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Barriers faced by health-care workers in use of personal protective equipment during COVID pandemic at tertiary care hospital Uttarakhand, India: A qualitative study

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Abstract:

BACKGROUND: To reduce the likelihood of transmission of infection to health-care workers (HCWs), personal protective equipment is used. However, wearing personal protective equipment (PPE) increases the risk of heat stress and loss of dexterity, leads to poor compliance to PPE. To address the issues of poor compliance to PPE, it was necessary to gain a deeper understanding about the factors that influence compliance. Thus this qualitative study was planned to explore barriers faced by HCWs while using PPE during a pandemic situation in a tertiary care hospital, Uttarakhand, India.

MATERIALS AND METHODS: A exploratory qualitative study was undertaken among health care workers involved in the care of COVID patients. FGDs were done and an unstructured interview guide with open-ended questions was used which helped to explore the factors which can be potential barriers to the HCWs while working wearing PPE.

RESULTS: Organizational and individual factors acting as barriers such as unavailability of essential personal protective equipment, a disharmonious work environment, lack of comfort, inadequate size, and quality of PPE were identified as the major barriers in the present study.

CONCLUSION: Future efforts to optimize PPE use should focus on to adequate supplies both in quality and quantity can help in avoidance of such barriers. Resources should be prioritized with the needs of the HCWs in the times of pandemic. Regular training and feedbacks are necessary for the satisfaction of HCWs and improving PPE compliance.

Keywords:

Barriers, COVID-19, health-care workers, personal protective equipment, tertiary care hospital

Introduction

COVID-19 started in December 2019, like a viral outbreak in Wuhan city, Province of China. About 40 cases of pneumonia with unknown etiology were reported and India reported its first COVID-19 case on January 30, 2020, and numbers began to rise gradually.^[1] The health-care workforce is integral to an effective pandemic response and faced various challenges at every front

like providing care to COVID-positive patients with the use of personal protective equipment (PPE),^[2] and when performing work, health-care workers (HCWs) are constantly exposed to the risks present in the work environment, which can interfere directly in their health conditions.^[3] Similarly, in case of HCWs, there is a more challenging situation while treating high-risk patients. "PPE is a device designed to create physical

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barriers between the worker and workplace hazards to protect the worker against work-related injuries and illnesses.”^[4] In the health-care setting, PPE is mainly used to protect the health-care personnel from the exposure of pathogens, especially hospital-acquired infections.^[5]

In these times of COVID pandemic, it became essential to use PPE while treating patients for infection control. The comfort and safety of the HCWs should be ensured along with the aim to reduce the likelihood of transmission, hence, detailed specifications for the components of PPE to be worn during delivery of care are important as wearing PPE increases the risk of heat stress and the loss of dexterity.^[6,7]

Despite the ability of PPE to protect HCWs, there are a number of factors, which have been, identified as barriers to PPE use in previous research studies.^[8-10] Factors such as discomfort, inconvenience, carelessness, forgetfulness, lack of habit, equipment inadequacy, insufficient quantity, and disbelief in its use acts as barriers to PPE use. The studies are mostly quantitative, however to develop effective intervention to address the issue of poor compliance to PPE, it is necessary to gain a deeper understanding about the factors that influence compliance. Thus this qualitative study was planned.

The purpose of present study is to explore barriers faced by HCWs while using PPE during a pandemic situation in a tertiary care hospital, Uttarakhand, India, and give remedial measures for the same. Once these barriers are identified, this study will help reduce the factors leading to these barriers in the future by giving solutions for the same so that HCWs can work effectively while exposed to minimal risk.

Materials and Methods

Study design and setting

This exploratory qualitative study was undertaken to explore the barriers to use PPE among HCWs at All India Institute of Medical Sciences (AIIMS), Rishikesh, Uttarakhand, North India.

Study participants and sampling

Health-care professionals of AIIMS Rishikesh involved in patient care during COVID pandemic were selected through convenience sampling. A total of 21 participants were included in present study including Residents, Nurses, and Hospital Attendants working in COVID or having a recent history of working in COVID area last 3 weeks.

Data collection tool and technique

The data were collected from June 2020 to October 2020. Data collection was done through Focus

Group Discussions, which included residents, nurses, and hospital attendants. Unstructured interview guide consisted of two parts were used. Part I of the questionnaire included socio-demographic characteristics of the study participants and Part II was the interview guide for FGDs, which explored the factors, which can be potential barriers to the HCWs while working wearing PPE. Four focus group discussions comprising of 4–6 participants were done. After obtaining informed consent for participation, interviews were audio-recorded, field notes were taken and transcripts were made on the same day. FGDs were continued till the point of data saturation. Member check was utilized during and after the interview to increase credibility, transferability of study results. At the end, investigator summarized all the discussed points and asked for any remaining points to be added. The interviews were then transcribed in notes and analyzed for words and phrases. To ensure the transferability, verbatim is provided in the result. Framework analysis^[11] was used to identify the barriers of PPE compliance. Following this, the authors independently reviewed the transcripts before the process of sorting and coding. After the discussion, working analytic framework was made. The process of refining, applying, and refining the analytic framework continued till no new codes were generated. The final framework consisted of seven codes with three categories as individual factors, organizational and environmental factors, and physiological factors.

