research Hospital between August 06 and December 31, 2020. According to the current findings of the study, it was observed that there may be a relationship between COVID-19 and the method used to protect healthcare workers and personal protective equipment. We believe that the findings of the study will help to develop protection strategies for workers in the event of a COVID-19 pandemic. In light of the ongoing global impact of the COVID-19 pandemic, it is imperative to proactively devise interventions and implement well-considered strategies aimed at safeguarding the health and well-being of healthcare professionals.

Sağlık Çalışanlarının Yeni Tip Koronavirüsten (SARS-Cov-2) Korunmak için Kullandıkları Yöntemler, Ekipmanlar ve Diğer Yöntemler

Anahtar Kelimeler
COVID-19, Sağlık çalışanları, Kişisel koruyucu ekipman, Korunma yöntemleri

Öz: Bu çalışmada sağlık çalışanlarının COVID-19 hastalığına karşı bilgi ve korunma düzeylerinin incelenmesi amaçlanmıştır. Çalışma evrenini 06 Ağustos - 31 Aralık 2020 tarihleri arasında Malatya Eğitim ve Araştırma Hastanesi Acil Servisinde çalışmaya katılmayı kabul eden 203 sağlık çalışanı (Doktor: 30, Hemşire: 104, Hizmetli: 21, Ebe: 48) oluşturmuştur. Çalışmanın mevcut bulgularına göre COVID-19 ile sağlık çalışanlarını korumak için kullanılan yöntem ve kişisel koruyucu ekipman arasında bir ilişki olabileceği gözlemlenmiştir. Çalışmanın bulgularının, bir COVID-19 pandemisi durumunda çalışanlar için koruma stratejileri geliştirilmesine yardımcı olacağına inanıyoruz. COVID-19 pandemisinin devam eden küresel etkisi ışığında, sağlık çalışanlarının sağlığını ve refahını korumayı amaçlayan müdahalelerin proaktif olarak tasarlanması ve iyi düşünülmüş stratejilerin uygulanması zorunludur.

1. INTRODUCTION

Pneumonia cases first appeared in Wuhan, China in December 2019, and were later discovered to be caused by a new form of coronavirus (SARS-CoV-2) agent [1]. SARS-CoV-2, which is believed to be the first cause of infection in wild animals, can be spread easily from person to person and can be carried asymptomatically [2]. COVID-19 is the name of the virus-caused disease table. Fever, cough, and shortness of breath are the most common symptoms, but gastrointestinal symptoms can also occur [3]. The virus has spread from China to the rest of the world due to the possibility of human-to-human transmission during the asymptomatic period [4]. The World Health Organization (WHO), in its statement on March 11, 2020, claimed that more than 118 thousand cases and 4291 deaths were seen in 114 countries, and Covid described 19 as a pandemic [5]. The first case was detected in Turkey reported on 11 March 2020 [6]. The number of cases continues to increase.

Healthcare workers have also started to be infected with SARS-CoV-2 since the outbreak had started. It was stated that 2055 healthcare workers were infected in China on February 20, 2020 [7]. As of 8 April 2020, the World Health Organization reported that a total of 22.073 healthcare workers from 52 different countries were infected [8]. It is predicted that the number in the world is much higher than this number. It has been announced that 15 thousand 315 healthcare workers were infected in Italy on April 10, 2020, and this number corresponds to 11% of the total infected patients [8,9]. In Turkey, on April 29 2020, according to the statement of the minister of health, 7 thousand 428 health care workers were recorded to be infected [6].

The duration of contact and the amount of virus found to be correlated with infection rates in studies conducted on infected healthcare workers [10]. Caring for a large number of infected patients over a long period of time increases the risk of infection [11]. Departments operating at the frontline and conducting processes that produce aerosols are especially vulnerable during the pandemic [12]. In a research conducted in the United States of America and England, it was presented that healthcare workers working in the front phase are at least 3 times more likely to be infected than the rest of the population. Although the use of personal protective equipment reduced the risk, it did not reduce the likelihood of infection to the same level as in the general population [13].

