

# Effects of the COVID-19 pandemic on handwashing habits of staff working in a maternity hospital

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DOI: [10.31083/j.ceog4806223](https://doi.org/10.31083/j.ceog4806223)

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Submitted: 9 October 2020 Revised: 24 April 2021 Accepted: 30 April 2021 Published: 15 December 2021

**Background:** Healthcare workers are at the forefront of the recent COVID-19 pandemic. In this study, we aimed to investigate the changes in handwashing behavior of healthcare workers before and during the pandemic. **Methods:** A survey was conducted at an obstetrics and gynecology clinic situated in Trabzon, Turkey. The survey contained 30 questions divided into two sections. The first 5 questions of which comprised the participants' demographic data such as their age, body mass index, gravidity, personal history, and occupation. The first and second sections of the questionnaire form covered the questions concerning habits of participants pre-pandemic and during the pandemic, respectively. The total handwashing scores before and during the pandemic were calculated by summing the answers for 25 questions relating to handwashing habits. Independent *t*-tests were performed for normally distributed data. **Results:** The data of 98 participants were analyzed. While there was no difference in handwashing scores between doctors ( $83.44 \pm 6.44\%$ ) and midwives ( $86.26 \pm 13.73\%$ ), there was a statistically significant difference between doctors and nurses ( $90.04 \pm 11.08\%$ ) ( $p = 0.02$ ). The results also showed that there was a significant difference ( $p = 0.03$ ) in daily handwashing frequency of doctors and nurses before and during the pandemic. **Conclusions:** Healthcare professionals attached importance to hand hygiene before the pandemic, and this is being emphasized even more during the pandemic with a significant difference. The highest increase was accounted for nurses.

## Keywords

Hand hygiene; Nurses; Doctors; Midwives; COVID-19; Handwashing

## 1. Introduction

The recent coronavirus disease (COVID-19) is an acute respiratory infection pandemic caused by Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a new type of coronavirus [1]. SARS-CoV-2, an enveloped, single-stranded, positive-polar ribonucleic acid virus is believed to spread through direct, indirect, and droplet contact [2]. COVID-19 was first detected in Wuhan, China in late 2019, from where it spread rapidly to neighboring countries including South Korea, Japan, and Iran [3]. In March 2020, with its spread to Europe and the Americas, the World Health Organization (WHO) declared the COVID-19 infection a global epidemic [4].

The WHO has since been emphasizing the significance of personal hygiene as a preventive measure to slow down the spread of infections and prevent the collapse of health facilities owing to patient density [5]. Globally, this emphasis on personal hygiene has resulted in hand hygiene awareness. Proper hand hygiene has the potential to reduce the spread of infectious diseases by 24% [6, 7]. Frequent handwashing with soap and water for at least 20 seconds is a recommended measure to prevent the spread of the virus. Countries have been encouraged to take effective social measures to reduce contagion [8], and hygienic safety measures are of the utmost importance in hospital settings. During the COVID-19 period, studies were carried out on hand hygiene at different populations relating to students and healthcare professionals. In a multicenter study, automated hand hygiene performance was evaluated in hospitals and an increase from 46% to 56% was detected at the beginning of the pandemic [9]. In a different study, the hand hygiene behaviors of adolescents were assessed. The authors concluded that the COVID-19 pandemic positively affected the behaviors of the Polish adolescents [10]. Lotfinejad *et al.* [11] underlined the susceptibility of pregnant women and neonates to respiratory viruses and the COVID-19 infection and the importance of the training of health care workers as nurses and midwives from preventing the infection. However, limited data exists on the changes of hand hygiene habits in maternity services during the COVID-19 pandemic.

Healthcare workers are at the forefront of the fight against the COVID-19 pandemic. Maternity services have a special patient population as pregnant and neonates, therefore, they cannot postpone their healthcare facilities during pandemic. In this study, we aimed to determine the importance ascribed to handwashing by nurses, midwives, and doctors at maternity services at the beginning of the pandemic and to investigate the changes in these habits during the pandemic.

## 2. Methods

In this study, a survey was conducted at an obstetrics and gynecology clinic called Trabzon Kanuni Training and Research Hospital situated in Trabzon, Turkey between April and June 2020. The related clinic was selected as it was the

reference hospital for the maternity patients in the Black Sea region of this country. Therefore, the majority of the health-care professionals treating maternity patients work in the related hospital. The study was approved by Trabzon Kanuni Training and Research Hospital ethics committee with the number 2020/35. A sample size of 100 participating health-care professionals was planned and they were selected randomly amongst the female personnel.

