

The COVID-19 Pandemic and Hand Hygiene

Abstract

As in protection from healthcare-associated infections, protection from all infectious agents requires an evidence-based, scientifically supported infection control program. Today, all over the world, the World Health Organization and the Centers for Disease Control and Prevention shed light on the needs of countries by publishing a comprehensive infection control program. A novel coronavirus disease 2019 pandemic has been announced by these organizations at a global scale as of January 30, 2020, and the attention of the whole world has been drawn to infection prevention practices. The leading, cheapest, and most reliable measure among the infection prevention practices is hand hygiene. Practicing proper hand hygiene has a significant influence on the transmission of infectious agents by contact. Proper hand hygiene practices are inevitable in preventing infections, both in healthcare institutions and in public areas. It has been observed that hand hygiene practices are also vital for the novel coronavirus disease 2019 pandemic announced as of 2020. Therefore, performing hand hygiene practices correctly and at the right time in light of the guidelines published by the World Health Organization, Centers for Disease Control and Prevention, and the Turkish Society of Hospital Infections and Control will be an important step in ensuring effective infection control. The aim of this review is to describe hand hygiene and emphasize its importance in the light of guidelines on pandemic processes and hand hygiene.

Keywords: COVID-19, hand hygiene, infection, pandemic

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Introduction

Taking preventive precautions in many pandemics that threaten all humanity throughout the history of the world has been considered the most important strategy for limiting the spread of cases. In all pandemics experienced throughout the history of mankind, certain authorities have taken precautionary warnings, and infections were tried to be brought under control.^{1,2} Of these precautions, the most important ones have been hygiene practices, particularly hand hygiene. In this sense, to control infections all around the world and to monitor health policies across countries, the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) were founded in 1948 and 1946, respectively, and in 1975, formal, written guidelines on handwashing practices were published by CDC.^{2,3} In Turkey, on the other hand, the Turkish Society of Hospital Infections and Control was founded in 2000, and guidelines published worldwide have started to be adapted to Turkey.³ In acknowledgment of the published guidelines, first, series of training was organized for health professionals, and a systematic infection control has been initiated.

Today, to prevent the spread of viruses, including the coronavirus (CoV) disease 2019 (COVID-19) outbreak that has been announced as a global pandemic by WHO, the focus is on effective infection control within the isolation of patients.^{1,2} In the guidelines published by WHO, CDC, and Turkish Ministry of Health, hand hygiene practices are emphasized as the first step of effective infection control.⁴⁻⁶ Health professionals in the areas where health services are provided protect both themselves and the individuals they care for with proper hand hygiene practices in the light of evidence-based information. In the same way, hand hygiene practices, including in social life, are the most important factor in minimizing the spread of the virus as well as in protecting individuals' own health.² The aim of this review is to, in the light of the published guidelines, emphasize the importance of hand hygiene practices among health professionals during the pandemic process. Collecting hand hygiene rules to be followed during the pandemic process as a review will allow health professionals to easily access accurate information about hand hygiene practices.³⁻⁶

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What is Coronavirus Disease 2019 (COVID-19)?

CoVs are a large family of viruses that are common in society and are known to cause illnesses ranging from the common cold to more severe diseases such as the Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS). CoVs have been divided into several subgroups: human CoV (HCoV)-229E, HCoV-OC43, HCoV-NL63, and HCoV-HKU1, which have been found in people and are easily transmitted from person to person.¹ As the first international health emergency of the 21st century, SARS-CoV emerged in 2003 and caused the death of hundreds of people. About 10 years later, MERS-CoV from the CoV family, which has not been previously found in humans or animals, was first described in humans in Saudi Arabia in September 2012.^{1,7,8}

The office of the WHO in China reported pneumonia cases of unknown etiology in Wuhan, China's Hubei province, on December 31, 2019.⁹ This case was identified as a novel CoV on January 7, 2020, and later, the name of the disease was accepted as COVID-19. WHO categorized the COVID-19 outbreak as "a public health emergency of international concern" on January 30, 2020 and made an assessment to characterize it as a global outbreak (pandemic) on March 11, 2020 owing to the spread and severity of the virus.^{1,7-9} In Turkey, on the other hand, studies on COVID-19 began on January 10, 2020, and the first case was confirmed on March 11, 2020.^{1,2}