During the pandemic, healthcare workers' daily working patterns had to be fully altered. Prior to COVID-19, healthcare professionals who deal with patients in respiratory distress did not use routine personal protective equipment (PPE). As shown by COVID-19 patients with atypical presentations, the use of personal protective equipment (PPE) by healthcare professionals has become routine, depending on the risks of the department in which they work. The methods of triage used in hospital applications have changed. Patients with high fever and COVID-19-like complaints like shortness of breath and cough were quickly evaluated separately from other patients and began to be taken into isolated environments [14,15].

During this period, healthcare professionals are advised to use personal protective equipment such as masks, goggles, gloves, visors, and aprons during their working periods [16]. It is thought that the insufficiency of PPE increases the incidence of infection in healthcare workers [17]. In addition to protective equipment, hand hygiene is regarded as one of the most vital steps to prevent infection. Healthcare workers with insufficient hand hygiene after contact with patients have been found to have a higher risk of contracting COVID-19 disease [18].

Due to a rise in the number of infected patients, healthcare professionals from each department have been assigned to identify and treat COVID-19 patients that are outside of their area of expertise. One of the reasons for the high infection rates among healthcare workers in China is a failure to provide sufficient information and training to front-line healthcare workers, as well as an inability to provide infection controls due to emergency situations [19].

The asymptomatic carriage has been found to have a significant place in SARS-CoV-2 transmission (20). Since healthcare workers are at higher risk of infection, it has been shown that they can become contagious with asymptomatic carriage [21]. This situation has yielded many healthcare professionals to distance themselves from their families and relatives. In Turkey, together with the world's health workers in many countries, thinking that they pose a risk in their homes, they left or were forced to isolate themselves from the vicinity of their homes in the pandemic period.

COVID-19 can be spread by droplets and interaction with polluted surfaces, putting healthcare workers at risk [22]. They must wear personal protective equipment such as masks, goggles, visors, and overalls to stay safe [23]. This condition raises the possibility of psychological issues in healthcare workers. Healthcare workers in hospitals, especially those diagnosed with COVID-19 and caring for suspected patients, may experience mental health problems as a result of their fear of infecting the virus and spreading it to others [24].

In order to carry out all strategies in epidemic management, it is critical to protect healthcare workers from the factor. Infection among healthcare workers would have a negative impact on the delivery of healthcare facilities, resulting in a reduction in the health system's response to the epidemic and an uncontrolled rise in the incidence rate [20]. Healthcare professionals in hospitals and pre-hospital areas, in particular, have no way of knowing if the patient or injured they are in close contact with has COVID-19, and they are competing with time, so they are more likely to become infected [25]. Based on this context, the purpose of the study is to examine the knowledge and protection levels of healthcare professionals against COVID-19 disease.

2. MATERIAL AND METHOD

This study was approved by the ethics committee of Malatya Training and Research Hospital (approval number: 23536505-000-13874). All the study subjects were assured that participation in the study was voluntary and that all information provided would remain confidential.

2.1. Design

One of the quantitative research techniques used in this study was the relational scanning model. The aim of relational scanning is to find the levels of variance in two or more variables. The relational screening model is described as “a research model that aims to determine whether there is a shift between two or more variables and, if there is, the degree of this change” [26]. The study population consisted of 203 healtycare professionals (Doctor: 30, Nurse: 104, Janitor: 21, Midwife: 48)

between 06 August and 31 December, 2020 who agreed to participate in the study.

2.2. Data Collection Tools

The literature on healthcare personnel's knowledge and protection levels against COVID 19 was scanned as the research's data collection tool, and appropriate modifications were made based on the opinions of field experts.

A questionnaire with 17 questions was utilized to assess the duties of the healthcare professionals who made up the study's sample, as well as their knowledge and protection levels against COVID-19.

The questions in the questionnaire form used within the scope of the research include whether or not healthcare professionals have received COVID-19 training, the country and year in which COVID-19 spread, the risk of transmission of COVID-19, is about their self-protection status (social distance, frequency of cleaning their hands with disinfectant during working hours, protective equipment they use) in hospital work areas, the status of passing and passing COVID-19 disease.