The questionnaire form used in this study was first applied by Üner [12] and later modified by The Ministry of Health, Turkey [13]. The form was adapted for this study with minor changes as explained below. The survey contained 30 questions divided into two sections. The first 5 questions of which comprised the participants' demographic data such as their age, body mass index (BMI), gravidity, personal history, and occupation. The first and second sections of the questionnaire form covered the questions concerning habits of participants pre-pandemic and during the pandemic, respectively (Table 1). The total handwashing scores before and during the pandemic were calculated by summing the answers for 25 questions relating to handwashing habits. Independent *t*-tests were performed for normally distributed data. Additionally, the same participants were asked to fill out a different form containing 3 questions relating to the importance and the counts of handwashing as well as the time takes for a single handwashing.

The answers to the 25 questions were recorded on a five-point Likert scale from 0 to 4 (Strongly disagree/Disagree/Neutral/Agree/Strongly agree) [13]. The total scores of handwashing before and during the pandemic were obtained by summing the scores of these 25 questions. The total possible scores ranged from 25 to 100 [13].

Statistical analysis was performed using the SPSS version 23.0 (IBM Corp., Armonk, NY, USA). Means, medians, and modes were determined, and the Kolmogorov-Smirnov test was performed to determine normality. Normally distributed data were analyzed with independent *t*-tests in order to compare responses from before and during the pandemic. *p*-values < 0.05 were considered statistically significant. One-way ANOVA was conducted to compare handwashing habits scores across occupational groups (doctors, midwives and nurses).

### 3. Results

After excluding two participants whose questionnaires were incomplete or incorrectly filled, the data of 98 health-care professionals including 32 doctors, 38 midwives, and 28 nurses were analyzed. The mean age of doctors, midwives, and nurses were  $38.13 \pm 3.34$ ,  $32.2 \pm 7.10$ , and  $38.31 \pm 5.6$  years, respectively. Mean gravidity data among doctors, midwives, and nurses were  $1.9 \pm 0.12$ ,  $2.00 \pm 0.96$ , and  $2.00 \pm 0.60$ , respectively. The mean values of BMI for doctors, midwives, and nurses were  $27.10 \pm 2.21$ ,  $24.75 \pm 4.17$ , and  $24.80 \pm 2.82 \text{ kg/m}^2$ , respectively. No significant difference was obtained amongst the groups in terms of demographic variables.

The mean scores for 25 questions about daily handwashing habits were  $83.44 \pm 6.44$  for doctors,  $86.26 \pm 13.73$  for midwives and  $90.04 \pm 11.08$  for nurses (Table 2). Although no significant difference was obtained between the doctor and midwife groups in terms of handwashing scores, the scores between doctors and nurses were found statistically significant ( $p = 0.02$ ) (Table 3).

The participants claimed that they washed their hands a minimum of 20 times a day both before and during the pandemic. A significant difference was observed between the doctor and nurse groups ( $p = 0.03$ ) for the values relating to the frequency of daily handwashing before ( $21 \pm 2.12/25 \pm 3.56$ ) and during the pandemic ( $33 \pm 3.41/37 \pm 5.35$ ). Almost 100% of the participants (with the exception of midwives) responded that 'handwashing is important in preventing pandemic-causing diseases' both before and during the pandemic. Midwives had the lowest correct answer rate to the question "What is the minimum number of seconds for which hands should be washed?" before the pandemic (57.9%). However, this group showed the highest increase in the correct response rate during the pandemic, as 78.9% with an answer "20 seconds" (Table 4).

### 4. Discussion

Hand hygiene is considered a very important element of infection control. Proper handwashing can break the cycle of diseases and reduce the risk of transmission by 6–44% [14]. Handwashing is recommended as both personal protection and an inexpensive and widely available preventive measure for the outbreak of certain respiratory viral infections such as influenza and severe acute respiratory syndrome [15, 16]. The importance of handwashing has been emphasized especially in studies on prevention of nosocomial infections [6]. Handwashing has been shown in studies to reduce infections. It can be said that infections can spread if people do not wash their hands properly. People tend to follow rules more when they are observed, but less when they are not observed. Handwashing can be effective in preventing infections if everyone washes their hands properly. In the study carried out by Moore *et al.* [9], which included 9 hospitals, the authors examined handwashing habits in the hospital before the pandemic, when schools were closed, and in the later stages of the pandemic. They found the rate of handwashing as 46% before the pandemic, 60% when the schools were closed, and 54% in the later stages of the pandemic. Handwashing rates increased when the schools were closed, but they reported a decrease of up to 6% afterward [9]. However, this habit is difficult to maintain.

