

Does the Use of Personal Protection Equipment for the Medical Staff Working with Patients with Coronavirus Disease 2019 Need to be Revised?

Ahmad Shah Farhat¹, Ashraf Mohamadzadeh², Reza Saeidi¹, Negar Yeganeh Khorasani^{3*}

1. Neonatal Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

2. Neonatal Intensive Care Unit, Imam Reza Hospital, Neonatal Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

3. Student Research Committee, Faculty of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran

ABSTRACT

Background: Personal protective equipment (PPE) is one of the protective equipment that health workers can use to protect themselves against coronavirus disease 2019 (COVID-19); however, it is accompanied by some problems for medical staff. Since severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is not transmitted through healthy skin, the hypothesis was examined as to whether the cotton gown could be used instead of PPE.

Methods: The medical staff of the Neonatal Care Unit took care of 51 patients with 1180 shifts. During the first and a half months, the medical personnel used a special PPE package for providing care of patients, which included an air-impermeable plastic gown with a head-to-toe cover, an N95 mask, gloves, and a face shield. However, from the beginning of the epidemic, doctors used cotton surgical gowns instead of the ones in the package. Following that, the nursing team gradually replaced the air-impermeable plastic gowns with cotton surgical gowns, and finally, all the staff used the cotton gowns.

Results: After three months, all medical staff was evaluated for clinical signs of COVID-19, such as fever, cough, nausea, and headache. During these three months, no symptoms or absence due to illness were observed in the staff. It should be mentioned that the antibody titer was not evaluated at the end of the study.

Conclusion: A retrospective review of the staff showed that the cotton surgical gown protected the staff against COVID-19. Accordingly, the cotton surgical gown can be used in medical centers to replace PPE sets containing an air-impermeable plastic gown with a head-to-toe cover. The result of this study can improve some of the problems of the medical staff.

Keywords: Care, COVID 19, Neonates, PPE

Introduction

Coronavirus disease 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a systemic respiratory disease that progresses to severe pneumonia in 10% to 15% of the patients. In severe cases, COVID-19 can lead to acute respiratory distress (ARDS) and multiple organ failure (MOF) (1). SARS-CoV-2 is transmitted through close contact with airborne droplets and particulate matter. However, the first step in infection is the binding of the virus to the host cell

receptors. Previous studies have shown that the SARS-CoV-2 virus receptor is mainly located in airway epithelial cells, alveolar epithelial cells, vascular endothelial cells, and macrophages in the lung (2). Since healthcare personnel has very close contact with patients, they are prone to be infected with COVID-19. It is difficult to develop a safe and effective vaccine against COVID-19, as it is a new infectious disease in such a short period; therefore, it is of great importance to protecting health care workers, who are the backbone of the

* Corresponding author: Negar Yeganeh Khorasani, Student Research Committee, Faculty of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran. Tel: 985138521121; Email: yeganehn972@mums.ac.ir

Please cite this paper as:

Farhat AS, Mohamadzadeh A, Saeidi R, Yeganeh Khorasani N. Does the Use of Personal Protection Equipment for the Medical Staff Working with Patients with Coronavirus Disease 2019 Need to be Revised? Iranian Journal of Neonatology. 2021 Apr; 12(2). DOI: [10.22038/ijn.2021.51449.1910](https://doi.org/10.22038/ijn.2021.51449.1910)

epidemic (3). For this reason, health care systems should prioritize the provision and distribution of protective equipment for their employees and students (4, 5).

According to the Guidance on Preparing Workplaces for COVID-19, personal protection equipment (PPE) is one of the protective equipment that health workers can use to safeguard themselves against COVID-19 (5-7). However, many employees described the use of PPE (an air-impermeable plastic gown with a head-to-toe cover, N95 mask, Latex gloves, and face shield) as uncomfortable and stated that it took them longer than usual to do the main tasks. Large quantities of PPE are also required to be stored, and the cost of PPE is also a matter of concern (8). Unlike the PPE set containing an air-impermeable plastic gown, a cotton surgical gown, is less expensive, and health workers are more comfortable with it because it feels less warm and is easier to wear.

Based on the assumption that the SARS-CoV-2 virus is transmitted through the respiratory tract, eyes, and mainly mucous membranes but does not pass through healthy skin, the virus can be removed from the skin after 20 seconds of washing. The PPE package in our hospital included air-impermeable plastic cloths with a head-to-toe cover, N95 masks, Latex gloves, and face shields. It was thought it would be possible to use cotton surgical gowns instead of air-impermeable plastic gowns with a head-to-toe cover and remove the virus from the skin after bathing with soap and water.

According to this hypothesis, from April 1, 2020, first the doctors and then the nursing and service group voluntarily and without government instructions used cotton surgical gowns instead of an air-impermeable plastic gown with a head-to-toe cover, N95 masks, gloves, and face shields. Accordingly, this retrospective study aimed to evaluate the use of cotton surgical gowns, which were used for three months, by healthcare workers at our ward.