2.3. Statistical Analysis

In this study, various analyses were conducted using SPSS 25 statistical analysis software. First, the demographic characteristics of the participants were analyzed using frequency analysis and percentage calculations. Then, the Chi-square test was used to assess the associations between having COVID-19 disease and variables such as hand hygiene, compliance with social distancing rules and changing work clothes, and use of protective equipment.

3. RESULTS

The distribution of demographic characteristics of the healthcare professionals included in the study is given in Table 1.

Table 1. The distribution of demographic characteristics of the healthcare professionals

		n	%
Profession	Doctor	30	14.8%
	Nurse	104	51.2%
	Janitor	21	10.3%
	Midwife	48	23.6%
Training on COVID-19 disease	Online	49	24.5%
	Face to face	60	30.0%
	Online and face to face	17	8.5%
	None	74	37.0%
With the emergence of COVID-19 disease; Did you change yourself in terms of protection in the working area in the hospital in the period before the appearance of COVID-19 disease?	Yes	196	96.6%
	No	7	3.4%
How many times do you wash your hands with soap during your working hours?	5>	3	1.5%
	5-10	48	23.6%
	10-15	51	25.1%
	15<	101	49.8%
How many times do you clean your hands with disinfectants during your working hours?	5>	27	13.3%
	5-10	45	22.2%
	10-15	56	27.6%
	15<	75	36.9%
Do you obey the social distance rule with the patients?	Yes	174	85.7%
	No	29	14.3%
Do you obey the social distance rule with the employees?	Yes	137	67.5%
	No	66	32.5%
Do you change the clothes you wear while coming to work in the hospital or do you work with the clothes you come from home?	I come to the hospital in my workwear	43	21.2%
	I come to the hospital with my regular clothes. I wear work clothes at the hospital	148	72.9%
	I come to the hospital in normal clothes and work with these clothes without changing.	12	5.9%
Have you had a PCR test for COVID-19 disease?	Yes	115	56.7%
	No	88	43.3%
Do you currently have COVID-19 disease?	Yes	3	1.5%
	No	200	98.5%
Have you had COVID-19 disease?	Yes	10	4.9%
	No	193	95.1%
Using Protective Equipment – Mask	Yes	203	100%
	No	-	-
Using Protective Equipment – Apron	Yes	48	23.6%
	No	155	76.4%
Using Protective Equipment – Gloves	Yes	39	19.2%
	No	164	80.8%
Using Protective Equipment – Shoe Cover	Yes	39	19.2%
	No	164	80.8%
Using Protective Equipment – Bonnet	Yes	115	57.5%
	No	85	42.5%
Using Protective Equipment – Visor	Yes	91	44.8%
	No	112	55.2%
Using Protective Equipment – Overalls	Yes	39	19.2%
	No	164	80.8%
Total		203	100%

The distribution of the answers given according to the condition of having COVID-19 disease was examined by Chi-square analysis in Table 2. According to Table 2., there is a significant correlation between the distribution of the answers given according to the conditions and having COVID-19 disease ($p < 0.05$).

Table 2. The distribution of the answers given according to the condition of having COVID-19 disease

		Had a COVID-19 Disease				p
		Yes		No		
		n	%	n	%	
How many times do you wash your hands with soap during your working hours?	5>	0	0.0%	3	1.6%	0.000
	5-10	10	100.0%	38	19.7%	
	10-15	0	0.0%	51	26.4%	
	15<	0	0.0%	101	52.3%	
How many times do you clean your hands with disinfectants during your working hours?	5>	3	30.0%	24	12.4%	0.002
	5-10	0	0.0%	45	23.3%	
	10-15	7	70.0%	49	25.4%	
	15<	0	0.0%	75	38.9%	
Do you obey the social distance rule with the patients?	Yes	10	100.0%	164	85.0%	0.206
	No	0	0.0%	29	15.0%	
Do you obey the social distance rule with the employees?	Yes	3	30.0%	134	69.4%	0.015
	No	7	70.0%	59	30.6%	
Do you change the clothes you wear while coming to work in the hospital or do you work with the clothes you come from home?	I come to the hospital with my work clothes such as apron and uniform.	0	0.0%	43	22.3%	0.142
	I come to the hospital in my regular clothes. I change it with uniform at the hospital.	10	100.0%	138	71.5%	
	I come to the hospital in normal clothes and work with these clothes without changing.	0	0.0%	12	6.2%	

