ORIGINAL ARTICLE

Knowledge, Attitude, and Practices among Practicing Clinicians, Indian Medical Association Members, on Personal Protective Equipment during the Coronavirus Disease 2019 Pandemic

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ABSTRACT

Background: Coronavirus 2019 severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) diseases is a rapidly progressing pandemic caused by large family of viruses causing illness ranging from the common cold to more severe disease. India's first positive case of SARS-CoV-2 was reported in Kerala, the state with over a population of 35 million, has reported 418,484 cases of SARS-CoV-2 as on October 29, 2020, and 656 deaths with an impressive recovery rate of 51.7%. As on October 29, 2020, India recorded 8 million cases with a death toll of more than one lakh. Healthcare workers being at the midst, all are exposed to the virus and there are chances for infection and hospitals become centers of transmission of the disease. As per the latest data collected by the Indian Medical Association (IMA) till September 2020, our nation has lost 382 doctors. Doctors suffer 4 times the mortality of ordinary citizens and private practitioners suffer 8 times mortality on the same scale. **Objective:** The objective of the study was to assess knowledge, attitude, and practice of personal protective equipment (PPE) during coronavirus disease 2019 (COVID-19) epidemic among practicing clinicians. **Materials and Methods:** An online cross-sectional study was conducted in the month of June 2020 among all practicing clinicians who are members of IMA. A total of 304 practicing clinicians were approached to participate in the study. An online data collection tool was designed and executed using Google Forms and questionnaire was sent to the enrolled participants. **Conclusion**: Almost half of the clinicians are well aware of the route transmission of SARS-CoV-2. All the participants knew the important components of PPE to be used. The knowledge regarding correct use of surgical masks with colored side out was only about 55% and only 46% of clinicians were aware that surgical masks will not protect against aerosols. Only 46% had correct knowledge regarding donning of PPE and similarly only 33% had correct knowledge about doffing. This study stresses the importance to ensure that all the clinician managing suspected or proven COVID-19 infected persons are trained and updated in the selection of appropriate PPE.

KEY WORDS: Clinician, coronavirus disease 2019, healthcare workers, personal protective equipments.

Introduction

Coronavirus disease 2019 (COVID-19) is a rapidly progressing pandemic caused by a novel human coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).[1] The current knowledge supports that this enveloped RNA virus is transmitted from person to person through respiratory droplets carried through saliva and nasopharyngeal secretions. These droplets can contaminate inanimate objects and they can also transmit the disease.[2,3] Clinical manifestation ranges from asymptomatic or mild symptomatic infections to severe illness like severe acute respiratory syndrome and even death, with old age and patients with pre-existing illnesses having high morbidity and mortality.[3] Due to decline in

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antibody levels with subsequent waning immunity, infection between a confirmed reverse transcription polymerase chain reaction negative test after infection and another positive result could be considered as a re-infection.[1,2]

India's first positive case of COVID-19 was reported in Kerala. Our state with over a population of 35 million, has reported 418,484 cases of SARS-CoV-2 as on October 29, 2020, and 656 deaths with an impressive recovery rate of 51.7%. As on October 29, 2020, India recorded 8 million cases with a death toll of more than one lakh. Healthcare workers (HCWs) being at the midst, all are exposed to the virus and have chances for infection and hospitals become centers of transmission of the disease. The doctors and nurses are at the forefront of the pandemic response to SARS-CoV-2 and are vulnerable and are at great risk because they have a frequent and close exposure to infectious patients. To protect the HCWs, personal protective equipments (PPEs) are designed and recommended to minimize the exposure to these agents.

As per the latest data collected by the Indian Medical Association (IMA) till September 2020, our nation has lost 382 doctors as on September 20, 2020. In comparison, doctors suffer 4 times the mortality of ordinary citizens and private practitioners suffer 8 times mortality on the same scale.

This study assessed knowledge, attitude, and practice (KAP) among practicing clinicians and plan intervention if needed as less is known so far about the effectiveness of PPE for HCWs who take care of patients infected with this highly infectious virus.