Ethical consideration

Ethical approval was obtained from the Institutional Ethics Board before the commencement of this study, wide letter no. AIIMS/IEC/20/159.

Results

A total of 21 participants were included in this study including residents, nurses, and hospital attendants working in COVID or having a recent history of working in COVID area last 3 weeks.

Majority (71.4%) of the participants belonged to the 25–44-year age group with a mean age of 28.2 (± 6.3) years followed by 20–24 (23.8%) years. Majority of the study participants were females. There were six residents, seven nurses, and eight hospital attendants in present study [Table 1]. Mean days of work in COVID area for the study with participant was 70 \pm 56. Mean hours spent per day at work was found to be 8.3 \pm 2.6 h. It was observed that around 29% (6) of the study participants did not receive any training regarding donning/doffing of PPE. Around 48% of the study participants had treated/were involved in the care of COVID-19 patients. Around 76% participants worked in COVID ward and remaining 24% had a history of working in screening OPD. Mean months of working, as a HCW was 16 months.

Findings of qualitative analysis

The study participants were six residents, seven nurses, and eight hospital attendants. Their personal and professional life history contains experiences of vulnerability to risk and exposure of COVID-19.

The thematic areas made according to the group member's statements were categorized into individual factors, organizational and environmental factors, and physiological factors [Table 2].

Individual factors

In the group discussions, poor quality and size of the PPE were highly reported to be as a barrier interfering in the functioning of the HCWs while delivering care to the patients. The study participants reported several times that PPE such as gowns, masks, gloves, face shields, and head cap was either too big or too small for them to work comfortably.

"...I have experienced that PPE does not sustain and gets torn if I wear it for more than 3 hours" (said a 27 year old male).

"...Only XL size is available, it does not fit me and still I have to wear it" (said a 26 year old female).

"...I get a bigger size and sometimes the ties open at the back automatically" (said a 27 year old male).

"...There are some PPEs, which come with a zip closure, and their quality is so bad that it rips apart when I wear them. Also....we get different size of head caps and it is very loose

Table 1: Frequency and percentage distribution of demographic profile of participants (n=21)

Demographic variable	Character	Frequency (%)
Age (years)	20-24	5 (23.8)
	25-44	15 (71.4)
	45-64	1 (4.8)
Gender	Male	7 (33.3)
	Female	14 (66.7)
Designation	Residents	6 (28.6)
	Nurses	7 (33.3)
	Hospital attendants	8 (38.1)

Table 2: Barriers to personal protective equipment use among the study population

Main themes	Subcategories
Individual factors	Improper size of the PPE
	Poor quality of the PPE
	Health issues
Organizational and environmental factors	Nonavailability of PPE
	Lack of privacy
	Unfavorable climate
Physiological factors	Inability to consume food and water

PPE=Personal protective equipment

which exposes us and hinders our vision while working" (said a 26 year old male).

Due to the size and quality issues a lot of HCWs reported that they experience discomfort and health issues while working in PPE. A lot of them experienced headaches and fatigue in PPE and reported that wearing PPE for longer hours leads them to sweat more than usual resulting into dehydration, which acts as a barrier in their functioning.

"...Quality, every time we are not getting the same kind of PPE, sometimes we get hard and we feel more perspiration, I sweat more" (said a 22 year old female).

"...I sweat a lot while continuously wearing it for hours, specially working while standing" (27 year old female).

"...Fatigue comes easily; we get tired within 2 h as compared to 4 h when we are not wearing PPE" (a 30 year old male said).

Besides the above-mentioned factors, participants also felt that the lack of pleasant climate also acts as a barrier. One of them quoted:

"...I have experienced headache and suffocation a lot many times during summer months" (said a 30 year old male).

The study participants also reported that sometimes PPE is painful in certain parts of their body and causes them skin rashes and pimples.

HA6: *"...There are a lot of times I have experienced difficulty while wearing masks because it is so uncomfortable on the nose and ears if I wear it continuously for longer hours" (29 year old male).*

HA7: *"...While bending or sitting, I feel very suffocated in PPE and sometimes it gets torn. There is a lot of sweating also" (said a 39 year old female).*

Organizational and environmental factors

During the discussions, almost all of the participants highlighted a general lack of PPE as a major barrier to their continued use of the full PPE. One respondent, for instance, expressed her dissatisfaction with the scarcity in the supply of PPE items in the hospital as quoted below.

"...there is non-availability of other sizes. Only 6.5 or 7 are available" (said a 28 year old male).

"...the PPE set is incomplete, either the head cap is not there or shoe cover is not there" (26 year old male).

The participants further highlighted the different tasks they had to perform in the absence of different components of PPE, exposing themselves.

"....Though it happens rarely, but sometimes shoe cover is not available with the PPE set I get and that is why fear of getting infection is always on my mind while working" (26 year old female).

Another issue acting as a barrier, the study participants brought into light was not having PPE replaced regularly. They reported that they had to reuse face shields and sometimes even masks as quoted below.

