REVIEW

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Management of Intensive Care Personnel with COVID-19 Exposure Risk

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ABSTRACT

The novel coronavirus disease 2019 (COVID-19) presents an important and urgent threat to global health. Healthcare personnel especially those who care for patients at the intensive care units are facing heavy workloads and high risk of infection. Healthcare workers who contact with COVID-19 patients are divided into risk groups according to the characteristics of the procedures they perform during contact, as well as the usage of personal protective equipment. Suggestions for healthcare workers\' risk assessments and recommendations for monitoring based on COVID-19 exposure risk are given in this article.

Keywords: COVID-19, Healthcare Personnel, Intensive Care Unit, Infectious Diseases, Critical Care

Introduction

The novel coronavirus disease 2019 presents an important and urgent threat to global health. Healthcare professionals (HCP) are at risk of transmission due to their direct contact with COVID-19 patients. COVID-19 is transmitted through droplets and close contact. It is reported that the infectivity period depends on the severity of the infection (1). In the intensive care units close contact and prolonged contact are unavoidable (2). Healthcare professionals especially those who care for patients at the intensive care units are facing heavy workloads and high risk of infection.

General Information

The characteristics of severe acute respiratory syndrome Coronavirus 2 (SARS CoV-2) and its transmission patterns could lead to high transmission rates among HCP. In Asian countries, HCP comprised 37–63% of suspected severe acute respiratory syndrome (SARS) cases and 43.5% of Middle East respiratory syndrome (MERS) cases (3,4). In a study with 138 COVID-19 patients from China, it was demonstrated that 40 (29%) of them were HCP. Among these infected HCP, 31 (77.5%) were working in clinical services, 7 (17.5%) in emergency service, and 2 (5%) in intensive care units (5). In order to prevent the transmission from patient to HCP, the necessary precautions should be taken that comprise the whole process.

In the worldwide the guidelines advised facilities to consider forgoing formal contact tracing and work restriction for HCP with exposures in favor of universally applied screening and source control strategies (6,7). In Turkey since the beginning of the outbreak, great importance was attached to the protection of HCP health and a series of urgent measures were taken. Because of their close contact with vulnerable individuals in healthcare settings, a conservative approach to HCP monitoring and applying work restrictions is recommended to prevent transmission from potentially contagious HCP to patients, other HCP.

Table 1. Procedures considered as intense contact in COVID-19 patient care;

- Taking a respiratory tract sample
- Nebulizer therapy
- Non-invasive ventilation
- High flow oxygen therapy
- Intubation, Extubation
- Aspiration of respiratory secretions
- Bronchoscopy/Endoscopy
- Mouth-throat-nose examinations
- Ophthalmological examinations
- Central catheter insertion
- Cardiopulmonary resuscitation

Table 2. Risk assessment of intensive care unit workers in COVID-19 patient care;

	Healthcare worker's Personal Protective Equipment (PPE) Usage Status	Exposure Category
Close contact with COVID-19 patient who was wearing medical (surgical) facemask	Not use a medical mask or N95 or use a medical mask in case of an N95 indication	Medium
	Not wearing eye protection	Low
	Not wearing gown or gloves	Low
	Wearing all PPE	No risk
Close contact with COVID-19 patient who was not wearing medical (surgical) facemask	Not use a medical mask or N95	High
	Use a medical mask in case of an N95 indication	Medium
	Not wearing eye protection	Medium
	Not wearing gown or gloves	Low
	Wearing all recommended PPE	No risk

COVID-19: The novel coronavirus disease 2019, PPE: personal protective equipment

The procedures that are evaluated within the scope of intensive contact and have a high risk of contamination during contact with the COVID-19 patient, are given below (Table 1).

Healthcare workers who contact with COVID-19 patients are divided into risk groups according to the characteristics of the procedures they perform during contact, as well as the usage of personal protective equipment. Republic of Turkey Ministry of Health has published the COVID-19 guidelines (8). According to these guidelines, suggestions on healthcare workers' risk assessments are given below (Table 2).

