

How we protected ourselves as workers in operating rooms during the Covid-19 pandemic: operating room experience for 2 years

Covid-19 pandemisinde ameliyathane çalışanı olarak kendimizi nasıl koruduk: 2 yıllık ameliyathane deneyimi

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Abstract

Purpose: Covid-19 virus is a viral disease that is transmitted quickly between people through close contact and droplets. It spread from China to the rest of the world easily and within a few months. The limited information about Covid-19 and the fact that it has changed the life routine has inevitably affected hospitals and many operating room settings, as in all parts of the countries. The aim of this article is to discuss the use of personal protection methods in our hospital, to examine the virus exposure of our personnel working in the operating room with the current protection methods in the operating room during the pandemic period lasting more than two years, and to examine and evaluate the effects of vaccination on the severity of the disease.

Materials and methods: This study was based on prospective data obtained from Pamukkale University Faculty of Medicine operating room staff between March 2020 and 2022 after receiving the approval from the Ethics Committee. The use of personal protection equipment against Covid-19 virus, exposure to the virus, vaccination status, and hospitalization status of healthcare workers in operating rooms, which is an isolated part of the hospital, were evaluated from the first period of the Covid-19 pandemic. At the same time, the groups were divided into 2 different time periods: before and after vaccination. The use of personal protective equipment, status of having Covid-19 infection, hospitalizations due to the virus, symptoms in case of illness, vaccination status and the number of vaccine doses were examined. During this time, people who were dismissed from the hospital were excluded from the study.

Results: Data were collected at 2 different time points as before and after the vaccination of healthcare workers. Demographic data, personal protective equipment use, Covid-19 positivity and negativity and symptoms of 144 participants were analyzed at two different time points. It has been found in many different analyses that women are better protected than men, but also that the protection of anesthesiologists is higher than other groups. Hospitalizations were very rare in operating room staff and they did not have severe symptoms. Finally, there was a significant decrease in symptoms and their severity after vaccination.

Conclusion: In conclusion this study revealed the fact that operating rooms are the most important places where precautions should be taken during pandemics. This study aims to shed light on the protection of operating room staff during possible future outbreaks.

Keywords: Covid-19, operating room, personal protective equipment.

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Öz

Amaç: Covid-19 virüsü, insanlar arasında yakın temas ve damlacık yoluyla hızla bulaşan viral bir hastalıktır. Çin'den dünyanın geri kalanına kolayca ve birkaç ay içinde yayılmıştır. Covid-19 hakkındaki sınırlı bilgi ve hayatın rutinini değiştirmiş olması, ülkelerin her yerinde ve her bölümünde olduğu gibi ister istemez hastaneleri ve birçok ameliyathane ortamını da etkilemiştir. Bu makalenin amacı, hastanemizde kişisel korunma yöntemlerinin kullanımını ele almak, iki yılı aşkın süren pandemi döneminde ameliyathanede çalışan personelimizin güncel korunma yöntemleri ile ameliyathanede virüs maruziyetini ve aşılamanın hastalık şiddeti üzerindeki etkilerini incelemek ve değerlendirmektir.

Gereç ve yöntem: Bu çalışma, Etik Kurul onayı alındıktan sonra Mart 2020-2022 tarihleri arasında Pamukkale Üniversitesi Tıp Fakültesi ameliyathane personelinden elde edilen prospektif verilere dayalıdır. Hastanenin izole bir bölümü olan ameliyathanelerde sağlık çalışanlarının Covid-19 virüsüne karşı kişisel koruyucu ekipman kullanımı, virüse maruz kalma durumları, aşılama durumları ve hastanede yatış durumları Covid-19'un ilk döneminden itibaren değerlendirildi. Aynı zamanda gruplar aşılama öncesi ve aşılama sonrası olmak üzere 2 farklı zaman dilimine ayrıldı. Kişisel koruyucu ekipman kullanımı, Covid-19 enfeksiyonu geçirme durumu, hastalık durumunda belirtileri, hastaneye yatışları, aşılama durumu ve aşı doz sayısı incelendi. Bu süre içinde hastanede işine son verilen insanlar çalışma dışı bırakıldı.

