

HAND HYGIENE AND PERSONAL PROTECTIVE EQUIPMENT IN HEALTHCARE SETTINGS DURING COVID-19 PANDEMIC IN BANGLADESH

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Abstract:

Objective: This study conducted to implement protective measures in healthcare settings during the COVID-19 pandemic in the context of Bangladesh.

Methods: It is an observational survey study. A pre-designed open questionnaire electronic link using google form was used to collect data from 500 healthcare workers within Bangladesh in which participants were observed, and variables were measured.

Results: The study findings revealed that among all participants, 70.9% were working in COVID-19 dedicated hospitals, and 1.8% were diagnosed with COVID-19 while working. The study showed that 69.1% of participants washed hands before and after consulting/handling each patient, 69.1% had readily available rubs/sanitizer in their healthcare facility, and 65.5% adhered principals of handwashing. The study also revealed that only 76.4% of participants maintained aseptic precautions for donning/doffing.

Conclusion: The study findings recommend that mandatory training and maintaining aseptic precautions for PPE putting on (donning), and removal (doffing) is equally important.

Keywords: COVID-19; SARS-CoV-2; Hand Hygiene; Personal Protective Equipment; Healthcare Settings; Bangladesh.

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Introduction

Coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first detected in city Wuhan, China, in December 2019. On 30 January 2020, the World Health Organization (WHO) declared that this outbreak constituted a public health emergency of international concern. On 11 March 2020, WHO has announced the novel coronavirus (COVID-19) outbreak, a worldwide pandemic. COVID-19 is spread by droplets infection.¹⁻² It shows that this virus is extremely infectious and spreads mostly who are come in contact. Maintaining good hand hygiene in healthcare workers

is fundamental to infection prevention yet remains a challenge to keep up, particularly in developing countries like Bangladesh.

Hand washing is one in each of those basic items which we never expect to be asked about, and it's proven in controlling the infectious disease like this.³⁻⁴ Personal protective equipment (PPE) has become a crucial and sensitive subject during this COVID-19 pandemic. COVID-19 spreads predominantly by large respiratory particles such as a droplet, close contact, or perhaps aerosol transmission, which are subject to gravitational forces and travel approximately 2 meters from the patient.⁵ These aerosols contain particles that vary and

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may travel more than 2 meters and remain airborne for a prolonged period, depending upon the weather conditions. Still, their chance of getting transmission is unclear. Contact droplets and transmission mechanisms are relevant during airway maneuvers such as tracheal intubation in infected patients.

Personal protective equipment such as gloves, face masks, boots, earplugs, goggles, hard hats, thin protective clothing, respirators, safety shoes are essential components, but only one aspect of a system, protecting staff and other patients from COVID-19 cross infection.⁶ Appropriate use of PPE significantly reduces the danger of viral transmission. Personal protective equipment should be up to the noble standards to stop the transmission from patient care-contact, droplet, or airborne. Recommendations from international organizations are specified different protective tools, but the proper technique to use equipment isn't much highlighted. Uncertainty remains around specific details of protective equipment, including hoods, gloves, mask type, and the potential for re use of PPE kit. Moreover, preventing transmission of this deadly COVID -19 virus requires two major things: make availability of high standard PPE and appropriate technique to use this equipment by our frontline healthcare workers. Without proper Hand hygiene and proper use of PPE, it's impossible to scale back the danger of infections, especially in frontline healthcare workers.

Methodology

Study design

It is an observational survey study, where we used a pre-designed open questionnaire to collect data from healthcare workers within Bangladesh, where we observed the participants and measured variables. This study neither influenced nor intervened in the study participant in any way. Collected data were simply gathered, and correlations were investigated without manipulation by the investigators.

Ethical consideration and approval, informed consent

The study was carried out in accordance with the recommendation of the Institutional Review Board (IRB), and the project was approved by the Hubei University of Medicine, Shiyan, Hubei 4000, China. The study was carried out in multiple healthcare workers' Facebook groups within Bangladesh, using an open questionnaire, which included a consent statement to participate at the top of the form "Note: Please fill all the questionnaire if you agree to participate in this research." Only those agreed to participate were able to submit the open questionnaire for data collection.

