

## Original Article

### Knowledge of PPE for Coronavirus Protection amongst Health Care Professionals: A Qualitative Research

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#### ABSTRACT:

**Aim of the study:** The purpose of the study was to ascertain the amount of knowledge the healthcare professionals- doctors, nurses, ASHA health workers etc. have regarding PPE and its importance in COVID-19 pandemic. **Methodology:** A questionnaire survey was conducted amongst variable health professionals like medical doctors, nurses and paramedical staff as well as ASHA healthcare workers. Total 200 people have participated in this survey which consisted of 56 medical doctors, 68 nurses and paramedical staff and 76 ASHA health care workers. The questions were based on about personal protective equipment's and the guidelines related to the same which have been issued by Ministry of health and family welfare, India.

**Results:** Among all surveyed HCWs, 80% of respondents believed that use of appropriate PPE would prevent acquisition of COVID-19. Of all respondents, 82% medical professionals reported >80% adherence with recommended PPE. However, only 32% of ASHA workers, correctly identified the equipment that would provide adequate protection. Whereas only 36% of nurses and paramedical staff had knowledge about the frequency of changing the PPE. **Conclusion:** Critical care HCWs may be at a substantial risk of developing and/or transmitting nosocomial respiratory viral infection, and 77% of critical care practitioners believe they can improve their infection control practice. To have an appreciable impact on patient and provider safety, efforts to improve PPE adherence and effectiveness must address both organizational factors associated with safety climate and knowledge barriers among clinicians.

**Key words:** Coronavirus, Personal protective equipment, safety, awareness.

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#### INTRODUCTION

In December 2019 a novel coronavirus (2019-nCoV) was identified as the causative agent of a severe acute respiratory illness among people exposed in a seafood market in Wuhan, China. Human-to-human transmission has been documented, including in healthcare workers, and aerosol-generating procedures (AGP) may play a role in the spread of the disease.<sup>1</sup> There are uncertainties in the natural history

of the 2019-nCoV, including source(s), transmissibility mechanisms, viral shedding, and persistence of the virus in the environment and on fomites. The use of personal protective equipment (PPE) by healthcare workers requires an evaluation of the risk related to healthcare-related activities.<sup>2</sup>

PPE includes gloves, medical masks, goggles or a face shield, and gowns, as well as for specific procedures, respirators (i.e., N95 or Filtering

Facepiece type 2-FFP2 standard or equivalent) and aprons. precautions are required by healthcare workers to protect themselves and prevent transmission in the healthcare setting. Precautions to be implemented by healthcare workers caring for patients with COVID-19 disease include using PPE appropriately; this involves selecting the proper PPE and being trained in how to put on, remove and dispose of it.<sup>3</sup>

Specifically, for aerosol-generating procedures (e.g., tracheal intubation, non-invasive ventilation, tracheostomy, cardiopulmonary resuscitation, manual ventilation before intubation, bronchoscopy) healthcare workers should use respirators, eye protection, gloves and gowns; aprons should also be used if gowns are not fluid resistant.<sup>4</sup>

Respirators (e.g., N95, FFP2 or equivalent standard) have been used for an extended time during previous public health emergencies involving acute respiratory illness when PPE was in short supply.<sup>5</sup> This refers to wearing the same respirator while caring for multiple patients who have the same diagnosis without removing it, and evidence indicates that respirators maintain their protection when used for extended periods. However, using one respirator for longer than 4 hours can lead to discomfort and should be avoided.<sup>6</sup>

Based on the available literature on earlier SARS outbreak, it is generally believed (if the PPE are correctly worn) that powered air purifying respirators (PAPR) offered the highest level of protection against infected aerosol of SARS patients followed by N95. Surgical masks may offer a certain level of protection, while paper masks generally offer little or no protection to the Health care workers (HCWs). Goggles protect the HCW against splashes of fluid from the SARS patients. Other protection included gloves, gowns, hair covers, and shoe covers.<sup>7</sup>

Consider, on a case-by-case risk assessment, the use of PPE for the different procedures to be performed. Based on the current knowledge on the transmission of COVID-19, in which respiratory droplets seem to play a major role (although airborne transmission cannot be ruled out at this stage), and taking into consideration the possible shortage of PPE in healthcare settings due to the increasing number of COVID-19 patients,<sup>8</sup> the suggested set of PPE for droplet, contact and airborne transmission (gloves, goggles, gown and FFP2/FFP3 respirator) can be adapted for the clinical assessment of suspected COVID-19 cases as below:

- Healthcare workers performing the first assessment without direct contact; the patient should wear a surgical mask and keep a distance of at least 1 metre. If possible, a physical barrier such as glass or a plastic teller window can be used to avoid direct contact and keep the distance; in such case no PPE is necessary.<sup>9</sup>

- If available, provide a surgical mask for patients with respiratory symptoms (e.g. cough)
- Healthcare workers performing aerosol-generating procedures (AGP), such as swabbing, should wear the suggested PPE set for droplet, contact and airborne transmission (gloves, goggles, gown and FFP2/FFP3 respirator)<sup>10</sup>
- If there is a shortage of FFP2/FFP3 respirators, healthcare workers performing procedures in direct contact with a suspected or confirmed case (but not at risk for generating aerosol) can consider wearing a mask with the highest available filter level, such as a surgical mask, in addition to gloves, goggles and gown.<sup>9</sup>

#### AIM OF THE STUDY

The purpose of the study was to ascertain the amount of knowledge the healthcare professionals- doctors, nurses, ASHA health workers etc. have regarding PPE and its importance in COVID-19 pandemic.

