

Medical mask or N95 respirator: when and how to use?

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Abstract: COVID-19 pandemic is now a global threat to human health reaching up to 2 million infected people all around the world. Since its first recognition in Wuhan, many topics were discussed intensively about COVID-19, both in the public and scientific community. Personal protective equipment, especially masks, has been among the hottest topics during this pandemic. Regardless of which mask is used, performing hand hygiene frequently with an alcohol-based hand rub or with soap and water if hands are dirty is the most effective preventive measure for COVID-19. The type of mask used when caring for COVID-19 patients will vary according to the setting, type of personnel/person, and activity. Although the main transmission route for COVID-19 is droplets, during aerosol generating procedures airborne transmission may occur. Keeping the distancing and medical masks and eye protection during close contact efficiently protects against respiratory diseases transmitted via droplets. Airborne precautions include goggles and respiratory protection with the use of an N95 or an equivalent mask respirator to prevent airborne transmission.

Key words: Masks, respiratory protective devices, respirators, air-purifying

1. Introduction

COVID-19 pandemic is now a global threat to human health reaching up to 2 million infected people all around the world. Since its first recognition in Wuhan, many topics have been discussed intensively about COVID-19, both in the public and scientific community. Personal protective equipment (PPE), especially masks, has been among the hottest topics during this pandemic. The shortage of PPE and inappropriate use increase concerns while many health care workers (HCWs) are getting infected in the countries hit by COVID-19. In this review we will try to answer some questions about masks such as when and how to use and which type of mask should be used in different settings.

2. Transmission

The agent of COVID-19 (SARS-CoV-2) can be detected in various clinical samples such as saliva, sputum, stool, and blood using polymerase chain reaction [1]. However, as World Health Organization stressed repeatedly^{1,2} current

scientific data suggest that SARS-CoV2 is transmitted via respiratory droplets and contact [2]. The droplets are respiratory particles which are larger than 5 µm in diameter and can travel, at the maximum, 6 feet (1.83 m) through the air before landing [2]. There is no clinical evidence that blood or bodily fluids pose a risk for transmission [3]

To recall this solid data is very important while choosing personal protective equipment. Keeping the distancing and medical masks and eye protection during close contact efficiently protect against respiratory diseases transmitted via droplets. Airborne transmission occurs by droplet nuclei and it is the main way of transmission for a small number of diseases (i.e. measles, varicella, tuberculosis). Droplet nuclei are respiratory droplets which get dried shortly after exhalation and become smaller than 5 µm in diameter [2]. Droplet nuclei remain suspended in air and can travel over long distances. Airborne precautions include goggles and respiratory protection; the use of an N95 or an equivalent mask respirator is needed to prevent airborne transmission [3]. Although the

¹ World Health Organization (2020) Advice on the use of masks in the context of COVID-19. Web site: [https://www.who.int/publications-detail/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-\(2019-ncov\)-outbreak](https://www.who.int/publications-detail/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-(2019-ncov)-outbreak) [accessed 12 April 2020]

² World Health Organization (2020). Rational use of personal protective equipment for coronavirus disease (COVID-19) and considerations during severe shortages. Web site: https://apps.who.int/iris/bitstream/handle/10665/331695/WHO-2019-nCov-IPC_PPE_use-2020.3-eng.pdf [accessed 12 April 2020]

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main transmission route for COVID-19 is droplets, during aerosol generating procedures airborne transmission may occur [3]. Aerosol generating procedures are listed as follows [3,4]: intubation, tracheotomy, endotracheal aspiration, induction of sputum, cardiac resuscitation, bronchoscopy, high-flow oxygen therapy, face mask ventilation, noninvasive mechanical ventilation and nebulizer use. N95 masks or FFP2 and other equivalent masks are only needed for HCWs who are performing these procedures on a COVID-19 positive patient.

The virus could remain viable in droplets which also land on surfaces and serve as a source of transmission via hand contact on these surfaces (contact transmission). Regardless of which mask is used, performing hand hygiene frequently with an alcohol-based hand rub or with soap and water if hands are dirty is the most effective preventive measure for COVID-19².

3. Masks

There are two main types of masks used as personal protective equipment in the hospital settings.

3.1. Medical/surgical face masks

If worn by a HCW when within 1 m of the patient, surgical face mask can efficiently protect against droplet transmission. The estimated risk reduction in this situation is about 80% [3]. If worn by the patient, it will reduce dispersal of respiratory droplets; thus, HCWs will be protected against droplet transmission. In addition to that, surgical masks worn by patient prevent contact transmission by reducing the contamination of the inanimate surfaces by virus-containing particles [3].

3.2. Filtering facepiece respirators

These masks are high-performance filtering masks (i.e. N95 or FFP2 or FFP3 standard or equivalent). Filtration is achieved by a combination of a web of polypropylene microfibers and electrostatic charge. These types of masks should be fit-tested before each use; at least the user should confirm a seal before entering the area containing aerosols [3].

