



Preventive Measures for COVID-19 Health Care Professionals

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ABSTRACT

WHO now acknowledges the COVID-19 (SARS-CoV-2) as a Public Health Emergency, which requires global attention. It has elevated the risk assessment of China, Regional Level and Global Level to Very High. It spreads when someone who has contracted the virus coughs out droplets of infected fluid. Most of these droplets are suspended and settle on various surfaces and objects nearby - such as desks, doors, Doorknobs, pens, tablets or phones etc. Anyone can contract COVID-19 virus by coming in direct contact with contaminated surfaces or objects - and then reaching out to their nose, eyes or mouth with those now-infected hands. If they are within a distance of one meter from an infected individual with or without symptoms, they can contract it by inspiring in the droplets coughed out or exhaled by COVID - 19 impacted individuals. To say, COVID-19 spreads the way the regular flu does. To curb and monitor the spread and contain the transmission of the disease a state control room has been established across the globe with an apparent cut insistence on the protection of Health Professionals committed towards the control of this pandemic. In the current situation of the world in this COVID-19 pandemic, the healthcare professionals (HCP) are at great danger of transmission as they are in direct contact with the patients tested positive with the virus. Therefore, the processes and precautions to quickly examine sick patients with acutely presenting symptoms must be regulated in advance.



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INTRODUCTION

The novel coronavirus (COVID-19) brings an immense risk to the healthcare providers (HCP) and society. This is so as it can be passed on even if a patient is asymptomatic. The primary source is an 'infected individual'. The virus is passed on

through close contact and droplets. It is reported that infectivity begins before any symptoms show. It effectively reduces seven days after the outbreak of symptoms. It is also seen that the period of infectivity is dependent on the stage of the infection and its severity. The virus has been able to survive on non-living surfaces in 40-50% relative humidity and 22-25 °C for a maximum of 5 days. It is said to increase the risk of contracting the infection. In such conditions, the transmission of an aerosol is likely to happen. A study shows that the virus can stay alive in the aerosol for a maximum of 3 hours after aerosol-generating procedures could be detected ([Coronavirus disease , 2020](#)).

General background

The use of Personal Protective Equipment (PPE) does not fully eliminate; however, it greatly reduces the risk of transmission ([CDC, 2020a](#)). An initial study from the origin country (China), it has been

reported that more than 2000 health workers working in different hospitals have been infected with COVID-19 for the period from 18th December 2019 to 20th February 2020. This amounts to 80% of such cases. Furthermore, the immune system gets weakened due to excessive fatigue and stress. This leads to increased sensitivity to COVID-19 (Kumar *et al.*, 2020). With the rapid spread of the infection, reports tell that there was a reduction in PPE availability, also spread of infection in health care Professionals led to an increased transmission among personnel, patients, and visitors. The authorities in China identified an outbreak caused by a new coronavirus, SARS-CoV-2. This leads to mild to severe respiratory illness, known as Coronavirus Disease 2019 (COVID-19). The outbreak began in Wuhan, Hubei Province, China. Since then, it has spread to many countries worldwide, including developed and underdeveloped countries. On 11th March 2020, the World Health Organization declared COVID-19 a pandemic (Aġalar and Engin, 2020).

Strategies adopted to combat exposure risk

The mandatory precautions to control the spread from patient to healthcare workers are essential and must include the entire process, which begins with a patient's admission in a hospital. Next are the procedures like surgeries as well as routine check-ups which shall be postponed. Admissions protocols shall be created for acute respiratory infection symptoms (ARIS). They begin with regulations at the entry points to a hospital. People must be given face masks and must wear them all the time. Health Care Professionals must be fully equipped with PPE. The suspected-patients must be isolated safely and soon enough. Hospital entrances, waiting rooms, as well as patient rooms and wards must have hand sanitisers. These must be more than 70% alcohol. A set up to separate Health Care Personnel and suspected-patients should be placed there. It may be a glass or plastic serving as a physical barrier. This shall restrict close contact (Dickens *et al.*, 2020).

The 2-meter distance shall be maintained between the Health Care Personnel and suspected-patients. This should also be followed in the exam rooms, which must be spacious enough to follow this. These rooms must have ventilation. HCP worked in care of a COVID-19 patient or who has been in close contact with one is under risk of getting infected by the same. National Center for Disease Control (formally National Institute of Communicable Diseases) defines close contact as, being in the same environment with an infected person in the absence of 2-meter minimum distance and being in direct expo-

sure with secretions of the infected person (Qureshi *et al.*, 2020). The national interim guideline of India states close contact as being in face to face contact with a diagnosed COVID-19 patient in the absence of 2-meter distance for more than 15 minutes. The same guideline also states it as carrying out any course of action that generates aerosol with no proper PPE or being present in the room during action with no proper PPE, or any contact with the patient, bodily fluids of the patient, or even if contact with laboratory samples of the patient without using necessary PPE (CDC, 2020a).