Coronavirus Disease 2019 and Infection Prevention Practices

Owing to the COVID-19 outbreak, regarded as a world pandemic, the importance of infection prevention practices in both healthcare and community areas has been once again recognized. Because it covers standard measures as well as contact and droplet precautions, the pandemic in question has integrated many rules into our lives, including the ambient conditions that have been contacted and the hygiene rules.⁶

All measures taken in all healthcare institutions independently from the general condition of the patient are cited as standard precautions.⁶ Standard precautions are of great importance during the COVID-19 pandemic as well as in the prevention of all infections. Besides the fact that the guidelines prepared by WHO, CDC, and Turkish Ministry of Health agree at the same point in terms of standard measures, they also clearly present the precautions that should be taken by health professionals in healthcare areas.⁴⁻⁶ As stated in the guidelines, there are many items as part of standard precautions, such as the use of personal protective equipment (PPE), the health of health professionals, and environmental controls. The leading and most significant item among them is hand hygiene. Hand hygiene is the first step in practicing standard precautions and is integrated with other practices.¹⁰ Health professionals should perform hand hygiene practices first and continue with other steps subsequently. Performing hand hygiene before and after all practices in the caregiving areas not only protects the health of the health professionals but also protects the health of those who come in contact with the setting, such as patients, visitors, and patient accompanists.^{11,12}

During the COVID-19 pandemic process, all guidelines published both internationally and nationally for healthcare institutions encompass appropriate patient care for droplet and contact isolation.⁴⁻⁶ In accordance with droplet isolation, health professionals who give care should wear a medical mask and gown for close-range contact (typically within 1 meter) practices and N95/filtering facepiece 2 respirators and gown for aerosol-generating procedures.⁶ Apart from droplet isolation, as per contact precaution, health professionals should nec-

essarily use gloves and gowns in all practices.⁶ PPE, such as gloves, gowns, eye protection goggles, face shield, mask, and others, will provide an adequate level of protection when they are used properly. To safely don PPE, the order of gowns, masks, eye protection-face shields, bone, and gloves should be followed, and to safely doff PPE, the order of gloves, gowns, eye protection-face shield, bone, and mask should also be adhered to. When donning and doffing PPE, hand hygiene should always be performed.^{10,13} These rules not only protect health professionals but also prevent the spread of infection from patient to patient and from patient to environment.¹³ In communities or social environments where patient care is not given, individual's use of masks following hand hygiene rules and maintaining social distancing are among the most important infection prevention practices.^{9,11,14}

Hand Hygiene

In the prevention of both healthcare-associated infections and community-acquired infections, the cheapest, most important, and easy-to-perform infection prevention practice is hand hygiene.³⁻⁵ Although handwashing with soap and water has been considered a measure of personal hygiene in general, cleaning hands with an antiseptic agent was conceptualized in the 19th century. Studies of Semmelweis provided the first evidence that hand decontamination can markedly reduce the incidence of infections in puerperal sepsis. This practice was a milestone in infection prevention. Besides, this case revealed that the most important source of transmission and spread of infectious agents in hospitals was the hands of health professionals. In addition, it is emphasized in today's studies that about 30-50% of healthcare-associated infections can be prevented with adherence to hand hygiene recommendations.¹⁵

The guidelines prepared by both CDC and the Turkish Society of Hospital Infections and Control cover studies on hand hygiene and the flora members on the hands.^{3,5} In these guidelines, colonization of the human body by bacteria and the differences in total aerobic bacterial counts on the different areas of the body are explained with studies in category I, which are strongly recommended for implementation and strongly supported by well-designed experimental, clinical, or epidemiologic studies.⁴⁻⁶ This colonization on the skin was divided into 2 categories: transient and resident. Resident flora is a kind of bacteria living with us that contribute to the defense mechanism against diseases. On the other hand, transient flora is the colonization of the superficial layers of the skin by bacteria due to several factors, such as contamination with blood or other body fluids, contact with inanimate objects that are colonized by bacteria, and poor hand hygiene, among others. In this sense, transient flora is more amenable to removal by routine handwashing.^{3,6} Transient flora encounters resistant bacteria owing to several factors such as hospitalization and contact with contaminated environmental surfaces. These resistant bacteria are gram-negative (-) bacilli (such as *Acinetobacter spp.*, *Pseudomonas spp.*) in hospital environments, and gram-positive (+) bacilli (such as *Staphylococcus aureus*) in social environments as well.^{3,9} Transient flora acquires new bacteria after contact with areas infected with bacteria and other agents and therefore causes illness.^{3-6,9,14}