The relationship between the health personnel's status of having COVID-19 disease and using protective equipment is given in Table 3. According to Table 3., there is no significant correlation between using protective equipment and having COVID-19 disease (p> 0.05).

Table 3. Relationship between healthcare professionals' status of having COVID-19 disease and using protective equipment

Using Protective Equipment		Had a COVID-19 Disease				p
		Yes		No		
		n	%	n	%	
Mask	No	0	0.0%	0	0.0%	-
	Yes	10	100.0%	193	100.0%	
Apron	No	4	40.0%	44	22.8%	0.188
	Yes	6	60.0%	149	77.2%	
Gloves	No	4	40.0%	35	18.1%	0.102
	Yes	6	60.0%	158	81.9%	
Shoe Cover	No	10	100.0%	154	79.8%	0.112
	Yes	0	0.0%	39	20.2%	
Bonnet	No	6	60.0%	79	41.6%	0.205
	Yes	4	40.0%	111	58.4%	
Visor	No	4	40.0%	108	56.0%	0.253
	Yes	6	60.0%	85	44.0%	
Overalls	No	10	100.0%	154	79.8%	0.112
	Yes	0	0.0%	39	20.2%	

Table 4. shows the association between healthcare professionals' COVID-19 disease training and their level of knowledge and protection against COVID-19 disease. According to Table 4., a statistically significant relationship has been found between whether healthcare personnel receives training for COVID-19 disease and their knowledge and protection levels against COVID-19 disease. Furthermore, whether or not healthcare personnel received COVID-19 disease training and used protective equipment such as an apron, gloves, shoe cover, bonnet, visor, and overalls ($p<0.05$) was found to have a statistically significant relationship.

Table 4. Relationship between healthcare professionals' knowledge and protection against COVID-19 disease and whether or not they receive training on COVID-19 disease

		Having training of COVID-19 Disease								p
		Online		Face to face		Online and face to face		No training		
		n	%	n	%	n	%	n	%	
How many times do you wash your hands with soap during your working hours?	5>	0	0.0%	0	0.0%	0	0.0%	3	4.1%	0.046*
	5-10	7	14.3%	20	33.3%	6	35.3%	12	16.2%	
	10-15	10	20.4%	15	25.0%	3	17.6%	23	31.1%	
	15<	32	65.3%	25	41.7%	8	47.1%	36	48.6%	
How many times do you clean your hands with disinfectants during your working hours?	5>	4	8.2%	7	11.7%	3	17.6%	13	17.6%	0.001*
	5-10	9	18.4%	20	33.3%	0	0.0%	13	17.6%	
	10-15	21	42.9%	4	6.7%	6	35.3%	25	33.8%	
	15<	15	30.6%	29	48.3%	8	47.1%	23	31.1%	
Do you obey the social distance rule with the patients?	Yes	37	75.5%	49	81.7%	17	100.0%	68	91.9%	0.134
	No	12	24.5%	11	18.3%	0	0.0%	6	8.1%	
Do you obey the social distance rule with the	Yes	30	61.2%	42	70.0%	14	82.4%	48	64.9%	0.000*
	No	19	38.8%	18	30.0%	3	17.6%	26	35.1%	