A poor understanding of the disease and prevention, among HCWs can result in delayed identification and treatment leading to rapid spread of infections among them. Over 380 doctors have lost their lives to SARS-CoV-2 in India, a tragedy to the world and a barrier to fight against the disease. Guidelines for HCWs and online refresher courses have been developed by the World Health Organization, Centers for Disease Control and Prevention (CDC), and various governmental organizations in various countries to boost the knowledge and prevention strategies. The purpose of PPE is to remove or reduce the risk between wearer and the risk. Coughing, sneezing, and even normal speech also emit large amount of microparticles carrying the virus, which spreads much faster than the influenza virus.

Examples of PPE include masks, gloves, face shields, goggles, gowns, shoe covers, and full body suites. Along with PPEs adequate air exchange is mandatory to prevent extensive dissemination. Even 2–3 days before the onset of symptoms, patients are infectious and are responsible for two-third of the transmission.

Masks – Aerosol spread of the virus is prevented by the use of masks. Triple layer surgical mask which fulfills quality standards protects patients or people near the wearer. Although HCW are not protected from aerosols because of loose fit, but get protected from spray or splashes of body fluids.[4,5] CDC recommends N95 masks as standard part of PPE against COVID-19. N95 masks can collect at least 95% of the particles which will not pass through. Respirator with expiratory valve will not allow exhaled air to pass through filter. Hence, a surgical mask has to be worn over it if at all it is used.

Face shields and goggles – Mucous membrane of the eyes, nose, and lips will be protected by face shield and efficacy is about 96% for droplets size more than 5 μ.

Medical gowns – includes aprons, gowns, and coverall. Patients and HCWs are protected by the surgical gown rather than aprons which cover only the torso.

Gloves – Extend to cover wrist of the isolation gown and non-powdered ones are preferred.

Shoe covers – As they are made of impermeable fabric and used over shoes they facilitate protection and decontamination.

Head covers - HCWs providing clinical care must use them along with gowns.

PPEs for HCWs performing aerosol generating procedures include double gloves, gown with long sleeves, eye protection with goggles and face shield and N95 mask.[4,5] Safe work practice must be followed to protect the HCWs. Hands should be kept away from face. Surfaces must not be touched as far as possible. Perform hand hygiene as often as required. Every employee who are using PPE must undergo training as to how to properly put on and take off, adjust, and wear each component of PPEs.[2,3,6]

Materials and Methods

Study design and site

An online cross-sectional study was conducted in the month of June 2020 among all practicing clinicians, members of IMA.

Study population

All practicing clinicians are members of IMA.

Study procedure

Due to COVID-19 pandemic, we opted to use WhatsApp Group of IMA for enrolling potential participants. A total of 304 practicing clinicians were approached to participate in the study. A self-defined questionnaire (Google forms) as an online data collection tool was designed and executed. The Google form link to the questionnaire was sent to the enrolled participates through the WhatsApp group. The questionnaire included (1) socio-demographic data (2) KAP of PPE. This Google forms are shared in WhatsApp group of IME. A pilot study was conducted and changes incorporated.

Data analysis and statistics

The data collected were entered into Microsoft Excel-2010 version and results were analyzed using Statistical Analysis System. Results were presented in tabular form and presented as frequency and percentages.

Results

Demographic characteristics

A total of 304 practicing clinicians responded to the questionnaire. Half of the participants were females (50.33%) and age of responders range between 30 and 50 years (57.24%). About two-third of respondents (63.82%) were from government sector and about one-third were from private sector. Regarding their service years 131 (43.09%) had served for <10 years in their respective professions. The main sources of information about PPE and COVID-19 among participants were from internet (38.82%) and government in service training (36.18%) and minimum numbers were from media such as television (6.5%) and newspaper (2.63%) (Table 1).