Data collection

An open questionnaire electronic link was established using google form on hand hygiene and personal protective equipment-related information. The form was then posted to multiple healthcare workers' Facebook groups within Bangladesh. Doctors, nurses, and lab technicians were included as the participants in this study. Once the google form was filled and submitted by each participant agreeing to the open questionnaire's consent statement, data were automatically collected. To conclude, a total of 500 responses were received.

Data analysis

Once the data were automatically collected via the electronic questionnaire link established using the google form, they were analyzed using the "publish analytics" tool of the form section. Analyzed data were used to describe the shortcomings of hand hygiene and personal protective equipment in Bangladesh's healthcare settings.

Results

Demographic characteristics

The demographic findings (see Table 1 and Figure 1) revealed that most of the participants were doctors, 76.4% (doctors), 16.4% (nurses), and 7.3% (lab technicians). Among these participants, 70.9% (were working in COVID-19 dedicated hospital), 25.5% (were not working in COVID-19 dedicated hospital), and 3.6% (were unsure whether their workplace was COVID-19 dedicated or not). 1.8% (were COVID-19 diagnosed), 90.9% (were healthy), and 7.3% (participants had COVID-19 related symptoms but were not diagnosed).

Hand hygiene-related maintenance

The study findings on hand hygiene-related maintenance (see Table 2 and Figure 2) revealed a record number of differences among healthcare workers. Frequency of sanitizing/wash hands was 69.1% (before and after consulting/ handling patients), 27.3% (only after consulting/handling each patient), and 20.0% (before and after the use of gloves); whereas materials used for handwashing 50.9% (plain soap), 20.0% (antiseptic soap), and 43.6% (antiseptic solution). Among all the participants 65.5% (adhered principals of handwashing), 3.6% (did not adhere principals of handwashing), and 30.9% (sometimes adhered principals of handwashing); whereas 54.5% (preferred alcohol rubs over handwashing), 36.4% (did not prefer alcohol rubs over handwashing), and 9.1% (preferred alcohol-based rubs after handwashing). Also, 69.1% (had readily available rubs/sanitizer in their healthcare facility), 9.1% (did not have readily available rubs/sanitizer in their healthcare facility), and 21.8% (used personal hand rub/sanitizer even though their healthcare facility had available rubs/sanitizer).

PPE-related maintenance

The study findings on PPE-related maintenance (see Table 3 and Figure 3) also revealed a record number of differences among healthcare workers and healthcare facilities. At the participant's workplace 61.8% (used PPE), 5.5% (did not use PPE), and 32.7% (used mask and gloves only) as protective equipment while working, and materials included in PPE were 16.4% (mask and gloves), 32.7% (gown, mask, and gloves), and 50.9% (gown, mask, gloves, goggles and/or face shield). 76.4% (participants maintained aseptic precautions for donning/doffing), 5.5% (participants did not maintain aseptic precautions for donning/doffing), and 18.2% (participants occasionally maintained aseptic precautions for donning/doffing).

Among all the participants, their mask type included were 45.5% (N95 or FFP2 respirator), 45.5% (surgical mask), and 9.1% (other available mask types). Additionally, 40.0% (participants healthcare facility had an available room for PPE donning/doffing), 58.2% (participants healthcare facility did not have available room for PPE donning/doffing), and 1.8% (participants stated availability but did not prefer to use it for PPE donning/doffing). Nonetheless, all the participants did not receive institutional training for PPE donning/doffing as revealed in this study 60.8% (received institutional training for PPE donning/doffing), 17.6% (did not receive institutional training for PPE donning/doffing), and 21.6% (participants did self-learning from non-institutional/other sources).