Spread from one Healthcare Professional to another is as essential in spreading as from a patient. A way which might lessen the risk of spread among the Healthcare Professionals is creating groups among the providers who work in labs and hospitals. In such a way, while maintaining social distancing, the risk of infecting each other can be minimised. All health providers must be checked two times a day for any respiratory symptoms and temperature, to raise chances of diagnosing the disease early. If all measures fail, and unfortunately, someone contracted the virus and tests positive, others in close contact should be quarantined and monitored for the development of symptoms (Sahu and Kumar, 2020).

Measures to be undertaken to prevent the transmission of COVID-19

A healthcare professional must always take necessary precautionary measures assuming everyone to be likely infected or to be harbouring the virus that can be spread to other healthy individuals and the surroundings. With the purpose to prevent the transmission of the novel coronavirus, a Healthcare Professional must undertake additive measures at the time of exposure during Aerosol Generating Procedures (AGPs), besides standard measures for airborne transmission, proximity, and droplets. Part of elementary measures which may cut down the risk of spread in Healthcare Professionals is assuring proper hygiene for hands.

Hand sanitisation

HCP should ensure the sanitisation of their hands before and after making contact with a positive or any unknown patient, after touching potentially infected material, and donning and doffing of Personal Protective Equipment. Considering that bare hands may easily get contaminated while doffing PPE, taking essential steps to assure proper hand sanitisation is the primary importance. Hands shall be washed for 20 seconds the least using water and soap or if unavailable, shall use a > 70% alcohol-based hand sanitiser or disinfectant or sterillium to

disinfect their hands (Mathur, 2011). Hands should strictly be scrubbed with water and soap if they are exposed. These hand hygiene protocols shall be implemented before and after going to the ICUs (Intensive care unit) (Peters *et al.*, 2019).

Personal Protective Equipment

The ineffectiveness of PPE can also contribute transmission of COVID-19 virus. Health professionals must be accomplished in the below acts.

1. A situational requirement of a specific type of PPE
2. Donning of PPE
3. Proper and precise doffing of PPE without any contamination
4. Proper discarding and disinfecting of the protective equipment.

The designated institutions must have proper regulations and defined written down policies that lay down the precise and correct methodologies and order for donning and doffing of the protective gear securely (OSHA, 2020).

The sequential wearing of the PPE following hand hygiene goes as a gown followed by the mask and goggles followed by a face shield and in the end gloves. The almost opposite order is followed for removing the PPE and goes as gloves followed by face shield and goggles followed by the gown and in the end the mask (PPE, 2020). It must not be taken off until the health care professional leaves the potentially high risk or contaminated zone. The mask shall be appropriately discarded once the contaminated zone has been exited (Herron *et al.*, 2020).

Not to mention the hand hygiene becomes even more critical once all of the protective gear has been removed. The ideal usage of the PPE by any Healthcare Professional according to various situations and guidelines as outlined by the WHO.

1. In COVID-19 patient rooms in places, health professionals serving directly must put on surgical masks, gown, glove, face shield, or goggles. For healthcare workers posted for Aerosol-generating procedures on COVID-19 patients must wear long-sleeved water-resistant gowns, N95 masks, face shield and goggles, gloves (Thomas *et al.*, 2020).
2. Cleaning professionals entering the rooms of COVID-19 patients must wear N95 masks, gloves, gowns, face shields or goggles and closed work shoes or boots.

3. Healthcare workers in an ambulance or transport vehicles of COVID 19 patients must wear double non-sterile gloves, N95 masks, face shields or goggles, and long-sleeved water-resistant gowns.

4. In outpatient departments, healthcare professions posted for patients with respiratory symptoms should wear surgical masks, gowns, gloves, and goggles (Woolley *et al.*, 2020).

5. Patients in waiting rooms with respiratory symptoms should wear an N95 mask. These patients should be isolated if possible, otherwise must keep a distance of at least 1 meter from each other.

6. Lab personnel working with respiratory samples must wear double non-sterile gloves, N95 mask, face shield or goggles, and long-sleeved water-resistant gowns.

Masks

National Centre of Diseases Control (NCDC), India states that if there is a shortage of N95 and HCP need to be in close contact with a suspected or diagnosed patient, if minimal to zero risks of transmission via aerosol is present, surgical masks may be used. Nonetheless, NCDC has put in guidelines that if the Health Care Professional needs to perform procedures such as sample collection that might generate an aerosol, they must bring to use N95 masks (Q&A, 2020). If the mask is used for sample collection is not moistened, or soiled, it can be used for 4–6 hours at max. According to the COVID-19 guidelines, all HCPs must wear a medical mask (Smith *et al.*, 2016). All members involved in the emergency or casualty, the infectious diseases OPD, the respiratory care OPD, endoscopic examination room, and the department of stomatology should be in an N95 mask (MacIntyre *et al.*, 2009).

The mask should be worn with precautions - without any space between the skin, and the mask and beard may be against the protective effect and restrict the mask from sitting.