Table 1: Socio-demographic characteristics of the participants

Variables	Frequency	Percentage
Age		
30–50 years	174	57.24
<30 years	40	13.16
>50 years	90	29.61
Gender		
Female	153	50.33
Male	151	49.67
Work/study place		
Government	194	63.82
Private	110	36.18
Work experience		
10–20 years	76	25
<10 years	131	43.09
>20 years	97	31.91
Source of information about COVID-19 and PPE (most preferred)		
Government personnel training	110	36.18
Internet	118	38.82
Newspaper	8	2.63
TV	20	6.58
Webinar	48	15.79

PPE: Personal protective equipments, COVID-19: Coronavirus disease 2019

Assessment of knowledge

The average knowledge score was 6.69 ± 1.23. The overall correct answer rate of the knowledge questionnaire was 57.70%. Nearly all participants (99%) knew the route of transmission of SARS-CoV-2 virus and also components of PPE. About 81% of participants were aware of the minimum content of alcohol required in hand sanitizer. It was noted that only 44% of participants were aware of the proper way of wearing a surgical mask. Among the participants, 92% of them had adequate information about the N95 mask. About 46% of respondents knew that surgical mask will not protect against aerosols, which is a very important fact every clinician must be aware of. About 34% respondents knew that the wearing gloves when using a shopping cart or using an ATM will protect them from SARS-CoV-2. Only about 46% had correct knowledge regarding donning of PPE and only 33% had correct knowledge about doffing the PPE (Table 2).

Assessment of attitude

Majority of respondents (96%) had positive attitude regarding motivating co-workers about the use of PPE. Many (80%) of clinicians positively responded

Table 2: Knowledge of practicing clinicians regarding PPE

Knowledge	True	%	False	%	I don't know	%
COVID-19 virus is transmitted between people through respiratory droplets and contact routes. (true)	302	99.34	2	0.66		
Components of PPE are gloves, mask, gown, goggles, face shield, head cover and shoe cover. (true)	303	99.67	1	0.33		
A hand sanitizer needs to contain at least 60% alcohol in order to kill viruses. (true)	247	81.25	51	16.78	6	1.97
The colored side/the side with folds facing downwards of the surgical mask should face inwards with the metallic strip upper most. (false)	169	55.59	127	41.78	8	2.63
Respirators or N95 mask can block 95% small particles that contain viruses and bacteria. (true)	281	92.43	14	4.61	9	2.96
It is not necessary for children and young adults to take measures to prevent COVID-19 infection. (false)	5	1.64	299	98.36		
Surgical mask protects against aerosols? (false)	149	49.01	140	46.05	15	4.93
Wearing gloves when using a shopping cart or using an ATM will not necessarily protect you from SARS-CoV-2. (false)	193	63.49	105	34.54	6	1.97
Correct order of donning PPE (putting on)?	139	45.72	165	54.28		
Hand hygiene, Goggles, face shield, mask, gown, gloves (true)						
Hand hygiene, gown, gloves, mask, goggles, face shield (false)						
Hand hygiene, gown, mask or respirator, goggles, face shield, gloves (false)						
Mask, gloves, gown, goggles, face shield, hand hygiene (false)						
Correct order of doffing PPE (taking off)?	98	32.24	206	67.76		
Gloves, gown, hand hygiene, face shield, goggles, mask or respirator, hand hygiene (false)						
Gloves, hand hygiene, face shield, goggles, gown, hand hygiene, mask or respirator (false)						
Gown, gloves, face shield, goggles, hand hygiene mask or respirator, hand hygiene (true)						
Mask or respirator, hand hygiene, face shield, goggles, gown, gloves, hand hygiene (false)						

PPE: Personal protective equipments, COVID-19: Coronavirus disease 2019, SARS-CoV-2: Severe acute respiratory syndrome coronavirus 2

that our country can win the battle against coronavirus. About 28% had a negative outlook toward participating in the management of COVID-19 infected patients. Only 58% responded to the question on the correct way of using PPE during preliminary screening not involving direct contact (Table 3).

Assessment of practice

It was impressive that 97% of clinicians had good hand hygiene practice. About 94% of clinicians had adequate knowledge regarding biomedical waste management. About 15% did not know the method to reuse of N95 mask. About 90% of respondents had good practice of updating knowledge on PPE and COVID-19 guidelines (Table 4).