employees?										
Do you change the clothes you wear while coming to work in the hospital or do you work with the clothes you come from home?	I come to the hospital with my work clothes such as apron and uniform.	19	38.8%	5	8.3%	3	17.6%	13	17.6%	
	I come to the hospital in my regular clothes. I change the uniform to work clothes at the hospital.	30	61.2%	55	91.7%	14	82.4%	49	66.2%	0.000*
	I come to the hospital in normal clothes and work with these clothes without changing.	0	0.0%	0	0.0%	0	0.0%	12	16.2%	
Mask	No	0	0.0%	0	0.0%	0	0.0%	0	0.0%	-
	Yes	49	100.0%	60	100.0%	17	100.0%	74	100.0%	
Apron	No	7	14.3%	12	20.0%	3	17.6%	26	35.1%	0.037*
	Yes	42	85.7%	48	80.0%	14	82.4%	48	64.9%	
Gloves	No	0	0.0%	20	33.3%	0	0.0%	19	25.7%	0.000*
	Yes	49	100.0%	40	66.7%	17	100.0%	55	74.3%	
Shoe cover	No	43	87.8%	38	63.3%	17	100.0%	63	85.1%	0.000*
	Yes	6	12.2%	22	36.7%	0	0.0%	11	14.9%	
Bonnet	No	9	19.6%	19	31.7%	6	35.3%	48	64.9%	0.000*
	Yes	37	80.4%	41	68.3%	11	64.7%	26	35.1%	
Visor	No	11	22.4%	39	65.0%	11	64.7%	48	64.9%	0.000*
	Yes	38	77.6%	21	35.0%	6	35.3%	26	35.1%	
Overalls	No	46	93.9%	35	58.3%	17	100.0%	63	85.1%	0.000*
	Yes	3	6.1%	25	41.7%	0	0.0%	11	14.9%	

4. DISCUSSION AND CONCLUSION

First of all, life must be maintained in order to protect human existence. It is critical to protect his health in order to accomplish this. While healthcare workers provide services to benefit patients and enhance their health, they must first protect their own health because the work environment and nature of their employment expose them to numerous risks and dangers [27]. Hospitals are high-risk workplaces for infectious diseases, and the likelihood of healthcare workers being exposed to occupational risks varies depending on the occupational group they work in, the job they do, and the department in which they work. Considering the working areas of healthcare professionals, the health risks of those who are in a position to directly care for the sick person are quite high [28,29]. When healthcare personnel comes into touch with percutaneous (piercing-cutting) injuries, mucous membranes, blood, tissues, or other contagious body fluids, they are exposed to infectious diseases [30]. Although the virus is most commonly found in blood, it can also be found in saliva, semen, and feces. A contaminated needle or another sharp instrument, a percutaneous stick, splashing on the skin or mucous membranes, or being swallowed are all possible routes of infection [31]. During the 2014-2015 Ebola pandemic in West Africa, almost 28,000 people were infected with the virus, with over 11,000 deaths. Most of the deaths have occurred among healthcare professionals with a high risk of infection [32]. In the COVID-19 pandemic, which is the subject of our study, which affects the whole world, the risk of respiratory transmission has affected many healthcare workers.

The careful use of personal protective equipment (PPE) by all healthcare professionals is very significant both for the patient and for his own health [33]. A recent study reported approximately 50% of hand or neck contamination during the removal of gloves, masks, and clothing. The amount of spontaneous contamination may vary depending on the type of PPE and the insertion technique, as well as other factors [34,35,36].

Points that were significantly associated with the method used to protect healthcare workers and personal protective equipment in the COVID-19 outbreak were observed, based on the present findings of our study. We believe that our findings will support the development of employee protection strategies in the event of a COVID-19 pandemic. Measures that can be taken during this time include providing a safe and healthy working environment, detecting risks and taking precautions, providing personal protection equipment, training, supporting, and promoting employee awareness.

A limitation of this study was its focus on healthcare professionals in hospitals in a single setting (Turkey). Thus, the results cannot be generalized to other settings.
As the global COVID-19 pandemic continues, it is vital to plan early intervention and appropriate strategies to protect healthcare workers' health, as well as to provide them with adequate working environments and protective equipment. With the modifications and interventions made, healthcare staff will be able to go through this tough process with the least damage. We think that conducting similar studies on bigger samples in order to offer ideal settings for healthcare professionals to be less affected by possible similar conditions will have extremely significant outcomes.

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