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## Review Article



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## Inappropriate use of personal protective equipment among health workers: A review of associated factors

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### Abstract

The study found that the discomfort of wearing F95 face masks and other PPE, willful refusal to wear N95 face masks, an excessive number of patients in the wards, and contracting a hospital-acquired infection as a result of using or wearing PPE are the individual factors associated with inappropriate PPE use among health workers. Also discovered: PPE access restrictions, training in infection prevention and control, a lack of PPE, and knowledge of the proper times to wash one's hands are all health system-related factors linked to inappropriate PPE use by health workers. The overwhelming number of patients on the wards (individually), the lack of PPE (health system), and the restricted access to PPE are found to be the main causes of inappropriate PPE use among health workers. When on the job, health professionals are advised to wear the PPE that is available and to do so in accordance with the industry's ethical standards. Finally, the paper suggests that because it endangers both patients' and health workers' lives, patients should, whenever possible, refuse to be treated by healthcare professionals who are not wearing PPE, such as gloves.

**Keywords:** inappropriate use, personal protective equipment, health workers, Covid-19

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## Introduction

Health care workers on the front lines, known as healthcare professionals (HCPs), are essential to the management of patients as well as the implementation of effective infection prevention and control (IPC) procedures in healthcare facilities [1-2].

They consequently have a significantly higher risk of contracting the virus and may help spread it [3-5].

The transmission of COVID-19 and the risk of infection in healthcare settings can be reduced through the use of infection prevention and control (IPC) techniques like the use of the appropriate PPE, proper handwashing, and hand hygiene [6-7]. Particularly during the current COVID-19 pandemic, it is strongly advised that healthcare workers wear the proper PPE, and national and international safety protocols for this population should be strictly adhered to. Health care workers are both protected and have lower infection risks when UPs are followed [8].

Each year, nosocomial infections are acquired by over 521,311 healthcare professionals worldwide. Three million health care workers (HCWs) are percutaneously exposed to blood-borne viruses every year, including hepatitis B, hepatitis C, and HIV [9]. Additionally, the US Centers for Disease Control and Prevention reported that healthcare workers accounted for roughly 11% of all confirmed COVID-19 cases in the United States, while the Italian Regional Reference Laboratories reported that 10% of the 162,000 cases of COVID-19 in the nation were related to the industry [10]. The demand for PPE has grown significantly around the world since the first COVID-19 outbreak report in December 2019.

Many healthcare settings in Africa, in particular, have trouble getting access to the right PPE to safeguard their health [8]. As a result, many healthcare professionals are still concerned about the possibility of contracting SARS-COV-2 due

to the lack of WHO-recommended PPE, and they are also ill-prepared to care for patients who have COVID-19 or other causes of infection [11]. In Sub-Saharan Africa, Health Care Practitioners (HCPs) frequently face difficult choices regarding whether to care for and treat COVID-19 patients in the absence of efficient PPE. African countries account for the majority of hospital acquired infections. Hospital acquired infections, including COVID-19, were present in about 11% of HCPs in Africa who were retrospectively studied [12]. Evidence from nations with the highest COVID-19 mortality rates suggests that the risk of coronavirus infection among healthcare workers is significantly higher than that of the general population, with rates ranging from 15 to 20 percent [13].

## Individual Factors Associated with Inappropriate Use of Personal Protective Equipment (PPE) among Health Workers

### Individual beliefs

PPE use is not an exception to the rule when it comes to individual beliefs, which are one of the most significant factors in health service uptake generally [14]. Numerous references have been made to the fact that individual traits and values, particularly in Africa, have a significant impact on the use of PPE and are influenced by individual presumptions, preferences, and concerns. Therefore, individual rather than governmental responsibility for PPE use and for anticipated hesitancy should receive equal weight [15].

### Low skill and lack of training

Earlier this year, Alao et al. [16] identified factors like low skill and lack of training as obstacles to nurses using PPE. Additionally, it has been demonstrated that personal traits like beliefs, attitudes, and values affect nurses' rates of compliance with self-protection behaviors. Previous research has shown that nurses may be unprepared with PPE and unaware of the most recent information regarding safe patient care

when caring for patients with novel infectious diseases (such as severe acute respiratory syndrome (SARS) or H1N1) [16].

### Feelings at work

An evaluation of the use of personal protective equipment by healthcare workers and their psychological readiness for the COVID-19 pandemic in Eastern Ethiopia was the goal of this facility-based cross-sectional study. A random selection was made of the health care workers (HCW) employed by the chosen healthcare facilities. This study included a total of 418 HCWs who were chosen at random. When compared to their counterparts, study participants who regularly used hand sanitizer, were trained in COVID-19 prevention techniques, felt hopeless about eventually contracting the disease at work (AOR = 2.6, 95 percent CI: 1.4-4.7), and felt unsafe at work when following standard precautions (AOR = 0.46, 95 percent CI: 0.27-0.79) used PPE more effectively. In addition, compared to physicians, nursing/midwifery professionals used good personal protective equipment (AOR = 3.7, 95 percent CI: 1.8-7.7). This study showed a positive correlation between the use of PPE and being a male, a nurse or midwife, frequently sanitizing hands and medical equipment, and feeling like one might eventually contract COVID-19 at work. Furthermore, the study found a negative correlation between HCWs' use of PPE and their sense of safety at work when following standard precautions [17].

### Doubts on quality and effectiveness of PPE, potential risks during doffing and poor comfort with PPE use

Likewise, Fan et al. Another study was carried out by [18] to evaluate the challenges faced by health care professionals (HCP) when using personal protective equipment (PPE) in clinical practice during the COVID-19 outbreak in Wuhan, China. Twenty of the 120 medical personnel from the Wuhan First Hospital's First Affiliated Hospital of Chongqing Medical University offered to take part in a focus group discussion with infection control nurse leaders. They were there to offer

medical assistance. Observed challenges included uncertainty regarding the caliber and efficacy of PPE, potential hazards during donning, and low comfort with PPE use [18].