"....Yes this is a major issue; we reuse the face shields after disinfecting them in hypochlorite solutions" (27 year old male).

Female study participants reported not having enough privacy as a major barrier while changing PPE. They complained that no separate place is designated to them for donning/doffing of PPE, and since they have to change in an open space, they feel that they have no privacy.

"....Yes we have, but it is not enclosed. It is in an open area and I think there is no privacy due to which I do have a problem changing there" (said a 26 year old female).

"....Yes it is a problem for me because there is no privacy. We have to change in open space only" (said a 27 year old female).

Physiological factors

Although not a major barrier, but some participants reported that inability to eat, drink or relieve themselves while working in PPE poses a problem for them when worn for longer hours as they experience dehydration and their body demands energy to function efficiently.

"....Yes that happens with me too. Also, I think there is a huge problem of eating and drinking while PPE is on because we cannot take a break while wearing it and if we remove it then we lose the PPE entirely. So measures can be taken regarding this such that we can save on PPE" (30 year old male).

"....When I had duty of 12 h, I could not eat or drink before the end of my shift" (38 year old female).

"....Yes it does, we cannot eat while working in PPE. It creates a problem while drinking water also because we do not know how to manage masks" (28 year old male).

Discussion

In these times of COVID pandemic, it became important for HCWs to protect themselves from the infection as far as it was possible with the help of PPE. The present study explored various barriers faced by different HCWs in a tertiary care hospital during COVID pandemic. This study used focus group discussions to find the barriers of PPE. One of the strengths of this study was that we conducted a qualitative study and in-depth discussions

along with real experiences of the HCWs which were helpful regarding the barriers of PPE. Another merit of this study was that it was done during a pandemic phase, which will be helpful to assess these barriers in the future pandemics and epidemics. Three thematic areas were developed from the discussions: individual factors, organizational and environmental factors, and physiological factors. The current study had 21 participants including residents, nurses, and hospital attendants. The major barriers reported by almost all the PPE users were the improper size and poor quality of PPE. These findings were similar in previous studies done at the time of influenza virus where lack of fit, lack of comfort, and lack of durability were found to be main barriers while working in PPE.^[12-14] Many of the participants reported that they experience pain, headache, and suffocation while working in PPE. This explains the individual perceptions and inconvenience regarding PPE use. The nonavailability of specific items and sizes was also noted a significant organization-level barrier, which was found to be an issue for the HCWs. A similar finding was found among an interview-based qualitative study done in India where they highlighted that HCWs reported that lack of availability of PPE acts as a barrier on an organizational level.^[9] Another study done in India on laundry workers suggested better and timely supply of PPE as an effective measure against the nonavailability barrier.^[15] Furthermore, some of the international research found that the absence of PPE was found to affect the quality of work and also endanger the livelihoods of HCWs.^[16,17]

A lot of study participants also reported the restriction to consume water and food in PPE as they feel that they have a risk of exposing themselves to the infection compromising their and other's health. This could explain the headache and dehydration experienced by many HCWs as reported. To address the barriers found in this study, organizational factors can be dealt with efficient functioning of the management system ensuring adequate supply of PPE, workplace safety and providing timely training for managing PPE to HCWs. In addition, feedback and follow-ups from the HCWs are equally essential for the maintenance and enhancement of all the services.

Further research should be conducted at an administration level to tackle these barriers effectively. We advocate the administration to address these barriers and motivate them for proper usage of PPE. Moreover, an interventional research study can be undertaken to find the effectiveness of a program or policy, which will be helpful in overcoming these barriers. An in-depth exploratory study could be helpful in assessing the barriers faced by HCWs arising out of anxiety and stress in pandemic situation.

Limitation and recommendations

One limitation of this study is that it focused on a single tertiary care hospital; therefore, the findings cannot be generalized to India's other health-care facilities, especially where resources are limited. Due to COVID-19 restriction, a larger sample of HCWs could not be incorporated in FGDs as a precaution to avoid the risk of getting an infection. Some remedial measures to already existing policies can be added to overcome these barriers in these challenging times.

1. Availability of user-friendly PPEs which can help overcome the quality and size issues can be achieved by conducting human factors and ergonomics research relevant to the needs and demands of the organization and HCWs working in it
2. Careful management of logistics should be in place to avoid any wastage of PPE and other materials
3. Provision of friendly health-care environment to HCWs to ensure any restriction or limitation does not occur while delivering care. This can be done by careful supervision and monitoring programs with regular feedbacks
4. Regular training and random audits can help identify the barriers sooner, which will help in planning the corrective measures in advance avoiding any conflicts or dissatisfaction during emergencies.

Conclusion

The present study was conducted amid COVID-19 pandemic, and the use of PPE is the main weapon for HCWs to counter the transmission of infection. Individual, physiological, organizational, and environmental were the main barriers which were explored in the present study. There is an urgent need to address these barriers to administration to take remedial measures and promote proper use of PPE that will facilitate comfort and safety to HCWs and thus help in better care of COVID-19 patients.

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Conflicts of interest

There are no conflicts of interest.

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