Table-I*Demographic characteristics data of participants*

Professions of participants	COVID-19 dedicated hospital as a working unit of participants	Participants diagnosed with COVID-19 while working
76.4% (doctors)	70.9% (yes)	1.8% (yes)
16.4% (nurses)	25.5% (no)	90.9% (no)
7.3% (lab technicians)	3.6% (not known)	7.3% (participants have related symptoms but not yet diagnosed)

Table-II*Hand hygiene-related maintenance data among participants*

Frequency of sanitizing/wash hands	Wash hands materials	Adhere, principles of handwashing,	Preference of alcohol rubs over handwashing	Readily available rubs/sanitizer in healthcare facility
69.1% (before and after consulting/handling patients)	50.9% (plain soap)	65.5% (yes)	54.5% (yes)	69.1% (yes)
27.3% (only after consulting/handling each patient)	20.0% (antiseptic soap)	3.6% (no)	36.4% (no)	9.1% (no)
20.0% (before and after the use of gloves)	43.6% (antiseptic solution)	30.9% (sometimes)	9.1% (prefer alcohol-based rubs after handwashing)	21.8% (use personal hand rub/sanitizer)

Table-III*PPE-related maintenance data among participants*

Participants use PPE at workplace	Participants PPE materials included	PPE aseptic precautions for donning/doffing	Participants mask type included	Available room for PPE donning/doffing	Institutional training for PPE donning/doffing
61.8% (yes)	16.4% (mask and gloves)	76.4% (yes)	45.5% (N95 or FFP2 respirator)	40.0% (yes)	60.8% (yes)
5.5% (no)	32.7% (gown, mask and gloves)	5.5% (no)	45.5% (surgical mask)	58.2% (no)	17.6% (no)
32.7% (mask and gloves only)	50.9% (gown, mask, gloves, goggles and/or face shield)	18.2% (sometimes)	9.1% (any other mask)	1.8% (available, not do not prefer to use it)	21.6% (self-learning from non-institutional/other sources)