Discussion

Clinical practice of practitioners is affected by their KAP toward the PPE. Almost half of the participants were females (50.33%) and age of responders ranged between 30 and 50 years (57.24%). About two-third of participants (63.82%) was from government sector and about one-third was from private sector. Regarding their service years 131 (43.09%) had served for <10 years in

Table 3: Attitude of clinicians regarding the use of PPE

Attitude	Agree	%	Disagree	%
I am motivating my co-workers about the usage of PPE	292	96.05	12	3.95
Our country would be able to handle the crisis well and win the battle against virus	244	80.26	60	19.74
When a patient has signs and symptoms of SARS-CoV-2 I can confidently participate in the management of patient	219	72.04	85	27.96
Mark the correct PPEs which you use when doing preliminary screening not involving direct contact	177	58.22	127	41.78
Mask				
Shoe cover				
Gown				
Gloves				
Face shield				
Mark the correct PPEs when you do cardiopulmonary resuscitation (CPR) in patient with known or suspected COVID-19	73	24.01	231	75.99
Face shield				
Mask				
Gown				
Gloves				

PPE: Personal protective equipments, COVID-19: Coronavirus disease 2019, SARS-CoV-2: Severe acute respiratory syndrome coronavirus 2

Table 4: Practice of clinicians towards PPE

Practice	Yes	%	No	%
Do you perform hand hygiene before and after handling each patient?	291	95.72	13	4.28
Do you dispose the used mask before leaving the hospital?	285	93.75	19	6.25
If you have only five N95 masks, will you rotate their use each day after allowing them to dry for more than 72 h, long enough that the virus is no longer viable?	259	85.2	45	14.8
Do you recommend maintaining a safe distance (6 feet or greater), possibly outside the door while nebulizing?	289	95.07	15	4.93
Are you updating the knowledge of COVID-19 and PPE guidelines developed by WHO/ICMR/GOVT?	272	89.47	32	10.53

PPE: Personal protective equipments, COVID-19: Coronavirus disease 2019

their respective professions. The main sources of information about PPE and COVID-19 among participants were from Internet (38.82%) and government in service training (36.18%) and very much less from media such as television (6.5%) and newspaper (2.63).

The study results indicate that nearly half of the clinicians are well aware of the transmission of COVID-19. To prevent or reduce the infection rates, they need to get correct information and act accordingly. It is good to know that most of the clinicians (99.6%) were aware of the components of PPE to be used during this pandemic.

The average knowledge score of clinicians with regards to PPE was moderate at 6.69 ± 1.23 with an overall correct rate of 57.70%. The PPE knowledge ranged widely indicating that while some participants had high levels of knowledge, others did not. The clinician's age between 30 and 50 years had higher knowledge scores, as they are often the close contacts and exposed frequently with COVID 19 patients. We noted that knowledge among the clinicians of younger age (30%) was inadequate and required updates and training.

An overload of irrelevant information can cause confusion. Keeping abreast of the COVID-19 infection

from reliable sources is necessary. As revealed by our study, the main source of information was from internet which is the new norm but has to be applied judiciously. The relevance of imparting knowledge about different types of masks, proper choice of PPEs and their indications especially during aerosol generating procedures is of utmost importance as we found that 54% of clinicians were not aware that surgical masks will not protect against aerosols.

It is good that majority had knowledge that children and young adults are equally at risk. Better knowledge is associated with optimistic attitude and good practice. With these combined positive attitude and cooperation of clinicians, the battle against pandemic can be won.

During this pandemic situation, attitude and practices toward SARS-Cov-2 and PPE did depend on the information they imbibed and subsequent action taken accordingly. This study stresses the importance to ensure that all the clinicians put in place new norms in terms of infection prevention and control practices, training, and motivation of coworkers and are trained in self-care and the precautions to be taken and the correct use of PPE. If clinicians follow these principles, quality healthcare can be rendered and risk of infection to all including oneself and to the patients can be mitigated.

Conclusion

More than fifty percentage of the clinicians were well aware of the route transmission of SARS-CoV-2. All the participants knew the important components of PPE to be used. The knowledge regarding correct use of surgical masks with coloured side out was only about 55% and only 46% of clinicians were aware that surgical masks will not protect against aerosols. Only 46% had correct knowledge regarding donning of PPE and similarly only 33% had correct knowledge about doffing. This study stresses the importance to ensure that all the clinician, managing suspected or proven SARS-CoV-2 infected persons, are trained and updated in the selection of appropriate PPE.

Limitations

Community-based sampling surveys were not feasible during this particular period. Our study is limited by its sample size and data were collected online, through self-reported questionnaires, depending on the responder's networks.

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