ORIGINAL ARTICLE

Knowledge, Attitude, and Practices of Healthcare Workers in Non-COVID Areas of the Hospital Regarding the Use of Face Mask to Limit the Spread of the Novel Coronavirus Disease (COVID-19): An Institutional Cross-sectional Online Survey

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Abstract

Background: COVID-19 pandemic is stressing the already burdened healthcare systems all over the world. To prevent infrastructure from getting overwhelmed, it is required that infection prevention practices are followed by everyone.

Objectives: To assess whether a knowledge gap exists in the correct use of face masks, attitude, and practices of participants in wearing a face mask to limit the spread of COVID-19.

Materials and methods: Faculty, medical officers, and postgraduate trainees working in SN Medical College, Agra, were invited to participate in this survey. All participants were asked to complete a self-administered closed-ended questionnaire about their knowledge, attitudes, and practices regarding the use of face masks. Data were analyzed using descriptive statistics. Quality improvement intervention was done.

Results: Among the 136 respondents, 73.5% knew the correct steps in wearing a face mask, and their attitudes toward face masks were strongly positive. Further analyses showed that respondents were equally likely to wear a face mask at hospital or at non-hospital places. Moreover, two-thirds respondents reported to have some problems while wearing a mask.

Conclusion: Studied subjects had a positive attitude but poor level of knowledge and good practices regarding the use of surgical face mask. Awareness campaigns regarding the proper use of face mask by utilizing all forms of available media and resources would be helpful during this pandemic.

Keywords: COVID-19, Healthcare workers, KAP, Quality improvement, Survey.

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Introduction

The first cases of the COVID-19 disease were linked to direct exposure to the Huanan Seafood Wholesale Market of Wuhan, China.[1] It has since spread to most of the countries around the world, and the World Health Organization (WHO) declared it pandemic on March 11, 2020. The disease has overwhelmed the healthcare infrastructure particularly in underdeveloped nations.[2] Its relatively long incubation period and high contagion rate make it difficult to trace and isolate infected individuals.[3,4] Current estimates suggest that about 35% of infected individuals do not show any symptoms and may contribute in the spread of the disease unknowingly.[5]

The COVID-19 virus mainly spreads through respiratory droplets (infected/asymptomatic patient coughs or sneezes) or by touching contaminated surfaces/objects and then touching their respective mouths and nose.[6,7] This forms the rationale for the recommendation for using masks to reduce the risk of cross-infection via the transmission of respiratory droplets from infected to healthy individuals. The risk of getting infected with COVID-19 is higher in healthcare workers, as they are in close contact with confirmed COVID-19 cases. The latest figures show that many of the doctors and healthcare workers are getting infected, and a substantial number of them of them have died in this ongoing pandemic.[8] In newer studies it has been found that the micron-sized droplets and their evaporated contents may remain suspended in the air for long periods of time, making it another mode of transmission, i.e., airborne transmission.[9,10] This emphasizes the use of face mask all the times.

Symptoms of early stages of the disease are nonspecific. Early respiratory symptoms are cough and shortness of breath without signs of severe pneumonia seen in complicated stages. As there is a possibility of transmission even before symptoms, individuals who remain asymptomatic are recommended to stay in isolation, and therefore everyone is recommended to wear a mask.[11] It is

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the best way to contain this pandemic with the currently available knowledge.

This study focuses on the face mask used by healthcare providers which acts like a physical barrier between the mouth and nose of the mask user and the contaminants in the immediate surroundings.[12]

The WHO and the Centers for Disease Control and Prevention (CDC) recommend the use of a face mask among the humans as a standard method to prevent transmission of virus.[13] Therefore, the correct use of face masks is important during this crucial time when its use is turning out to be highly prevalent. The WHO states that the correct use and disposal method of mask is very important as when not worn properly it may actually increase the rate of transmission, i.e., if a person wears a mask, and then they must also know about correct methods of usage and disposal.[14]

We did a survey among our faculties, postgraduate trainees, and medical officers about the use of facemask. The objective of this study is to assess the knowledge, attitude, and practices of participants in wearing a face mask to limit the spread of COVID-19.

Materials and Methods

This cross-sectional, institute-based survey was conducted at SN Medical College Agra, India, during the period from July 05 to 15, 2020. The study participants were faculty members, medical officers, and postgraduate trainees of our institute working in non-COVID areas and excluded all those working in COVID areas of hospital. The study was conducted as online survey using Google doc questionnaire. The questionnaire was adapted from the work of Kumar et al., and permission was sought from the authors.[15] The adapted questionnaire was modified a little and comprised of questions on knowledge, attitude, and practices regarding the use of a face mask to limit COVID-19 exposure. For the purpose of simplified analyses, each correct response in the knowledge category, good practice, or positive attitude was scored 1, and each incorrect response, bad practice, or negative attitude was scored 0. The total number of questions was 15. The mean scores were calculated for knowledge and practices separately and then categorized as good (>90%), moderate (75–90%), and poor (<75%). Once the respondents submitted their answers, immediately a correct version of the answers was sent to them along with their scores, and they were encouraged to take the questionnaire again to promote quality improvement. The study was conducted after getting approval from institutional ethical committee.