Hand hygiene is a general term that applies to either antiseptic hand rub or washing hands with soap and water. In published guidelines, hand hygiene is defined as practices such as handwashing with soap and water when the hand shows visible dirt or alcohol-based hand rub when the hand does not show visible dirt.³⁻⁶ Hygiene materials such as water, soap, and antiseptic, among others used during hand hygiene practices should have certain qualities. The water used for handwashing should have the characteristics of decontaminated, high-quality potable water. In this sense, water purifying equipment can be used

in areas where mains water is considered to be contaminated. Depending on the contamination load on the hands, the amount of water used for handwashing varies between 0.5 and 2 liters. Besides, hands should always be rinsed in running water.¹⁶

In areas where healthcare services are provided, performing hand hygiene in 5 indications—(1) before patient contact, (2) after patient contact, (3) after contact with blood or body fluids, (4) after contact with patient's environments, and (5) before aseptic procedures—becomes effective in reducing healthcare-associated infections.⁴⁻⁶ Many studies examining these 5 indications reported that there is a decrease in the adherence to hand hygiene recommendations of health professionals before patient contact, before aseptic procedures, and after contact with patient's environments.^{2,15,17,18} Because health professionals consider themselves clean, they believe that their hands are contaminated only after contact with patients, they suppose that the environment is still clean after contact with patient's environments, or regarding patient's environment, they believe that sickbed reduces adherence to hand hygiene recommendations. Unlike adherence to these indications, washing hands after contaminating with body fluids and after patient contact enhances the adherence to hand hygiene recommendations for visible dirt.^{2,3,15,17} Besides, many factors such as workload, difficulties in finding water and soap, lack of health professionals, cleansing of wrong dispensers, and personal behaviors, among others, negatively impact adherence to hand hygiene.^{14,17}

The Coronavirus Disease 2019 Pandemic and Hand Hygiene

During the COVID-19 pandemic process, the importance of hand hygiene practices has perceptibly increased not only in health institutions but also in all areas of the society. Hand hygiene practices that are effective in preventing infections are frequently performed by everyone in the community, and materials are reached in all areas of the society for practices.¹⁹ During the pandemic process, both announcements made through television programs, radio channels, newspapers, and brochures and strict measures taken by authorities such as the Ministry of Internal Affairs and the Ministry of Health have highlighted the importance of infection prevention to the public. In this process, several antiseptics such as hand antiseptics, cologne, and others have been added to handwashing that has become integrated into social life. Posters and announcements about the importance of hand hygiene draw attention in many areas of life, such as public areas, social environments, and shopping malls, among others.^{1,2,9,10}

Frequent emphasis on hygiene during the COVID-19 pandemic process motivates individuals for hand hygiene practices and enhances adherence to hand hygiene. However, in this process, there are also nonconforming behaviors in hand hygiene practices. These nonconforming behaviors encompass deficiencies in hand hygiene practices as well as misuse of gloves. Mistakes such as the preference of using gloves instead of hand hygiene practices, failure to perform hand hygiene practices in transition from social areas to private areas, and applying hand antiseptic on the gloves can be examples of misbehaviors in hand hygiene practices.^{3,17} Gloves should be worn only in case of contact with blood and body fluids.³ In a study examining the perception of glove use among health professionals, it was observed that there is a perception of wearing gloves not only after contact with body fluids but also in all processes, and it was concluded that this increases the risk of cross-contamination.²⁰ On the other hand, in another study investigating glove use and the perceptions of health professionals, it was found that the use of gloves instead of hand hygiene and that errors in the use of gloves increase the risk of contamination.²¹ In social areas other than healthcare facilities, one should not wear gloves for

protection from both COVID-19 and other infectious agents. Contrary to popular belief, the use of gloves creates a false sense of safety and leads to more contamination in individuals. In the public sphere, individuals wear gloves in the first hours of the day and touch everywhere all day long. This is neither used in infection prevention practices nor does it protect the individuals. Touching objects in the environment and touching both belongings and mouth and nose with the same gloves seriously contaminates individuals. Touching common-use areas such as door handles, elevator buttons, and others with contaminated gloves also negatively affects the individuals in the settings.³ During the COVID-19 pandemic process, as in protection from all infections, providing hand hygiene at the right time instead of using gloves would be the most appropriate behavior for infection control.