The type of mask used when caring for COVID-19 patients will vary according to the setting, type of personnel/person, and activity (Table)^{3,4}. From the very

early times of COVID-19 pandemic, the type of the mask that should be used in health care settings became a matter of debate in Turkey. Many physicians stated that everyone who will give direct care to the COVID-19 patients should wear N95 mask or an equivalent mask. Many of the studies comparing various protective measures, especially the effect of N95 respirators and medical masks in prevention of respiratory infections among HCWs, have conflicting results [5,6]. To comment on these results is misleading because these studies had some flaws. Many of them are underpowered, have no control group, do not explore community exposure, have recall and self-selection bias, and do not consider the effect of other measures (i.e. hand hygiene) on acquisition. Only a few of them performed laboratory testing on cases and controls [7].

According to a cluster randomized clinical trial published in Journal of the American Medical Association, both N95 respirators and medical masks are found to be equally efficient in terms of prevention of laboratory confirmed influenza among HCWs [8]. Taking these studies and the fact that filtering facepiece respirators are not easy to use into consideration, COVID-19 Advisory Committee of Ministry of Health of Turkey prepared a guideline for personal protective equipment (PPE) use in both community and health care settings (Table and Figure).

4. Conclusion

Face masks are very effective preventive equipment against COVID-19. There are different types of face masks and the type of mask used during direct patient care will vary according to the setting, type of personnel/person, and activity. Misuse of face masks would put HCWs at risk of COVID-19 and cause shortage. Every health care facility should pay attention to the proper use of masks.

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Conflict of interest

The authors declare that they have no conflict of interest.

³ T.C. Sağlık Bakanlığı Halk Sağlığı Genel Müdürlüğü (2020). COVID-19 (SARS-CoV-2 ENFEKSİYONU) REHBERİ Bilim Kurulu Çalışması. Web Site: https://covid19bilgi.saglik.gov.tr/depo/rehberler/COVID-19_Rehberi.pdf [accessed 15 April 2020] Turkish

⁴ Center for Disease Control and Prevention (2020). Web site: <https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/diy-cloth-face-coverings.html> [accessed 13 April 2020]

Table. The type of mask used when caring for COVID-19 patients [3,5].

Setting	Target personnel or patients	Activity	Type of mask
Inpatient facilities			
Screening	HCWs	Preliminary contact not involving direct contact	If physical distance (1 m) is feasible, no need for face mask; when not feasible, use a medical mask.
	Patients with symptoms suggestive of COVID-19	Any	Medical mask
	Patients without symptoms suggestive of COVID-19	Any	If the incidence of COVID-19 is low, no need for medical mask. When the incidence is high, cloth face masks/coverings may be used.
Patient room	HCWs	Providing direct care (no aerosol-generating procedures)	Medical mask
	HCWs	Direct care (aerosol-generating procedures are frequently in place)	N95/FFP2 respirators
	Cleaners	Entering the room of COVID-19 patients	Medical mask
Areas of transit where patients are not allowed	All staff, including HCWs	Any activity that does not involve contact with COVID-19 patients	No masks are required. Maintain physical distance (if not feasible, cloth face coverings/masks may be used).
Laboratory	Lab technician	Manipulation of respiratory samples of suspected COVID-19 patients	N95/FFP2 respirators
Administrative areas	All staff, including HCWs	Administrative tasks that do not involve contact with COVID-19 patients.	No masks are required. Maintain physical distance (if not feasible, cloth face coverings/masks may be used).
Outpatient facilities			
Screening/triage	HCWs	Preliminary contact not involving direct contact	If physical distance (1 m) is feasible, no need for face mask; when not feasible use a medical mask.
	Patients with symptoms suggestive of COVID-19	Any	Medical mask
	Patients without symptoms suggestive of COVID-19	Any	Mask is not required if physical distance is maintained.
Waiting room	Patients with symptoms suggestive of COVID-19	Any	Medical mask
	Patients without symptoms suggestive of COVID-19	Any	Mask is not required if physical distance is maintained.
Consultation room	HCWs	Physical examination	Medical mask
	Patients	Any	Medical mask
	Cleaners	After and between consultations with patients with respiratory symptoms.	Medical mask

Table. (Continued).

Administrative areas	All staff, including HCWs	Administrative tasks	No masks are required. Maintain physical distance (if not feasible, cloth face coverings/masks may be used).
Home care			
Home	Patients with symptoms suggestive of COVID-19	Any	Medical mask (except sleeping)
	Caregiver	Entering the patients room but not providing direct care or assistance	Medical mask
	Caregiver	Providing direct care	Medical mask
	HCWs	Providing direct care	Medical mask
Community Settings			
	Anyone	Indoor environment	Maintain physical distance (if not feasible, cloth face coverings/masks may be used).
		Outdoor environment	Maintain physical distance. No mask required.

MEDICAL MASK USAGE RULES

It should never be touched to the front of the medical Mask

If accidentally touched, hands should be washed for at least 20 seconds with normal soap and water or hands should be rubbed with alcohol based antiseptic.

If medical mask gets wet, dirty or if it is ruptured during use it must be replaced with a new one.

Medical masks should not be used in common.

Used medical masks even if thought that as not dirty should not be used again.

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Figure. Flyer to inform HCWs about proper medical mask usage prepared by Turkish Ministry of Health.

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