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Bulgular: Veriler sağlık çalışanlarının aşılanması öncesi ve sonrası olmak üzere 2 farklı zaman noktasında toplanmıştır. 144 katılımcının demografik verileri, kişisel koruyucu ekipman kullanımı, Covid-19 pozitifliği/negatifliği ve semptomları iki farklı zaman aralığında analiz edildi. Kadınların erkeklere göre anesteziistlerin de diğer gruplara göre daha fazla korunduğu bulundu. Ameliyathane personelinde hastaneye yatışlar çok nadirdi ve ciddi semptomlar yoktu. Son olarak, aşılamadan sonra semptomlarda ve şiddetinde önemli bir azalma oldu.

Sonuç: Bu çalışma, pandemi döneminde önlem alınması gereken önemli yerlerin başında ameliyathanelerin de olduğunu ortaya koymuştur. Bu çalışma olası salgınlar sırasında ameliyathanede çalışan personelin korunmasına yönelik fikir verebilir.

Anahtar kelimeler: Covid-19, ameliyathanelerde korunma, kişisel korunma ekipmanları.

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Introduction

The new Coronavirus disease (Covid-19) emerged in Wuhan, China in December 2019 and a pandemic was declared by the World Health Organization in January 2020. Covid-19 virus causes a viral disease that spreads rapidly between individuals through close contact and droplets. The rapid spread of the virus from China to the whole world had occurred easily within a few months [1]. The scarcity of knowledge about Covid-19 and its impact on daily life eventually impacted every location and subdivision of government, particularly hospitals and many operating room setups. The priorities of the transactions and the way they are performed have been necessarily changed. The priority was to protect healthcare workers and to heal patients diagnosed with Covid-19 both in the service and intensive care units. During this chaotic time, the order of the operating rooms had to be altered and all priorities changed. Managing employees and work environments during emergencies such as disasters or epidemics is challenging and expensive. Many details that need to be considered have entered our lives with the Covid-19 epidemic and "the new normal" expression has been added to our literature [2]. Again, the order of resource use in epidemic management has been a challenging condition for medical personnel health and structure, as well as freshly acquired principles and details [3]. To cope with the expected increasing number of Covid-19 patients, the entire world has turned to limiting the number of elective surgeries [4]. Among healthcare employees, operating room workers, particularly anesthesiologists, face substantial risks. Airway manipulation and close contact with the patient, and the fact that emergencies often occur in operating theaters,

put operating room employees at a greater risk than other healthcare professionals [5]. The importance of personal protective equipment is also essential for those working in this field. Personal protection equipment (PPE) used to prevent contact includes gloves, gowns, a N95 or higher grade respirator, and a full face shield or goggles. Face masks are recognized worldwide as an acceptable alternative when respirators are not available [6]. The importance of vaccination in the Covid-19 pandemic process, which has been going on for about 3 years, has been stated by many authors [7]. In our country, vaccination of healthcare workers started on January 14, 2021. Exposure to corona virus after vaccination reduced the severity of the disease. The purpose of this article is to talk about the use of personal protection methods in our hospital and to examine the virus exposure of our healthcare personnel working in the current prevention and operating room during the pandemic period. Another aim was to evaluate the effects of the vaccination status of the employees on the severity of the disease.

Material and methods

This study was conducted with Pamukkale University Faculty of Medicine operating room staff between 16 March 2020 and 16 March 2022. The study, which was started after the approval of Pamukkale University Non-Interventional Clinical Research Ethics Committee, was based on the data obtained prospectively. The use of personal protection equipment against the Covid-19 virus, exposure to the virus, vaccination status, and hospitalization status of the healthcare workers in the operating rooms, which is an isolated part of the hospital, were assessed beginning with the first phase of the pandemic. In the study, the employees were divided into 4 groups: Group 1

consists of anesthesiologists, Group 2 consists of anesthesia technicians, Group 3 consists of operating room nurses and Group 4 consists of operating room assistants. Simultaneously, the timeline between groups was split into two distinct time periods: before and after vaccination. The use of personal protective equipment, status of Covid-19 infection, hospitalizations due to the virus, symptoms in case of illness, vaccination status and doses were examined. Those who stopped working at the hospital during this period were excluded from the study.