Eye Protection

The transmission of COVID 19 virus via eyes is not definite; nevertheless, various animal experiments have resulted in spread through this route. Hence, eye protection is considered as a part of the PPE and must not be neglected. A Healthcare Professional shall wear some kind of protection for eyes or a disposable face-shield which blocks the face from fore and sides while visiting a patient's room. The equipment for the protection of eyes should be

removed before going out of the room or care zones. In case reusing equipment for protection of eyes, they must be cleansed and disinfected before using again according to the producer's directions (Chu *et al.*, 2020).

Gloves

While coming in contact with the patients, the healthcare professional must wear uncontaminated unsterile gloves. If they are exposed, hygiene for hands must be ensured, and new gloves must be used. When going out of the rooms of the patients or care zones, the used-gloves must be discarded, and hygiene for hands shall be maintained. They must not be brought to use again (Mahmood *et al.*, 2020).

Aerosol-generating procedures (AGP)

Aerosol-generating procedures are extubation, intubation, and various procedures like ventilating the patient manually and respiratory tract suctioning in a freeway, bronchoscopy, tracheostomy/ tracheotomy, postmortem procedures and surgery involving noninvasive ventilation (NIV), high-speed devices, induction of sputum, cardiopulmonary resuscitation, high-frequency oscillating ventilation (HFOV), and high-flow nasal oxygen (HFNO) (Harding *et al.*, 2020). Collecting respiratory samples for the diagnosis of COVID-19 is an AGP as it induces cough reflex (Gana and Narula, 2020).

Aspects of environmental sanitation

Nosocomial transmission of the virus is caused by environmental contamination by patients (WHO, 2020). It is reported that using water and cleaning solutions and using disinfectants for the common use at the hospital level to clean the general surfaces and equipment used for patient care is effective and sufficient. COVID-19 is sensitive to 70% ethyl alcohol, sodium hypochlorite (0.1%–0.5%), povidone-iodine (1% iodine), 50% isopropanol, chloroxylenol (0.24%), 0.05% benzalkonium chloride, hydrogen peroxide (0.5%–7.0%), or %1 cresol soap. All surfaces such as walls, floor, and objects must be disinfected with a solution that has 1000 mg/L chlorine (Q & A, 2020). Disinfection should be performed at least thrice a day, and the process must be duplicated every time there is contamination. (Takagi and Yagishita, 2020). Appropriate PPE must be worn by HCP whose responsibility includes cleaning of the environment and disposal.

Lab safety in times of COVID-19

A recommendation is that one must consider all samples in the laboratory to be possibly infectious. The process of analysis of non-reported COVID-19 samples might lead to spread for laboratory workers. All of them must be informed about the use of

biological agents and the probability of spread that they hold. All labs must assess risk before executing the planned tests. They must ensure the use of appropriate PPE. It should consist of gloves, gown, protection for eyes, shief, and a mask which will be selected based on the perceived risk of the type of procedure (COVID-19 - Control and Prevention, 2020).

Even though the laboratory analysis is at times done through automation systems, the in-person procedures elevate the risk of spread of infection. All the workers in the lab must know the kinds of risks that may occur. During this phase, procedures must limit the formation of droplets and aerosols (W.H.O., 2020).

Suppose they work on blood samples which have serum tests into consideration. In that case, they must take care of the applications and steps that include the basis of Good Microbiological Practices and Procedures (GMPP) (Tips for Lab Safety During a Pandemic, 2020).

For disinfecting the general surfaces of labs, sodium hypochlorite 1000 ppm (0.1%), 0.5% hydrogen peroxide, 62–71% ethanol, phenolic compounds, and quaternary ammonium compounds can be used for COVID-19 effectively. The type of disinfectant used, the time duration of contact between the disinfectant and the surface, expiration date after preparation date of the solution, and concentration of the active compound is crucial and must be given great care (CDC, 2020b).

Though biosafety measures might lead to stress to the workers, they are helpful in the reduction of risk in the spread of the virus. They promote a safe working environment for all. They are the most important source for public health. They must remain healthy to restrict the spread of the pandemic. The health authorities must ensure their protection through guidance on the proper use of PPE, increased support in terms of logistics, supply medical equipment, and implement improved techniques for disinfection of zones where they will reside throughout the pandemic (Novel Coronavirus, 2020).

CONCLUSION

The distance between two individuals should come to be at least 2 meters; the virus suspects or diagnosed patients shall be instructed to wear at least a surgical mask. While these patients are being taken care of, the HealthCare Professional must wear personal protective equipment (PPE) according to the procedure being carried out and must not neglect

hand hygiene at any cost. The patient samples of potential COVID-19 patients are also reported to be hazardous in aspects of being infected, and an assessment of risk must be done following the procedures that must be carried out in various labs. The PPE used must be as per the procedure being performed following the recommended WHO guidelines. The safety of workers, who sacrifice at the risk of life, must be ensured by control of the spread of infection and safeguards.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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