Statistical Analysis

The statistical analysis was done after entering data in Microsoft excel sheet.

Results

A total 142 participants responded to the questionnaire, and 136 forms were complete and thus utilized for analysis. To encourage participants to answer honestly, complete anonymity was maintained in data collection, and hence no demographic, educational, or designation data were collected. On assessing the knowledge about number of layers in a surgical mask, 92.6% answered correctly, 73.5% knew the correct way of wearing a surgical mask, and only 58.8% were aware of the maximum duration for wearing a surgical face mask. In all, 97.1% correctly responded about the purpose of the metal strip in the surgical mask, and 75% knew correctly about the layer in mask that acts as filter media. About 44.1% of participants knew the correct type of mask that can actually protect against COVID-19 with surety. Efficiency of cloth mask in comparison to surgical mask on assessment showed 80.9% correct responses. When the study participants were asked about the extent to which surgical mask should cover, 92.6% answered correctly and if a surgical mask can protect from getting COVID-19 infection was affirmatively responded by 60.3%. The mean score for all questions on knowledge was 0.74, falling in poor category (Table 1).

Table 1: Distribution of responses to questionnaire with correct answers about knowledge

Knowledge	*Responses*	*N (136)*	*(%)*
How many layers are there in a surgical mask?	• One	5	3.7
	• Two	5	3.7
	• Three (correct)	126	92.6
Which is the correct way of using a surgical face mask?	• White side facing in (correct)	100	73.5
	• White side facing out	36	26.5
How long can you wear a surgical mask in one stretch?	• Less than two hour	17	12.5
	• Two to four hours (correct)	80	58.8
	• More than four hours	39	28.7
What is the purpose of the metal strip on a surgical mask?	• No purpose	3	2.2
	• To fit on the nose (correct)	132	97.1
	• To fit on the chin	1	0.7
Which layer acts as a filter media barrier?	• First layer	26	19.1
	• Middle layer (correct)	102	75
	• Last layer	8	5.9
Which type of masks actually protects against COVID19?	• Surgical mask	2	1.5
	• N-95 (correct)	60	44.1
	• Both	74	54.4
Is the cloth facial mask as effective as a regular surgical facial mask against COVID19?	• Yes	26	19.1
	• No (correct)	110	80.9
For proper wearing, to which extent the surgical mask should cover?	• Nose only	0	0
	• Nose and mouth	9	6.6
	• Nose, mouth, and chin (correct)	126	92.6
	• Mouth and chin	1	0.7
Can wearing a surgical mask help to protect (limited manner) you from COVID19?	• Yes (correct)	82	60.3
	• No	29	21.3
	• Maybe	25	18.4
Overall score (for knowledge)		0.74	

The confidence of wearing surgical mask correctly was shown by 94.9%. The overall mean score for questions on practices was 0.95, which lies in good category. In all, 97.8% responded that they will not remove mask during clinics, and 99.3% were wearing surgical face mask while in hospital. In all, 99.3% were not storing the mask for later use, 80.1% were discarding it in correct manner, and everyone said that they wear surgical masks in public places (Table 2).

Participants' who submitted their responses for reassessment, their number had attrition and it was reduced to 112. On reassessment of the scores for the questionnaire, the frequency for correct responses increased to almost 100% for all the responses, showing significant improvement, particularly knowledge about using masks was considered.

Participants were also asked to submit structured responses about various problems that they encountered and about their behavior while wearing a mask (Figs 1 and 2). Difficulty in breathing (32%) was the most common response followed by facial sores (21%), headache (11%), impaired concentration (4%), and dizziness (3%). There were 29% respondents who claimed to experience no problem at all in using a face mask. When behavioral changes were assessed, 53% respondents said that they had to talk louder while using the mask. In all, 14% respondents said that they were talking less, and 11% said their respiratory rates were altered while using mask. One-fifth of respondents said that there was no change, and they behaved normally.