Statistical method

Within the scope of the research, first of all, demographic findings and frequency analyzes of the participants were shared. Then, independent samples T-test, one-way analysis of variance (ANOVA) and correlation analyzes were performed, respectively. The findings of the relevant analyzes are also shared respectively.

Results

The findings of the study were obtained by analyzes at 2 different times. Data were collected at 2 different times, before and after the vaccination of healthcare workers in our country. Demographic findings in the first time period are shown in Table 1. According to Table 1, it is seen that the 144 participants participating in the research show an almost equal distribution in terms of gender and title. 23.6% of the participants were identified as Covid-19 positive cases. The average age of the participants is 34. The level of protection was 2.77, slightly above the average in the 5-point Likert type. The frequency analyzes of the demographic characteristics of the study participants who are positive for Covid-19 and their symptoms are presented in Table 2. 34 of the 144 participants in the study were Covid positive. The majority of the positive individuals were anesthesiologists and operating room personnel. The average age is 32 and 7.6% of those who tested positive for Covid-19 were hospitalized. The level of protection was 2.73 in the 5-point Likert type. When the symptoms of these 34 participants were examined, it was seen that the most common complaints were fever, cough, loss of taste, headache and muscle pain, respectively. The least complaints were determined as chest pain, diarrhea, shortness of breath and nausea, respectively.

Independent Samples T-Test was applied to examine whether the protection levels differ according to the categorical variables within the scope of the research. Table 3 and Table 4 include the T-test findings performed to examine the differences in terms of hospitalization variable. Table 3 shows the average values of the protection levels of the participants according to gender. Accordingly, while the average value of women is 3.09, the average value of men is 2.42. When Table 4 is examined, it is concluded that the level of protection of women is statistically significantly different than that of men ($p < 0.05$). Accordingly, women are more protected than men. However, if $p > 0.05$ as a result of Levine's equality of variance test, the variance is considered to be equally distributed. Accordingly, it was concluded that the variance in the examined variable was not evenly distributed. When Table 5 is examined, it is concluded that the level of protection of the patients does not differ statistically according to the status of hospitalization ($p < 0.05$). If the p value is greater than 0.05 as a result of the Levine equality of variance test, the variance is considered to be equally distributed. Accordingly, it was concluded that the variance in the examined variable was equally distributed. Table 6 demonstrates the average values of the protection levels of individuals with and without Covid-19. Accordingly, the average of those with and without Covid-19 is 2.73 and 2.78, respectively. In the study, the protection levels of the participants differed according to the title (Anesthesiologist, Technician, nurse, staff). The Sheff Test was used to determine from which categories this differentiation was originated. The results of the Scheffe Analysis show that anesthesiologists are significantly different from nurses and staff. Accordingly, anesthesiologists have a higher level of protection than nurses and staff.

Technicians and nurses are more protected than operating room personnel. Correlation analysis was performed to examine the relationship between age and the level of protection. A negative and weak correlation was found between the age variable and the level of protection. This means that as age increases, the level of protection decreases. Table 7 summarizes the results in the procedure following the delivery of vaccines to healthcare personnel. According to this information, the 154 individuals

have a nearly equal distribution based on their title. 38.3% of the participants were identified as Covid-19 positive cases. The hospitalization rate of the participants was very low, at 0.6. When the vaccination status of the participants is examined, it is seen that the majority of them received 4 vaccinations consisting of 2 Sinovac and 2 Biontech vaccines. However, the majority of the participants preferred the surgical mask instead of N95. If we examine the frequency distribution of the symptoms of Covid-19 positive health personnel; the majority of the positive ones are anesthesiologists and nurses. The distribution is 23 (39%) anesthesiologists, 16 (27.1%) nurses, 13 (22%) operating room personnel, and 7 (11.9%) anesthesia technicians. When the vaccination status of the participants is examined, it is seen that