In-hospital transmission is one of the main ways SARS-CoV-2 spreads among healthcare workers [17]. According to Amnesty International, the global COVID-19 mortality rate among healthcare professionals is over 7000 [18]. However, in many cases, contact with patients with the COVID-19 is inevitable. Nguyen *et al.* [19] compared the general population and healthcare workers in terms of the risk of contract-

**Table 1. The questions asked before and during the pandemic to measure the scores of handwashing habits.**

	Before COVID-19 pandemic	During COVID-19 pandemic
	Strongly disagree (0)/Disagree (1)/Neutral (2)/Agree (3)/Strongly agree (4)	Strongly disagree (0)/Disagree (1)/Neutral (2)/Agree (3)/Strongly agree (4)
I wash my hands before meals		
I wash my hands after meals		
I wash my hands before using the toilet		
I wash my hands after using the toilet		
I wash my hands after coming home from outside		
I wash my hands after shaking hands with people		
I wash my hands before going to bed		
I wash my hands after touching animals		
I wash my hands when I get up in the morning		
I was my hands before and after changing babies' diapers		
I wash my hands before eating anything		
I wash my hands when I see them dirty		
I wash my hands before preparing food		
I wash my hands after exchanging money		
I wash my hands after cleaning my nose		
I wash my hands after touching garbage		
I wash my hands before touching a sick person		
I wash my hands after touching a sick person		
I wash my hands after combing my hair		
I wash my hands after cleaning the house		
I wash my hands after washing the dishes		
I wash my hands after doing some cleaning		
I dry my hands after washing them		
When I wash my hands, I remove my ring.		
I wash my hands after touching something commonly used like a doorknob.		
Total score for hand washing habits		

**Table 2. The change in the handwashing habit scores of the professions before and during the pandemic.**

	Scores for hand washing habits		
	Before COVID-19 pandemic	During COVID-19 pandemic	<i>p</i>
Doctor	72.34 ± 6.23	83.44 ± 6.44	0.04*
Midwife	74.43 ± 12.16	86.26 ± 13.73	0.03*
Nurse	79.14 ± 10.27	90.04 ± 11.08	0.04*

Data show as mean ± standard deviation. \*A significant difference was found in all professions before and during the pandemic in independent *t*-test.

ing COVID-19 infection. Their results demonstrated that front-line health-care workers were at increased risk for reporting a positive COVID-19 test (adjusted HR 11.61, 95% CI) compared to the general community [19].

Therefore, hand hygiene is of paramount importance in preventing COVID-19 among healthcare professionals [20, 21]. COVID-19 has necessitated serious life changes; in addition to the social changes, the importance of hand hygiene has increased significantly. There are studies showing that hand hygiene performance increases significantly at the beginning of the epidemic, but decreases a little over time [9]. In the

current study, the changes in handwashing habits of health-care workers before and during the epidemic were investigated. The results showed that healthcare workers including all the groups investigated are highly aware of the importance of handwashing before and during the pandemic. The scientific studies emphasizing the importance of handwashing to prevent nosocomial infections, and hospital infection control committees could be considered responsible for the high awareness levels of healthcare professionals. In this study, it was also found that before and during the pandemic, the daily number of hand washes per person was generally over 20, and healthcare professionals have always been diligent about the recommended 20-second handwashing duration. The responses on all investigated parameters showed dramatic improvements during the pandemic. The handwashing habits score, achieved by summing the scores of 25 questions, was found to be the lowest among doctors (83.44 ± 6.44) and highest among nurses (90.04 ± 11.08), and the difference was found as significant (*p* = 0.03). In addition, daily handwashing frequency was significantly higher among nurses.

In a study of Karabey *et al.* [22] the handwashing frequency was 28% among both doctors and nurses and 42% in assistant healthcare personnel. However, it is highly likely

**Table 3. Demographic variables of groups.**

	Doctor	Midwife	Nurse	<i>p</i>
Age	38.13 ± 3.34	32.2 ± 7.10	38.31 ± 5.61	0.06
Gravidity	1.90 ± 0.12	2.00 ± 0.96	2.00 ± 0.60	0.31
BMI	26.10 ± 2.21	24.75 ± 4.17	24.80 ± 2.82	0.43
Hand washing habits score before COVID-19 pandemic	72.34 ± 6.23*	74.43 ± 12.16	79.14 ± 10.27*	<b>0.02*</b>
Hand washing habits score during COVID-19 pandemic	83.44 ± 6.44*	86.26 ± 13.73	90.04 ± 11.08*	<b>0.02*</b>

Data show as mean ± standard deviation. \*A significant difference was found between doctors and nurses in the ANOVA test.