Hand hygiene practices within healthcare facilities maintain their importance not only in preventing healthcare-associated infections but also in the pandemic process.¹⁷ In the guidelines published by WHO, CDC, and Turkish Ministry of Health within constantly updated studies in category I, it is emphasized that hand hygiene practices of health professionals are of great importance in preventing transmission.⁴⁻⁶ In the guidelines in question and the studies conducted, both hand hygiene practices and the mechanism by which these practices break the chain of infection prevention are supported by being strongly recommended for implementation and are strongly supported by well-designed experimental, clinical, or epidemiologic studies and strong theoretical rationale.^{1-3,7,8,17-19} Healthcare-associated pathogens can be recovered not only from infected or draining wounds but also from frequently colonized areas of normal, intact patient skin. It was proven that approximately more than 10^6 viable microorganisms are shed daily from normal skin and that objects in the patient's immediate environment can easily become contaminated with these microorganisms.^{1-3,7,8,17-19} In this sense, it was corroborated that the spread of infection could be reduced by breaking the mode of transmission ring of chain of infection that has a loop, including reservoir, portal of exit, mode of transmission, portal of entry, and susceptible host.^{1-3,7,8,17-19} Studies have reported that an increase in health professionals' adherence to hand hygiene recommendations provides a decrease in the prevalence of healthcare-associated infections.¹⁷⁻¹⁹ Acquarulo et al.²² reported that hand hygiene training is of great importance in preventing contamination at critical points where healthcare services are provided. Kapoor and Saha¹⁹ concluded that the use of the proper technique of handwashing or hand rub by health professionals prevented contamination. Many investigations on outbreaks have reported that the causes of a pandemic encompass the lack of a number of staff and patient admission beyond the capacity of the health facility as well as low adherence to hand hygiene recommendations.^{7-10,16-18} Viruses and other pathogens are mechanically damaged during handwashing or hand rub with alcohol-based hand antiseptics. The number of pathogens on the hands of health professionals effectively reduces if hand hygiene is performed in sufficient time and in appropriate conditions.⁵ Health professionals should also not ignore their responsibility to protect patients from infections while taking their therapeutic roles and responsibilities for care. In this regard, health professionals should definitely perform hand hygiene before and after all the procedures they will perform on patients, during the transition from patient to patient and from patient to patient's environment, and before and after touching materials.³⁻⁶

Apart from the healthcare-associated infections, the COVID-19 pandemic process has increased the awareness of health professionals' hand hygiene practices. Performing proper hand hygiene practices in all areas where patient care is provided, such as inpatient treatment centers, outpatient units, invasive units, geriatric care centers, home

care services, emergency services, is the most important responsibility of health professionals.^{3-6, 17-19} Even though healthcare services are provided in many varying areas, hand hygiene practices include a certain standard for infection control. Performing hand hygiene under the 5 indications mentioned earlier will prevent contamination in all areas where patient care and treatment are involved.¹⁷⁻¹⁹ In their study on maximum barrier measures and hand hygiene practices in emergency service, Barratt et al.²³ concluded that the lack of hand hygiene practices due to the intensity in emergency services significantly increased the transmission of infections. Similarly, in their study carried out in aged care facilities, Pineles et al.²⁴ determined that a proper hand hygiene practice reduces the risk of infection. In their study conducted in an intensive care unit, Lohiya et al.²⁵ concluded that increased adherence to hand hygiene decreases healthcare-associated infection rates. In this sense, performing hand hygiene practices properly during the COVID-19 pandemic in the areas where healthcare service is provided is of great importance.

Conclusion

Measures taken in accordance with standard precautions in both public spheres and healthcare facilities are the most leading prevention strategies during the COVID-19 pandemic process as well as for all infections.⁶ Keeping the pandemic under control and ensuring that the infection affects the least number of individuals is possible with effective infection control. In this sense, the most leading measure among the precautions to be taken is hand hygiene. Hand hygiene practices performed at the right time and with the appropriate methods would minimize the spread of the virus.³⁻⁶ Hand hygiene should be performed correctly as a habit, not only in healthcare facilities but also in social life. Educating individuals on the habit of hand hygiene, particularly at early ages, is of great importance in terms of hygiene behavior in future generations.^{2,3,6,8,9}

In healthcare institutions, health professionals' knowledge of hand hygiene practices should be kept at a sufficient level in the light of currently published guidelines and should be supported by in-service training. Materials to be used for hand hygiene practice should be kept within the reach of healthcare professionals, and contamination of materials should be avoided. While taking the pandemic process under control through the best conditions as per the stipulated measures, prevention of other healthcare-associated infections would be a great outcome.

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