the vast majority (96.6%) have 4 vaccines (2 Sinovac + 2 Biontech). It has been determined that patients with only 2 Biontech vaccines (3.4%) have Covid-19 infection more rarely than those who have 4 vaccines. This situation may also be related to the characteristics of the research sample. It was determined that the preferred type of mask for protection was the surgical mask (79.7%). The hospitalization rate for those who are positive after vaccination is 1.7%. When the symptoms of 59 participants were examined, the most common complaints were muscle pain (39%), headache (35.6%), cough (27.1%), fever (23.7%) and loss of taste (11.9%). The least common complaints were determined as chest pain, shortness of breath, nausea and diarrhea, respectively.

Table 1. Frequency distribution regarding the demographic characteristics of the participants

Variable	Category	Frequency	%
Gender	Woman	74	51.4
	Man	70	48.6
Title	Doctor	35	24.3
	Technician	23	16.0
	Nurse	43	29.9
	Operating Room Staff	43	29.9
Positive/Negative	Positive	34	23.6
	Negative	110	76.4
	n	Mean	Standard deviation
Age	144	34.26	7.174
Protection levels	144	2.7708	.74532

Table 2. Frequency distribution of the symptoms of Covid 19 positives

Variable	Category	Frequency	%
Gender	Woman	15	44.1
	Man	19	55.9
Title	Doctor	11	32.4
	Technician	4	11.8
	Nurse	8	23.5
	Operation Room Staff	11	32.4
Hospitalization	Yes	6	17.6
	No	28	82.4
Cough	Yes	32	94.1
	No	2	5.9
Headache	Yes	26	76.5
	No	8	23.5
Fever	Yes	33	97.1
	No	1	2.9
Shortness of breath	Yes	6	17.6
	No	28	82.4
Muscle Pain	Yes	25	73.5
	No	9	26.5
Nausea	Yes	7	20.6
	No	27	79.4
Diarrhea	Yes	4	11.8
	No	30	88.2
Loss of Taste	Yes	32	94.1
	No	2	5.9
Chest Pain	Yes	3	8.8
	No	31	91.2
	n	Mean	Standard deviation
Age	34	32.56	5.333
Protection levels	34	2.7353	.86371

Table 3. Group statistics for gender

Variables	Gender	N	Mean	Standard deviation
Protection levels	Woman	74	3.0946	.60066
	Man	70	2.4286	.73369

Table 4. Independent samples T-test results for gender variable

Variables	Variance distribution	Levene's Equation of Variance Test				T-test	
		F	p	t	df	p	o.difference
Protection Level	Assuming equal variance	10.983	.001	5.974	142	.000	.66602
	When Variance Is Not Assumed Equal			5.942	133.505	.000	.66602

Table 5. Independent samples T-test findings for hospitalization or not

Variables	Variance distribution	Levene's Equation of Variance Test				T-test	
		F	p	t	df	p	o.difference
Protection Level	Assuming equal variance	.980	.324	-.349	142	.728	-.10870
	When Variance Is Not Assumed Equal			-.255	5,223	.808	

Table 6. Group statistics for Covid-19 positive and negative variable

Variables	Covid 19	N	Mean	Standard deviation
Protection Level	Positive	34	2.7353	.86371
	Negative	110	2.7818	.70881

Table 7. Frequency distribution of the participants' demographic characteristics in the post-vaccination timeframe