From early March 2020, the Iranian government decided to centralize the care for suspected COVID-19 cases to reduce the risk of secondary transmission. Imam Reza teaching Hospital in Mashhad, northeast Iran, was officially announced as one of the hospitals designated for the reception of COVID-19 patients in Khorasan Razavi province. Subsequently, in early March 2020, the neonatal intensive care unit (NICU) of this hospital accepted the infected patients, and during the first one and a half month, the medical

personnel used a special PPE package for patients care, which included the air-impermeable plastic gown with a head-to-toe cover, N95 mask, gloves, and face shields. From the beginning of the epidemic, doctors used cotton surgical gowns instead of the ones in the package. Following that, the nursing team gradually initiated to use cotton surgical gowns, and by April 20, 2020, all the staff used the cotton gowns. During the three months from April 20, 2020, to July 22, the medical staff took care of these patients with 1180 shifts using N95 masks, cotton surgical gowns and gloves, as well as face shields. There were six nurses, three assistant nurses, two residents, one fellow, and one staff (with a mean age of about 34.5 years) in each working day. After three months, the subjects were evaluated for clinical signs of COVID-19 diseases, such as fever, dry cough, headache, dizziness, diarrhea, nausea, and hemoptysis. In these three months, no symptoms or absence due to illness were observed among the staff. The limitation of our study was that we did not measure the antibody titer at the end of the study. Furthermore, the staff was satisfied and comfortable with this gown since it was not as warm as the air-impermeable plastic gown.

A retrospective review of the staff showed that the cotton surgical gown protected the staff against COVID-19. This study also revealed that cotton surgical gowns could be used in medical centers to replace air-impermeable plastic gowns with a head-to-toe cover. In addition, the antibody titer was not evaluated at the end of the study. The reason is that the study was retrospective, and the antibody level had not been evaluated at the beginning of the study. Accordingly, antibody testing was not reliable in this regard. On the other hand, the personnel were in contact with the environment and could be infected with asymptomatic diseases from outside the hospital.

The results of this study can reduce some of the medical costs imposed on the countries, in addition to being able to reduce some of the problems medical personnel facing as a result of wearing PPE sets containing an air-impermeable plastic gown with a head-to-toe cover. Regarding the limitations of the study, one can refer to the retrospective research method and the participation of the NICU personnel in this study. Accordingly, it is recommended that larger and prospective studies be conducted in different wards, such as pediatric intensive care unit, ICU, surgery, medical obstetrics, and gynecology using Real-Time Polymerase Chain Reaction method or rapid antigen tests to rule out asymptomatic

COVID-19 positive cases among the health care personnel and longer follow-up.

Acknowledgments

The authors thank the Student Research Committee at Mashhad University of Medical Sciences, Mashhad, Iran.

Conflicts of interest

The authors declare no conflicts of interest regarding the publication of the study.

References

1. Lippi G, Plebani M, Henry BM. Thrombocytopenia is associated with severe coronavirus disease 2019 (COVID-19) infections: a meta-analysis. *Clin Chim Acta*. 2020; 506:145-8.
2. Tay MZ, Poh CM, Rénia L, MacAry PA, Ng LFP. The trinity of COVID-19: immunity, inflammation and intervention. *Nat Rev Immunol*. 2020; 20(6):363-74.
3. Jin YH, Huang Q, Wang YY, Zeng XT, Luo LS, Pan ZY, et al. Perceived infection transmission routes, infection control practices, psychosocial changes, and management of COVID-19 infected healthcare workers in a tertiary acute care hospital in Wuhan: a cross-sectional survey. *Mil Med Res*. 2020; 7(1):24.
4. Liu M, Cheng SZ, Xu KW, Yang Y, Zhu QT, Zhang H, et al. Use of personal protective equipment against coronavirus disease 2019 by healthcare professionals in Wuhan, China: cross sectional study. *BMJ*. 2020; 369:m2195.
5. Saeidi, R., Izanloo, A., Izanlou, S. A study of the relationship between job satisfaction and burnout among neonatal intensive care unit staff. *Iranian Journal of Neonatology*. 2020, 11(1): 67-70
6. Occupational Safety and Health Administration. Guidance on preparing workplaces for COVID-19. Washington, D.C: United States Department of Labor; 2020.
7. Fallahi M, Afjeh A, Saneifard H, Namazi N, Kazemian M, Tabatabaee S. Comparison of Vitamin D level in preterm and term infant-mother Pairs: A brief study(Article). *Iranian Journal of Neonatology*. 2016, 7(1): 32-36.
8. Phin NF, Rylands AJ, Allan J, Edwards C, Enstone JE, Nguyen-Van-Tam JS. Personal protective equipment in an influenza pandemic: a UK simulation exercise. *J Hosp Infect*. 2009; 71(1):15-21.