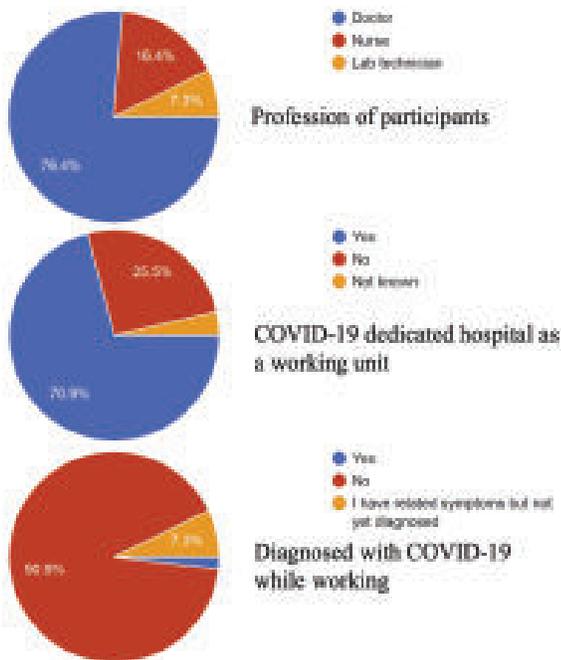


Fig.-1: Demographic characteristics of participants

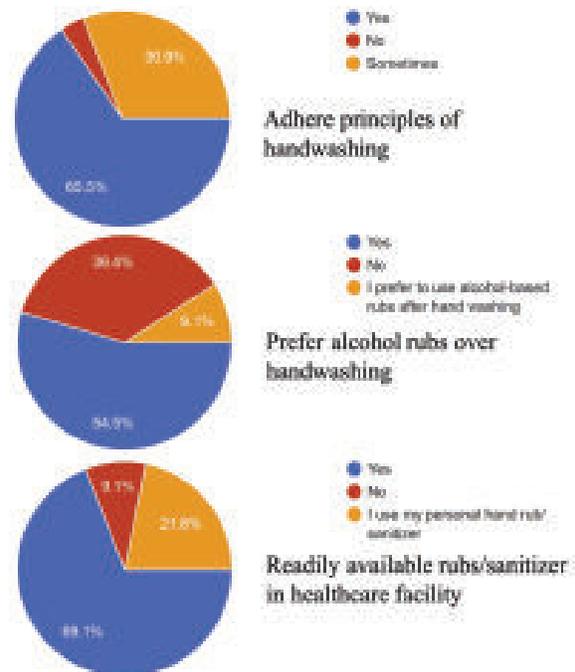


Fig.-2: Hand hygiene-related maintenance among participants

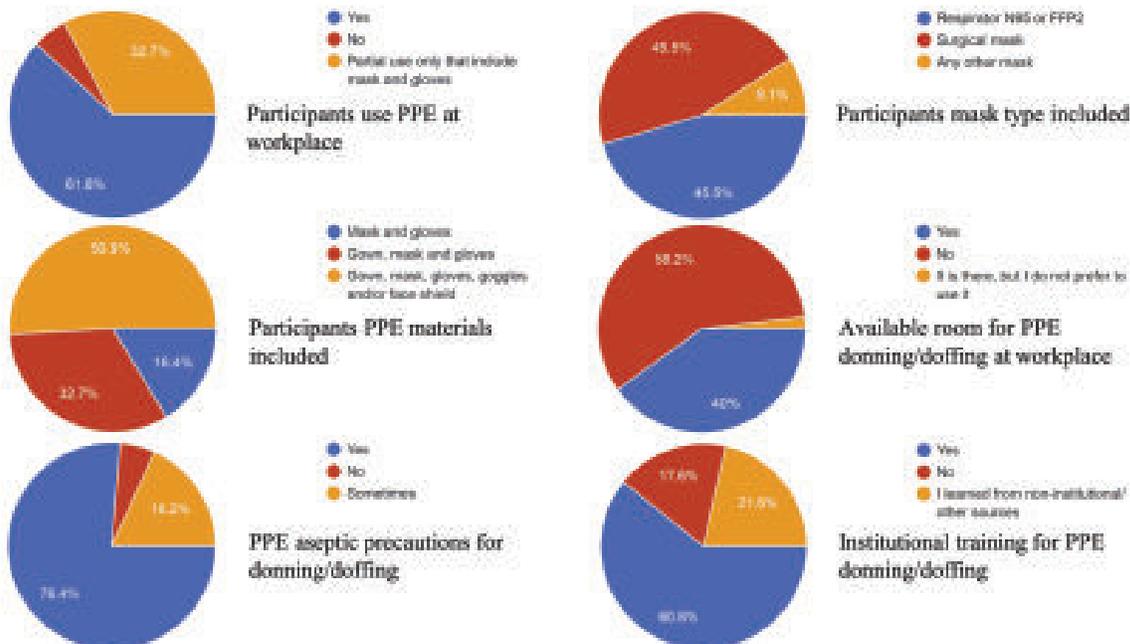


Fig.-3: PPE-related maintenance among participants

Discussions

Thousands of people died around the globe from infections acquired while receiving health care. Hand hygiene is the foremost important measure to avoid the transmission of harmful germs and prevent healthcare-associated infections. These things even

become more crucial after we discuss the developing world. There are numerous reasons why healthcare workers are unable to maintain good hand hygiene within the hospital sector. The foremost important factor is the shortage of PPE and proper techniques for using PPE while handling the patient. WHO

recommends that healthcare workers wash their hands before touching a patient, before cleaning/aseptic procedures, after exposure/risk, after touching a patient, and after touching the patient's surroundings. As infection-causing pathogens can live to inform the story one's body and within the encircling environment. Hence more practical interventions should be encouraged for personal-hygiene.

Healthcare professionals' hands are the typical leading vehicle for transmitting healthcare-associated pathogens from patient to patient and patient to healthcare professionals and within the healthcare environment.⁷ Hand hygiene is a crucial measure for preventing the spread of pathogens and reducing healthcare-associated infections.⁸ Still, healthcare professional's compliance with optimal practices remains low in most settings, especially developing country, where improper hand hygiene while handling the patient has been practiced frequently and thus becomes an easy route for transmission of this deadly virus COVID-19.⁹⁻¹⁰ The main objective of the first global patient safety challenge, launched by the WHO, is to realize an improvement in hand hygiene practices worldwide with the ultimate word goal of promoting a sturdy patient safety culture. The varied strategies proposed within the WHO guidelines readily available hygiene in health care.¹¹

On the other hand, personal protective equipment is clothing, or equipment designed to safeguard healthcare workers from the chance of injury or illness. PPE can include protective clothing, helmets, goggles, or other garments or equipment. These are necessary tools for healthcare workers to prevent the transmission of pathogens and stop cross-transmission. PPE includes a serious limitation that it doesn't eliminate the pathogens at the source and will end in healthcare workers being exposed to the pathogens if the equipment fails or faulty. PPE may be a hot topic, probably the foremost discussed and controversial subject for frontline healthcare staff working with patients with COVID 19. As this COVID-19 is already declared an outbreak by WHO, and each day thousands of peoples getting this disease, including our frontline healthcare workers everywhere on the globe.

