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Role of bathing after doffing PPE: Results from dedicated Covid facility

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# Abstract

**Background:** Health care workers (HCWs) involved in looking after covid patients are at high risk of contracting this deadly virus. In present research we have studied the effect of mandatory bathing after doffing the PPE on infection rate among health care workers in a dedicated covid facility.

**Methods:** Single centre retrospective study conducted between 11 April 2020 to 6 May 2021. All the HCWs working in covid facility practiced mandatory bathing after doffing the PPE and were tested for SARS-CoV-2 by reverse transcriptase polymerase chain (RT PCR) reaction on seventh day of quarantine post duty.

**Results:** Of total 1404 HCWs only 3 were found to be positive for SARS- CoV- 2 after working in dedicated covid facility. The positivity rate is only 0.21%. A total of 741 patients were treated for SARS-CoV-2 infection

during this period and the bed occupancy rate of facility was 81.7%.

**Conclusion:** The simple step of bathing with soap and warm water after doffing the PPE can substantially reduce the risk of nosocomial SARS- CoV- 2 infection among HCWs in dedicated covid facilities. The authors are of view that CDC guidelines should be amended to incorporate this step after doffing of PPE for larger benefit of HCWs.

**Keywords:** Bathing, Doffing, PPE, SARS CoV 2, HCWs

### Introduction

Covid 19 pandemic struck the whole world in start of 2020. This highly infectious disease posed a serious challenge to the health care workers (HCWs) throughout the globe. Managing these patients suffering from SARS- CoV- 2 exposed the health care providers

to this deadly virus<sup>1</sup>. Personal protective equipment (PPE) became the only means to protect the care providers from acquiring this deadly infection during discharge of their duty. The incidence of healthcare related cross transmission of SARS-CoV-2 is high up to 40%.<sup>2</sup>

The donning and doffing of PPE kits is very important to prevent infection among HCWs working in covid wards<sup>3,4</sup>. The staff manning the covid ward includes doctors, nurses, ward boys, sanitary workers etc. Every member of this team is at risk of acquiring infection. The education and technical skill of these covid warriors varies from one end of spectrum to other. The doctors are highly skilled and ward boys & sanitary workers are least skilled to handle PPE. Every worker of covid team is equally important for taking care of patients. The care of every member of this varying team is a challenge. Any loss of workforce due to covid infection weakens the fight against this deadly virus.

The SARS-CoV-2 virus can spread through three means. Direct contact with fomites, aerosols suspended in air and droplets from cough and sneezing of patient. The PPE can protect HCW from fomites and aerosols and droplets as well<sup>5,6</sup>.

During doffing the secretions present over PPE can get inoculated on the body of the HCWs and can be the reason for infection. In the present research the step of bathing with soap and running warm water was added after doffing to prevent infection in HCWs. The donning and doffing process for PPE was standardized for all the staff working at dedicated covid facility. As the members of team have different medical knowhow bathing with soap and warm running water was made mandatory for every HCW after doffing the PPE.

### Methods

This is a single centre retrospective study conducted at a dedicated covid facility from 11 April 2020 to 6 May 2021. All the staff working in the covid ward were studied for infection from SARS CoV-2 post duty. The staff members worked in covid ward in three shifts for 6 hrs, 6 hrs and 12 hrs each day for seven days and were quarantined for 14 days away from their homes. With effect from 28 August 2020 staff worked for ten days and was quarantined for ten days as per latest advisory from Government<sup>7</sup>. As HCWs were working in covid dedicated facility in rotation some of them were also performing repeat duties.

The CDC guidelines on donning and doffing of PPE were followed<sup>8</sup> and training was given to each member of the team.

The donning steps were as follows.

- 1 Remove all jewellery
- 2 Change to hospital scrubs
- 3 Wear first pair of gloves
- 4 Wear shoe cover
- 5 Put on coverall gown
- 6 Wear second pair of gloves over cuff
- 7 Put on surgical cap, mask and Goggle
- 8 Wear cover all cap
- 9 Wear face shield (Optional)
- 10 Put on last pair of gloves over cuff

#### **Doffing process**

Doffing of PPE after working in covid ward is the most important step to prevent infection among HCW.

#### **Doffing area**

Doffing area was provided separate from donning place. It had provision for dirty and clean chair. Liberal 70 % alcohol hand sanitizer was also provided for frequent hand hygiene. Dr Amit Saini, et al. International Journal of Medical Sciences and Innovative Research (IJMSIR)

#### Steps

Perform hand hygiene with 70% alcohol after each step

1 Look for any breach of PPE

2 Remove outer pair of gloves

- 3 Remove shoe cover
- 4 Remove second pair of gloves
- 5 Remove coverall cap

6 Put off coverall gown without touching the outside surface

7 Remove goggles

8 Remove mask in end after exiting doffing area

9 Mandatory bathing with soap and hot running water after doffing ( in addition to CDC guidelines)

10 Discard scrubs used in ward for laundry and change to new scrubs after bathing

All the staff followed this sequence strictly and no one was allowed to enter the staff rest rooms without mandatory bathing.