**Table 4. The results of the responding groups on the importance, the duration and the frequency of handwashing before and during the epidemic.**

		COVID-19 pandemic					
		Doctor		Midwife		Nurse	
		Before	During	Before	During	Before	During
Is hand washing important in preventing COVID-19? (%)	Little matter	-	-	-	-	-	-
	Important	-	-	10.5	-	-	-
	Highly important	-	-	5.3	-	-	-
	Very highly important	100	100	84.2	100	100	100
Count of hand washing per day	(count)	21 ± 2.12	33 ± 3.41	23 ± 2.45	35 ± 4.23	25 ± 3.56	37 ± 5.35*
Minimum hand washing (sec.) (%)	5	-	-	-	-	-	-
	10	6.3	-	5.3	-	-	-
	15	6.3	-	36.8	21.1	7.1	-
	20	87.5	100	57.9	78.9	92.9	100

\**p* = 0.03, statistical difference between doctor and nurse groups.

that doctors and nurses may have worked on the same number of procedures and come into contact with the same number of patients since the study was conducted in an intensive care unit, therefore, this could explain the fact that they had the same handwashing frequency. Our working group mainly consists of non-intensive care medical personnel. Therefore, they obtained lower handwashing scores compared to this study. Girou *et al.* [6] later demonstrated that nosocomial infections were significantly reduced (24%) by handwashing indicating the importance of handwashing in preventing the infections.

Questions for calculating the handwashing score usually include hand contact in daily life. Nurses take part in the therapeutic services of the hospital as part of their duty. Nurses are often the primary point of care in their communities, especially during infectious disease outbreaks. Their frequent exposure to pathogens, long working hours, stressful work environment and fatigue predispose them to acquire or transmit infections such as the COVID-19 [11]. It is known that the contact time of nurses with the patients is long and therefore, the contamination with infected secretions is high in the maternity services. In fact, the routine COVID-19 screening is not usually performed in patients' service admission. Therefore, it is likely that midwives have an increased risk of infection, particularly with a high risk of contamination during cesarean section. Moreover, it is commonly known that the nurses enter to the patient rooms many times every day and come into close contact with the patients and their belongings. In addition to the treatment, patients first

convey all their complaints to the nurses. For all these reasons, nurses have more daily patient contact than doctors. This could explain the significant difference in handwashing frequency and handwashing habit score between nurses and doctors. However, in order to be able to make a more accurate and definite interpretation about the reason for the difference, it is necessary to determine how many procedures performed by healthcare professionals require handwashing and to conduct a separate observational study on this aspect. According to the WHO, observation is the only valid method for directly measuring healthcare workers' compliance with hand hygiene rules [23]. Karaoglu *et al.* [24] reported that although their survey showed good handwashing habits of nurses, the observation method revealed otherwise since a specialist observed employees handwashing and found that it was not done according to the rules [24]. Therefore, additional studies applying observation methods may also be useful to carry out to confirm the current results in the future.

Hand hygiene and handwashing recommendations have become more pronounced after the COVID-19 outbreak. Previously, the Centers for Disease Control and Prevention (CDC) recommended washing hands with soap and water or antiseptic soap for at least 15 seconds, followed by drying [25]. These recommendations were further detailed after the epidemic. The five steps of proper handwashing are as follows: (1) Wet your hands with clean running water (lukewarm or cold), turn off the tap, and apply soap; (2) Rub your hands with soap and lather the back of your hand, between your fingers, and under your nails; (3) Brush your hands for



at least 20 seconds; (4) Rinse your hands thoroughly under running clean water; (5) Dry your hands with a clean towel or air dry [26].

In this way, the health ministries of all countries have made hand hygiene recommendations. Similarly, the Turkish Ministry of Health has made the following suggestions: rubbing hands and distributing the soap on all surfaces of the hands; rubbing the inside and outside of palms thoroughly; rinsing hands with plenty of water; covering the faucet with a paper towel used to dry hands (if not with the sensor or on-off type) [27].

The most important limitation of our study is the use of a questionnaire based on subjective answers and the fact that the majority of the sample was female. Participants which include healthcare professionals are not reflective of society as a whole, it is necessary to verify our results with community-based studies. Trabzon Kanuni Training and Research Hospital is the largest hospital in the region. Although the study was carried out in the largest hospital and tried to reflect the society, another limitation of the study was that it was conducted in a single center as the monitoring hygiene in different hospitals may vary. Therefore, future studies are advised to carry out with larger sample groups including different factors.

## 5. Conclusions

Owing to their position at the forefront of the fight against COVID-19, globally, healthcare workers are the most affected population. Based on the results of our study, healthcare professionals attached importance to hand hygiene before the pandemic, which continues to increase during the pandemic. The highest increase is seen in nurses, perhaps because of their close involvement in the most aspects of patient care.

## Author contributions

RE and YBT designed the research study. RE, KBE and DK performed the research. RE analyzed the data. RE, YBT wrote the manuscript. All authors read and approved the final manuscript.

## Ethics approval and consent to participate

The study was approved by the ethics committee of Trabzon Kanuni Training and Research Hospital with the number 2020/35. All authors declare ethical standards are followed, written consent has been obtained from all participants, and that the suitability of the data and materials used in the article.

## Acknowledgment

The authors thank to Sevim Köse, Karadeniz Technical University for her help in revising this manuscript.

## Funding

This research received no external funding.

## Conflict of interest

The authors declare no conflict of interest.

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