The maximum viral load of SARS CoV 2 is in sputum, and upper airway secretions, whereas blood borne infection, isn't considered a significant source of transmission.¹² The virus is especially spread by droplets and different contact routes.¹³ Transmission occurs through droplet particles bigger than 5µm diameter, mainly respiratory particles. These unlikely to travel quite 1-meter, therefore a 2-meter margin on

contact is safety. Contact transmission occurs because once the virus is on a surface, it'll remain there and can be a possible source of infection for hours or maybe days.¹⁴ This makes the danger that healthcare workers touching that surface will become contaminated, and subsequently, they, or others, will become infected. The transmission mechanism is seen when smaller respiratory particles (generally <5µm) circulate within the air for prolonged periods. Usually, viral particles are absorbed via the respiratory mucosa and potentially across the conjunctivae. Particles smaller than 10µm are presumably to breach deeply into the lung and cause infection.¹⁵ The coronavirus isn't currently considered an airborne virus, so airborne precautions don't seem to be frequently necessary.¹³ However, specific procedures, mainly those associated with airway management, can create aerosols containing viruses that remain within the air and thus risk transmission over distances beyond 2 meters.

Various organizations have produced guidance on PPE which is broadly consistent, including the world health organization,¹⁶ the EU center for disease control,¹⁷ Public Health England 2, and also, the European society of medical aid medicine and society of critical care medicine.¹⁸ Each organization states that airborne precautions include fit tested and fit checked high filtration masks, goggles or visor, long-sleeved fluid repellent gown, and gloves. Guidelines include the employment of FFP2 masks,^{16-17,19} although few currently only sit down with FFP3 masks.¹³

Nonetheless, personal protective equipment should be disposable soon, accurately, and instantly after removal. There should be an observer employing a checklist ensuring donning and doffing of PPE is performed correctly. Training and practicing PPE use before and after patient care is mandatory for healthcare workers and patient safety. Hence, all the healthcare workers exposed daily to those viruses must protect themselves by using PPE like respirators, clothes, goggles, surgical cap, and face mask. In this research, we analyzed hand hygiene factors and personal protective equipment compliance in healthcare settings in Bangladesh using an open questionnaire to healthcare workers. The results show highly consistent with other researches.²⁰⁻²² Furthermore, without adequate and high-quality PPE, healthcare workers are at higher risk of getting infected.²³

Conclusion

Hand hygiene and personal protective equipment in healthcare settings during the COVID-19 pandemic are incredibly crucial. Hands are the foremost pathways of germ transmission during health care and

could be a vital public health concern. Nonetheless, personal protective equipment should be accessible to get rid of after use without contaminating the user. Therefore, the following recommendations could help improve hand hygiene and PPE in healthcare settings in Bangladesh. (1) Adhere to principles of handwashing and increase the frequency of sanitizing/wash hands. (2) Maintain aseptic precautions and arrange for mandatory training for PPE donning and doffing to all healthcare workers. (3) Assure the quality of PPE in healthcare settings to avoid cross-transmission. This study represents a minuscule of a larger sample. However, further research is required in a larger sample, to evaluate each strategy component's relative efficacy and identify the foremost appropriate interventions, particularly in healthcare settings, with limited resources.

Conflict of Interests

None to declare.

Authors' Contributions

MRK: concept development, review plan, data collection, data analysis, manuscript writing, review, and editing of the manuscript. SKS, and AS: data collection, review, and manuscript writing. MTF, and AR: data collection and review of the manuscript. KI, MNHB, and MMR: critical review and editing of the manuscript.

Declaration

All the authors approved to publish this work.

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