The samples of the staff members were taken on seventh day post last exposure to the covid ward. Nasopharyngeal and oropharyngeal swabs were taken and RT PCR for SARS CoV2 was done.

The education level of HCW was also noted to analyse the difference in infection rate and education status.

#### Results

This research included 1404 staff members working in dedicated covid facility in rotation from 11 April 2020 to 6 May 2021. The breakup of health care providers is shown in table 1 and education status is shown in Table 2

Table 1: Breakup of HCW

HCW	Number
Doctors	180
Nurses	318
Ward Boys	252

Sanitary Workers	252
Security Staff	252
Others	150

Table 2: Education status of HCW

Medical Degree/Diploma	180
Nursing Degree/Diploma	364
Graduate	223
Higher Secondary	369
Matriculate and less	268

The total no of SARS CoV 2 positive patients treated during this period were 741. The bed occupancy rate of covid facility was 81.7%.

The RT PCR of the HCW was done on 7 day post last exposure to covid ward. Both nasopharyngeal and orophyrangeal swabs were taken and collected in one viral transport medium.

Of the total 1404 samples taken only three came positive for SARS- CoV- 2. The positivity rate among HCWs after working in covid ward came out be only 0.21%. The positive members were from sanitary and security teams but as the positivity rate is very low this cannot be attributed to low medical skills of these staff members.

#### Discussion

This research focuses on the importance of mandatory bathing after doffing the PPE. The study was conducted in a dedicated covid facility. All HCWs working in covid ward performed mandatory bathing with soap and warm water after doffing the PPE. The SARS CoV-2 virus is highly infectious and can be transmitted to the HCWs taking care of these patients.

The duration of research was from 11 April 2020 to 6 May 2021. Total of 1404 HCWs were included in study. Every member of covid team was subjected to RT PCR for SARS CoV-2 on seventh day of quarantine. During this long period the total infection rate among HCWs after working in covid ward was limited to just 0.21 %. As we were following CDC norms<sup>8</sup> for donning and doffing of PPE except that mandatory bathing was added as last step in doffing, this may be the reason for such drastically less number of nosocomial SARS CoV-2 infections among HCWs. Many studies have reported different infection rate among HCWs. Chou R etal have reported infection rate of 5.1% among HCW<sup>9</sup>. A survey in Netherland screened 1067 HCWs with RT PCR and positivity rate was 4.1%<sup>10</sup>. The Turkish medical association on 29 April declared that of total positive covid 19 patients 6.1% were HCWs<sup>11</sup>. To the contrary our dedicated covid health facility had covid 19 infectivity rate of only 0.21% among HCWs. As our workers were performing bathing with soap and warm water after doffing the PPE this could be the factor causing such less infectivity rate.

Our study has some limitations. Firstly it is a single centre study. The HCWs were tested with RT PCR which is not ideal for HCWs as it has positivity rate of 70%<sup>12,13</sup>. The seroprevalence studies can pick up SARS CoV-2 infection at an early stage. The IgM and IgG antibody levels begin to rise in the first 5 to 7 days and peak at about 3<sup>rd</sup> week of infection<sup>14</sup>. However seroprevalence kits were not available at our institute at the time of this research. The strong points of the study are that it has been conducted over a period of about 13 months. It has a good sample size. The bed occupancy rate of the facility was 81.7% which proves that there was sufficient viral load in the ward. As the HCWs were residing in separate rooms away from the society while working as well as during quarantine there is less possibility of acquiring infection from other sources.

### Conclusion

HCWs working in covid wards are at high risk of infection from this deadly virus. The simple step of bathing thoroughly with soap and running warm water after doffing the PPE can substantially reduce the risk of infection among HCWs working in covid facilities. The authors are of the view that CDC guidelines on doffing of PPE should be amended to include mandatory bathing with soap and warm water as last step after doffing PPE.

#### Declarations

**Ethics approval:** The study has been approved by institutional ethics committee with reference no HFW-H-Dr RKGMC/Ethics/2021/3

Availability of data and materials: The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

#### **Authors' contributions**

AS was involved in design of work, interpretation of data and major contributor in writing the manuscript. SC was involved in data collection and revised the manuscript.GG was involved in design of work, writing of manuscript and interpretation of data. RC was involved in substantially revising the manuscript. All authors read and approved the final manuscript.

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