The feasibility of performing contact tracing of exposed HCP and application of work restrictions depends upon the degree of transmission of COVID-19 and the resources available for contact tracing. After the risk assessment of HCP monitorization and management are done in accordance with their risk groups (6,8).

Management of High Risk HCP

HCP should undergo isolation for 7 days at home with active symptom monitoring; polymerase chain reaction (PCR) test is performed on symptom day if the symptom develops or on the 7th day if symptom does not develop. If the PCR test is positive, it is managed like the definitive case. If the PCR test is negative, HCP without symptoms; works with the mask, active symptom follow-up is continued, with the total time to be completed to 14 day. If the symptom develops, the PCR test is repeated. If the symptom does not develop, rapid antibody test is performed on the 14th day; if the antibody test is negative, the follow-up is terminated; if the antibody test is positive, PCR test is repeated. If there is a symptom in PCR negative HCP, the PCR test is repeated 48 hours after the first test (8).

Although there is no strong evidence that the usage of hydroxychloroquine in prophylaxis, it is recommended for high-risk contacts 2x200 mg for three days in Turkey. If the PCR test is positive, it is managed like the definitive case and hydroxychloroquine treatment is completed in 5 days. HCP should be evaluated for G6PD deficiency prior to use of hydroxychloroquine (8). Hydroxychloroquine and chloroquine are widely used in the treatment of malaria and rheumatic diseases, and they have been suggested as effective treatments for COVID-19 on the grounds of both antiinflammatory and antiviral effects (9,10). Various mechanisms have shown it to have a role in SARS CoV infection. The SARS CoV-2 is bind to human cells via the Angiotensin Converting Enzyme 2 (ACE2) receptor. The studies have shown that the glycosylation process of ACE2 receptor gets affected thus causing the cells pre-treated with chloroquine to be refractory to SARS-CoV-2 infection, that may be the mechanism through which even human cells can become refractory to this infection (11). Hydroxychloroquine has the same mechanism with better safety. These drugs have shown to have immunomodulatory effects which may play a role in reducing the severity of COVID-19 (12).

Although there is no strong evidence, The Indian Council of Medical Research (ICMR) has recommended the use of hydroxychloroquine for prophylaxis of HCP based on the ongoing trials (13,14). But Johns Hopkins Hospital COVID-19 Treatment (JHMI) clinical guidance do not recommend pre or post exposure prophylaxis in individuals with suspected exposure to COVID-19 (15). The results of the ongoing trials give us more insight on hydroxychloroquine prophylaxis.

Management of Medium Risk HCP

HCP works with mask and active symptom monitoring is performed; PCR test is performed on the symptom day if the symptom develops, or on the 7th day if symptom does not develop. If the PCR test is positive, it is managed like the definitive case. If the PCR test is negative, HCP without symptoms; works with the mask, active symptom follow-up is continued, with the total time to be completed to 14 day. If the symptom develops, the PCR test is repeated. If the symptom does not develop, rapid antibody test is performed on the 14th day; if the antibody test is negative, the follow-up is terminated; if the antibody test is positive PCR test is repeated. If there is a symptom in PCR negative HCP, the PCR test is repeated 48 hours after the first test (8).

Management of Low Risk HCP

HCP works with mask and active symptom monitoring is performed for 14 days. If the symptom does not develop, rapid antibody testing is performed on the 14th day; if the antibody test is negative, the follow-up is terminated on the 14th day. If the antibody test is positive PCR test is performed. If symptoms develop during follow-up, PCR test is performed directly. When the PCR test is positive, it is managed like the definitive case. If there is a symptom in PCR negative HCP, the PCR test is repeated 48 hours after the first test. If PCR test is positive, it is managed like the definitive case. If the PCR test is negative, home rest is recommended until the symptom resolves (8).

Conclusions

In order to prevent the transmission from patient to HCP the precautions should be taken that comprise the whole process. The ratio of confirmed HCP infection to patients is decrease, due to the increased supply of critical PPE, enhanced vigilance, and accumulated experienced among HCP (16). It should not be forgotten healthy team of HCP is crucial to successfully preventing the on-going outbreak from further expansion.

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