

Personnel Protective Equipment for Healthcare Professionals During COVID-19 Pandemic

COVID-19 Pandemisi Sırasında Sağlık Çalışanları İçin Kişisel Koruyucu Ekipmanlar

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ABSTRACT

COVID-19 is highly contagious and transmission dynamics of COVID-19 are not yet fully elucidated. It is known that the ill person begins to become contagious before the symptoms of the disease begin. Also asymptomatic person who are infected but does not have symptoms and signs, can infect other individuals. The only way for health workers to protect themselves from COVID-19 is proper use of personal protective equipment and to ensure hand hygiene. COVID-19 is transmitted through close contact and large respiratory droplets and not transmitted by airborne. The surgical mask prevents the passage of respiratory droplets. However, during the aerosol producing procedures performed on the patient, small particles containing infectious particles are scattered to air in high amounts. Healthcare workers are more likely become infected during these procedures. It is recommended to wear respirator during these procedures. Use of masks or respirators must be in conjunction with other recommended PPE and appropriate hand hygiene.

Key Words: COVID-19, Personnel Protective Equipment, Pandemic, Healthcare worker

ÖZ

COVID-19 oldukça bulaşıcı bir vürüştür ve bulaş dinamikleri henüz tam olarak aydınlatılabilmemiş değildir. Hasta kişinin semptomlar başlamadan önce bulaştırıcı olmaya başladığı bilinmektedir. Ayrıca enfekte olmuş ancak semptom ve bulguları olmayan asemptomatik bireylerin de diğer kişileri enfekte edebildiği bilinmektedir. Sağlık çalışanlarının COVID-19 hastalarına bakım verirken kendilerini korumalarının tek yolu el hijyenlerini sağlamaları ve kişisel koruyucu ekipmanları (KKK) doğru şekilde kullanmalarıdır. COVID-19 yakın temasla ve büyük solunum damlacıkları ile bulaşmaktadır, hava yolu ile bulaşmamaktadır. Cerrahi maske solunum damlacıklarının geçişini önlemektedir. Ancak aerosol oluşturan işlemler sırasında enfeksiyöz küçük partiküller yüksek oranda çevreye saçılır. Bu işlemler sırasında sağlık çalışanlarının enfekte olma ihtimali daha yüksektir ve bu nedenle bu işlemler sırasında respirator takılması önerilir. Sağlık çalışanlarının kendilerini korumaları için, maske ve respirator kullanımının yanısıra diğer önerilen KKK'ler de kullanılmalı ve el hijyeni sağlanmalıdır.

Anahtar Kelimeler: COVID-19, Kişisel koruyucu ekipmanlar, Pandemi, Sağlık çalışanı

INTRODUCTION

Health workers are at the forefront of the fight against COVID-19 infection. The only way for health workers to protect themselves is proper use of personal protective equipment (PPE) and to ensure hand hygiene (1). The transmission dynamics of the

new COVID-19 infection are not yet fully elucidated. By the time the available information suggests the infection is transmitted through close contact and large respiratory droplets and not transmitted by airborne. It is known that the ill person begins to become contagious before the symptoms of the disease begin. It is also known that asymptomatic person who are infected but does not have symptoms and signs, can infect other individuals



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(2). Considering all this information, health workers should use the right PPE in the right situation and at the right time.

What is personal protective equipment:

1. Surgical mask
2. N95/FFP2 respirator (or N99)
3. Apron
4. Glove
5. Goggles or face shield
6. Overshoes

Mask

Healthcare professionals who care for possible or definite COVID-19 patients should always wear masks. There are two main types of mask:

Medical (surgical) mask: It acts as a physical barrier in front of the mouth and nose. If worn properly, the surgical mask prevents the respiratory droplets of the sick person from spreading to the mouth and nose of the healthcare worker. The surgical mask does not filter or block very small particles that can be transmitted by coughing, sneezing, or some medical procedures in the air. Also, the surgical mask may not provide complete protection if it does not fit the face properly (3).

Respirators: They are also referred to as N95, N99 or FFPII, FFPIII. N95 masks, fits completely on the face and have the ability to filter very effectively the respiratory particles. The expression N95 means that at least 95% of very small (0.3 micron) particles are filtered by the mask. If used correctly, the filtering properties of N95 respirators are higher than medical masks (3).