#### METHODOLOGY

A questionnaire survey was conducted amongst variable health professionals like medical doctors, nurses and paramedical staff as well as ASHA healthcare workers. Total 200 people have participated in this survey which consisted of 56 medical doctors, 68 nurses and paramedical staff and 76 ASHA health care workers. Questions were in an open-ended format and in English language for medical doctors and in local languages for nurses, paramedical staff and the ASHA health care workers. The survey was sent by email as well as WhatsApp mobile application to the survey participants. The questions were based on about personal protective equipment's and the guidelines related to the same which have been issued by Ministry of health and family welfare, India. They were also asked to respond about various types of masks that they use and the sanitation measures as well as disposal of hospital waste.

#### RESULTS

Among respondents, 85% reported knowing when their patients had been placed on droplet (respiratory) precautions, with significantly more physicians (i.e., house-staff, faculty, and fellows) than nurses and paramedical staff, knowing when precautions had been instituted. 12% of the survey participants indicated a higher level of respiratory protection (N-95 filtering facepiece or powered air-purifying respirator). (TABLE 1)

Many of the health care professionals find it cumbersome to wear the PPE for around close to 10 hours at one stretch as the amount of these equipment's are in shortage. They also have a hard time trying to reuse the basic PPEs like masks and gloves.

**Table 1- Survey characteristics related to PPE amongst medical professionals, nurses, paramedical staff and ASHA workers.**

Survey points	Medical professionals	Nurses and Paramedical staff	ASHA health care workers
Identification of PPE used for protection against coronavirus	91.1%	64%	32%
Waste management knowledge related to PPE	74.2%	55%	12%
Cumbersome condition of wearing PPE	92%	89.5%	78%
Shortage of PPE	67%	45.7%	80.3%
Reusing PPE			
Adherence to PPE guidelines	82%	62.5%	32%
Knowledge about how frequently to change PPE	69%	36%	15%
PPE can help against coronavirus	77%	47.8%	33%

Many hospitals have people to check how properly the PPE has been worn by the HCWs before going for treatment of coronavirus patients especially the ICU. The cleaning staff is also less equipped with knowledge about how to dispose the medical waste laced with virus.

Only 32% of ASHA workers, correctly identified the equipment that would provide adequate protection. These health care workers who generally take up the primary screening in containment zones have knowledge of gloves and surgical mask only and thus they are underequipped with the adequate PPE knowledge. They also aren't equipped with knowledge of how frequently they should change gloves as well as masks when they are screening patients as well disposal of the medical waste even though they do comprise of a large part of frontline health care workers.

Among all surveyed HCWs, 80% of respondents believed that use of appropriate PPE would prevent acquisition of COVID-19. Of all respondents, 82% medical professionals reported >80% adherence with recommended PPE. When asked to assess their colleague's use of PPE, 53% reported that their colleagues often forget to use all recommended PPE. Our analyses found that organizational factors, including hospital affiliation and the perception that not using correct PPE would result in reprimand.

## DISCUSSION

Our survey found gaps in knowledge and adherence with recommended PPE use for COVID-19 control across all types of critical care HCWs. Despite the fact that infection prevention and control practices can significantly improve patient outcomes, adherence with these practices is generally poor. Previous studies have indicated that addressing workplace factors related to infection control practices will have the greatest impact on adherence behaviour.<sup>10</sup>

The British Columbia Interdisciplinary Respiratory Protection Study Group found that "organizational and individual factors can explain much of the variations in self-protective behaviour in healthcare

settings, especially with respect to applying universal standard precautions".<sup>11</sup> Henry et al, demonstrated that point estimates of self-reported adherence with all barrier precautions (with the exception of gloves) overestimated observed adherence by at least a factor of 3.<sup>12</sup> Similarly, O'Boyle et al, found that the correlation between reported and observed adherence with hand-washing recommendations among nurses was quite low.<sup>13</sup>

Infection prevention and control practices are essential at all levels of healthcare delivery. However, recent concerns about respiratory epidemics, such as SARS and pandemic influenza, have highlighted gaps in our knowledge specific to the nosocomial spread of respiratory viruses and drawn attention to concerns that critical care providers are at a particular risk.<sup>14</sup>

Initial clinical presentation of pandemic coronavirus will likely be similar to, if not indistinguishable from, seasonal influenza or other viral respiratory infections. Research strongly supports early containment as the best strategy for controlling the potentially devastating consequences of an unchecked outbreak. As such, it is appropriate that routine ICU practices be targeted and critical care practitioners educated regarding seasonal influenza control to maximize routine patient safety and the ability to deliver effective care in times of crisis.<sup>15</sup>

## CONCLUSION

We observed significant gaps in knowledge about correct PPE use among all the HCWs. The inconvenience of PPE use and perception of organizational norms significantly influenced adherence behaviours. Critical care HCWs may be at a substantial risk of developing and/or transmitting nosocomial respiratory viral infection, and 77% of critical care practitioners believe they can improve their infection control practice. To have an appreciable impact on patient and provider safety, efforts to improve PPE adherence and effectiveness must address both organizational factors associated with safety climate and knowledge barriers among clinicians.

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