### Training on PPE use

Using an online self-administered survey, a cross-sectional study of Egyptian HCWs was carried out. Depending on their score, participants were categorized as "Compliant" or "Non-compliant.". A total of 404 responses were analyzed, with a 56.4% female gender distribution and a mean age of 36.6 8.4 years. 53.2% of participants were non-compliant HCWs. Females (51.3 percent,  $p = 0.05$ ), doctors (54.2 percent,  $p = 0.005$ ), and medical specialties (34.7 percent,  $p$  eight hours/day (71.3 percent,  $p$ ) reported higher compliance with proper PPE use.

### Lack of access to PPE

Health workers' inability to use safety equipment is a major deterrent; as a result, safety equipment needs to be made more readily available, trained users need to use it, and it needs to be improved [20]. To overcome the PPE barrier, it is crucial to make PPEs accessible, train HCWs in their use, and optimize the ergonomics of both the PPE and its user [20].

### Risk perception with PPE use

The Savoia et al. [21] conducted a cross-sectional study of Italian physicians to examine the variables related to PPE usage and access during COVID-19. The findings of their study showed that health workers' perceptions of the risk of contracting an infection from PPEs hindered the use of PPE.

### Health System-Related Factors Associated with Inappropriate Use of Personal Protective Equipment (PPE) among Health Workers

#### Lack of healthcare equipment

The biggest obstacle for nations trying to lower morbidity rates is a weak healthcare

infrastructure, which includes a dearth of medical supplies [23]. Increased morbidity and mortality are a result of poor health or the presence of risk factors, especially in vulnerable groups, primarily first responders. The claim that unsatisfactory health care systems have a significant impact on the health-care workforce has been supported by numerous studies. In a recent review, factors like low skill, a lack of training, limited access to PPE, and environmental factors were identified as obstacles to nurses using PPE [16].

### **Health center policy on PPE use**

Aguwa and others. [24] evaluated the use of personal protective equipment (PPE) by health workers and the related factors in a tertiary health institution in South East Nigeria prior to the Ebola outbreak. They used a semi-structured self-administered questionnaire to collect data from health workers using a descriptive cross-sectional methodology. The findings of their study showed that, despite nearly half (45%) having received training on personal protective equipment, the majority (96%) had never seen a policy on such equipment. This suggests that there is no hospital policy regarding the use of PPE.

### **COVID-19 management guidelines and training on COVID-19**

Containing the deadly COVID-19 pandemic requires the effective implementation of prevention and control measures by health professionals [25]. a facility-based cross-sectional study that sought to evaluate the use of PPE by healthcare workers and their psychological readiness for the COVID-19 pandemic in Eastern Ethiopia. A random selection was made of the health care workers (HCW) employed by the chosen healthcare facilities. The study included a total of 418 HCWs who were chosen at random. In comparison to their counterparts, study participants who used hand sanitizer regularly, had access to COVID-19 management guidelines (AOR = 2.83, 95 percent CI: 1.46-5.47), and had received training on COVID-19 prevention techniques (AOR = 2.6; 95 percent CI: 1.4-4.7) were more likely to have worn personal protective

equipment (PPE). The study found a correlation between the use of PPE and having COVID-19 management guidelines and training [17].

### **Inappropriate PPE sizes, the design of the PPE and its complexity of use and space layout between clean and contaminated area**

Likewise, Fan et al. Another study was carried out by [18] to determine the challenges faced by health care professionals (HCP) when using personal protective equipment (PPE) in clinical settings during the COVID-19 outbreak in Wuhan, China. Twenty medical professionals from the First Affiliated Hospital of Chongqing Medical University presented to the Wuhan First Hospital to offer medical aid, and among them, 20 HCP, volunteered to take part in a focus group discussion with infection control nurse leaders. Inappropriate PPE sizes, the PPE's design and use's complexity, and the layout of the space between the clean and contaminated areas were among the observed challenges. The use of PPE can also be positively or negatively impacted by other factors, including the equipment, management, processes, readiness, and HCP [18].

### **Prior training on proper PPE use and exposure to COVID-19 patients**

Using a self-administered online survey, a cross-sectional study of Egyptian HCWs was carried out. According to their results, participants were either deemed "Compliant" or "Non-compliant.". The analysis included 404 responses, with a total of 56.4% of the responses being female and a mean age of 36.6 8.4 years [26-32]. A total of 53.2% of participants were non-compliant HCWs [33-37]. Most reported a shortage of N95 respirators (91.3%), used extended PPE (88.1%), and worked longer than eight hours per day (71.3%).

### **Availability of PPE**

In a different investigation, the use of personal protective equipment by laundry staff employed by government hospitals in Hawassa City, Southern Ethiopia, was evaluated in 2019. Focus



group discussions and key informant interviews were the two qualitative methods used to gather data for this study. The present study identified organizational-level barriers as the main deterrents to the use of personal protective equipment, such as the absence of necessary PPE and an unfriendly work environment [38-44].

## Conclusion

The most striking individual factor associated with health workers using PPE inappropriately is the overwhelming number of patients in the ward. The need for health services is simply too great for the health workers to handle, and this has a significant impact on how quickly PPE like gloves and face and nose masks can be changed between patients.

Simply put, the hospital does not have enough personal protective equipment (PPE) for the medical staff, and when it is available, it is not always easily accessible. One of the reasons why patients are occasionally advised to purchase PPE, such as gloves, from private healthcare facilities outside of the hospital is due to this.

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