Variable	Category	Frequency	%
Title	Doctor	45	29.2
	Technician	23	14.9
	Nurse	43	27.9
	Operation Room Staff	43	27.9
Positive/Negative	Positive	59	38.3
	Negative	95	61.7
Hospitalization	Yes	1	0.6
	No	153	99.4
Vaccination Status	2 Sinovac+2 Biontech	129	83.8
	2 Biontech	25	16.2
Mask Usage Status	N95 mask	18	11.7
	Surgical mask	136	88.3

Discussion

Pandemics have required innovations in work environments. With the Covid-19 pandemic, working procedures in operating rooms, as in many other areas, have altered, and awareness of employees have been concentrated on protection [8]. In a study in which the level of personal protection was assessed with a survey for health workers during the Covid-19 pandemic, more than 60% of the 358 participants stated that they dreaded of being exposed in hospitals [9]. In the studies in which many precautions were emphasized with the Covid-19 epidemic in operating rooms, the priority was to protect healthcare workers, however, the initiation times of elective surgeries were prolonged [10, 11]. From the beginning of the epidemic, the first priority in this study was the supply and use of personal protection equipment of operating room personnel. Anesthesiologists battled at the front lines both in operating rooms and in intensive care units during the pandemic [12]. As seen in the results of this study, personal protection rates are high among anesthesiologists. However, due to the frequency of dealing with the airway, anesthesiologists were among those who were most vulnerable to the Corona virus. Many studies on the subject have recommended the use of personal safety devices, particularly for operating room personnel [8-11]. In the analyzes performed in this study, the rates of protection were found to be high in our operating room. If we consider the first phase of the study as the period when vaccines are not yet in use, 34% of the operating room workers were Covid positive in the first period and 17.6% of the workers were hospitalized. Although there are not many publications in the literature on this subject, virus exposure is not only related to working in the operating room. Because the majority of the workers were believed to have been in the same rooms as the patients in various locations throughout the hospital, and they may have encountered individuals who had the virus in their social activities. Many symptoms mentioned in the Covid-19 studies in the literature [13] were also seen in many employees in this study. The most prevalent symptoms in Covid positive employees in this research were fever, cough, loss of flavor, headache, and muscle pain. In the United States, it was decided on January 1, 2021 that healthcare personnel should be vaccinated

first and put on paid administrative leave in case of adverse effects [14]. In our country, Covid-19 vaccination was started on January 14, 2021 and priority was given to healthcare workers [15]. Vaccines were administered to all operating room staff as of the vaccination date in this study, and Covid-19 positivity rates were assessed after this time. In the study group, the highest rate of positivity was found in anesthesiologists. The studies have also stated the importance of having the necessary number of personnel to reduce the virus circulation in the operating room, the importance of the airway and the importance of an anesthesiologist in critical situations, and the fact that the majority of the exposure to the virus is to anesthesiologists during the Covid pandemic [16]. However, many studies emphasize that hospitalization rates are reduced in patients after vaccination [17, 18]. Similar results were also found in this research, and hospitalization rates were found to be significantly lower compared to first phase.

In conclusion, the fact that operating rooms are at the top of the list of locations where precautions must be taken during epidemics has come to light. It has been stated in the literature that operating rooms and the anesthesiologists in charge of these positions should be protected, and that employees with a poor level of education should be trained in terms of personal protection [19]. With this research, we expect that the methods used in operating rooms during the pandemic time will serve as a model for future studies. We believe that it can also shed light on the approaches in unexpected epidemic situations that may be experienced in the future.

Among the limitations of this study, variability due to sample difference can be counted. However, since it is a long-term study, the change in the number of staff in the operating room is not thought to change the results, but it can still be a limitation.

Conflict of interest: There was no conflict of interest among the authors in this study.

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Authors' contributions to the article

A.M.Y. constructed the main idea and hypothesis of the study. A.M.Y. and I.H.A. developed the theory and arranged/edited the material and method section. A.M.Y., I.H.A., S.K. and H.S. have done the evaluation of the data in the Results section. Discussion section of the article written by A.M.Y., I.H.A., S.K. and H.S. reviewed, corrected and approved. In addition, all authors discussed the entire study and approved the final version.