Important points to be considered while wearing a mask:

The recommendations regarding which mask should be worn in which cases is summarized in Table I (2,4). IDSA says that healthcare professionals can wear surgical or N95 (or N99) masks, since wearing surgical or N95 masks is superior to approaching possible or definitive COVID-19 patients without a mask. Use of masks or respirators must be in conjunction with other recommended PPE and appropriate hand hygiene (1,2). The recommendations for PPE are shown in Table I (2,4).

There are necessary points to be considered while wearing a mask. The medical mask should be worn to cover the nose, mouth, and the lower part of the chin and must be tightly tied. Stranded flexible tape on the bridge of the nose should be compressed. Medical masks should be changed with new ones in case of contamination, moisture, wear (3,5).

Respirator fit test should be done when using a respirator. Respirators can be used for up to 4-6 hours as long as they are not damaged, moisturized and become dirty (4). Regardless of the mask type, healthcare providers must maintain hand hygiene before and after touching the mask (3).

Apron

Healthcare professionals who will be closer than 1 meter in contact with the probable or definite COVID-19 patients should wear apron. The apron should be knee-length and cover the front and back of entire body. The sleeves of the apron should be long and have wristbands (5).

Gloves

Healthcare professionals who will be closer than 1 meter in contact with the probable or definite COVID-19 patients should wear gloves. Gloves should be worn to cover the wrist part of

Table I: Recommendation for PPE (2,4).

| Activities | Surgical mask | Respirator | Gloves | Gown | Goggles/ face shield | Boots or closed work shoes or overshoes |
|---|---------------|------------|--------|------|----------------------|---|
| Healthcare workers when providing direct care in patient room | √ | X | √ | √ | √ | X |
| Healthcare workers when aerosol-generating procedures performed on COVID-19 patients | X | √ | √ | √ | √ | X |
| Cleaners when entering the room of COVID-19 patients | X | √ | √ | √ | √ | √ |
| Healthcare workers in an ambulance or transfer vehicle for COVID-19 patient | X | √ | √ | √ | √ | X |
| Healthcare workers in outpatient facilities | √ | X | √ | √ | √ | X |
| Cleaners after and between consultations of patients with respiratory symptoms in outpatient facilities | √ | X | √ | √ | X | √ |
| Patient with respiratory symptoms in waiting room | √ | X | X | X | X | X |
| Laboratory personnel Working with respiratory samples | X | √ | √ | √ | √ | X |

the apron (5). There is no recommendation for health personnel about double-gloving (2).

Goggles or face shield

The transmission through the eye for COVID-19 is possible. Goggles or face shield should be used to cover the face and eyes (4).

Overshoes

There is no recommendation for wearing overshoes. However, if there is a risk of splashing of contaminated fluids on the health care worker, overshoes can be used (2).

Other important points:

Aerosol producing procedures: COVID-19 infection is transmitted by respiratory droplets and the surgical mask prevents the passage of respiratory droplets. However, during the various procedures performed on the patient, small particles containing infectious particles are scattered to air in high amounts. After these processes, COVID-19 virus in aerosol particles has been reported to hang up to 3 hours in the air (4). Healthcare workers are more likely become infected during these procedures. It is recommended to wear N95 or N99 during these procedures (1,2,4,5). These processes are listed below (4):

- Aspiration of respiratory secretions
- Collection of respiratory tract specimens
- Intubation, extubation and related procedures,
- Dentistry applications
- Highflow nasal oxygen
- Noninvasive ventilation, bi-level positive airway pressure (BiPAP) and continuous positive airway pressure ventilation (CPAP)
- High-frequency oscillating ventilation
- Cardiopulmonary resuscitation
- Drug treatment with nebulizer
- Bronchoscopic and endoscopic procedures

Sequence for putting on PPE: Hand hygiene should be provided before wearing PPE. The order for putting on PPE is apron, mask, goggles/face protector and gloves (5,6).

Sequence for removing PPE: The order for removing PPE is gloves, apron, goggles/face protector, mask. Hand hygiene should be provided after removing the apron. When removing goggles/face protector, front side should not be touched. Finally the mask is removed and hand hygiene is provided again. It is especially important to remove the mask after leaving the patient's room (5,6).

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