Table 2: Distribution of responses to questionnaire with correct answers about attitude and practices

Attitude	*Responses*	*N*	*(%)*
Are you confident enough to know the correct steps of wearing a face mask?	• Yes (correct)	129	94.9
	• No	7	5.1
Practices	*Responses*	*N*	*(%)*
During clinics, if there is a need to talk to the patient, will you remove your mask?	• Yes	3	2.2
	• No (correct)	133	97.8
Do you wear a mask in hospital premises to protect yourself against COVID-19	• Yes (correct)	135	99.3
	• No	1	0.7
If you are not sick, do you store the used surgical mask in a bag for later use?	• Yes	135	99.3
	• No (correct)	1	0.7
In which color-coded bag you dispose of your mask?	• Yellow-coded bag (correct)	109	80.1
	• Blue-coded bag	4	2.9
	• Red-coded bag	11	8.1
	• Black-coded bag	12	8.8
Do you wear a mask in public places to protect yourself against COVID-19?	• Yes (correct)	136	100
	• No	0	0
Overall score (for practices)		0.95	

Discussion

Usage of face masks is an effective and protective barrier for reducing the risk of transmission of microorganisms between patients, healthcare workers, and the environment. Mask use decreases the effective transmission rate in nearly linear proportion to the product of mask effectiveness[14]

In our study, almost 95% respondents were confident about using the mask correctly but when assessed at procedural level it was effectively 73.5% respondents who could use the mask correctly. According to the study done by Kumar et.al, it was 88.5% and 56.4%, respectively,[15] and this variation may be explained by the difference in the composition of the study participants, as our study comprised only of doctors, but other study had paramedical workers also. The rationale for only including doctors in our study was that they being the teachers must be able to impart correct knowledge to all support staff as well. Although the questionnaire was not rigorous and very detailed, but still the result shows that despite positive attitude, one may not be protected when correct knowledge is deficient.

In a study by Ho, among the 399 respondents, 52% knew the correct steps in wearing a face mask as against 73.5% respondents in our study, and their attitudes toward face masks were generally positive as in our study. Further analyses showed that respondents were more likely to wear a face mask at a clinic than in a public

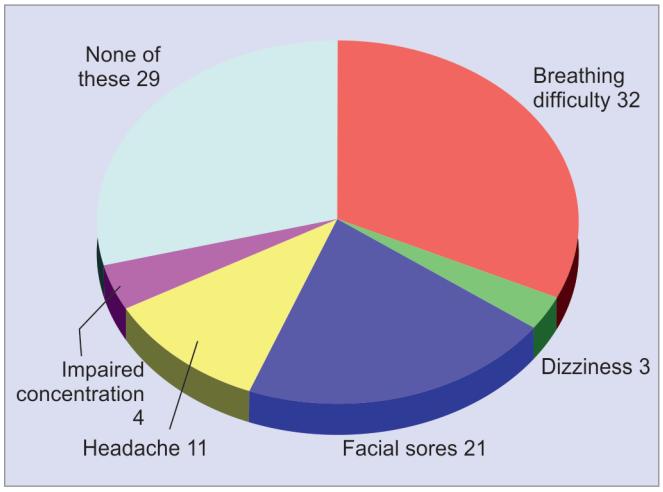

Fig. 1: Responses to, "what problems do you encounter while using a mask?"

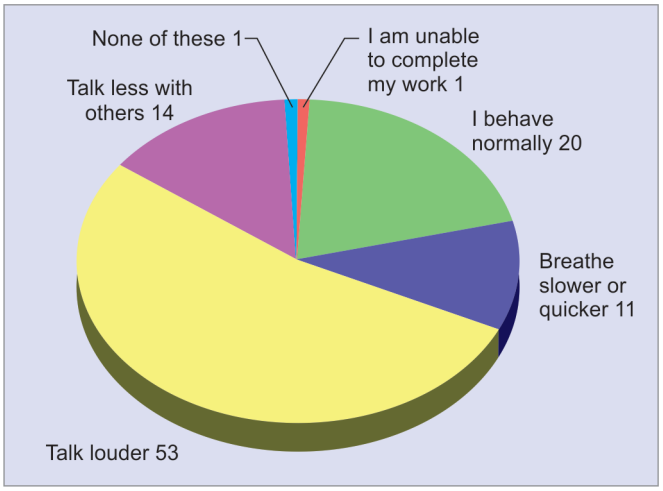

Fig. 2: Responses to, "how do you behave while using a mask?"

place or at home, but in our study it was same at hospital and other places. The difference is likely due to difference in composition of study participants.[16]

Only 73.5% respondents could answer correctly about the correct side, white/non-white, that goes towards the wearer of mask. This is a low score and shows that a large number of respondents are not aware about proper usage of mask. In theory, the white side is hydrophilic that absorbs moisture from our breath, thus reducing possibility of fogging on glasses. Also, the non-white side is hydrophobic, thus repelling moisture and preventing sticking of particulate matter and increasing risk of infection.[17]

The duration for which the surgical mask can be worn is quite variable and in normal scenarios cannot be more than 4 hours, as progressively the mask accumulates moisture making it less efficient with passing time.[18]

In a meta-analysis by Chu et al., face mask use could result in a large reduction in risk of infection ($n = 2647$; aOR 0.15, 95% CI 0.07 to 0.34, RD −14.3%, −15.9 to −10.7; low certainty), with stronger associations with N95 or similar respirators compared to disposable surgical masks or similar equipment.[19] Recently govt. of India has started a narrative on social media and print media that even cloth mask can be used in COVID-19 pandemic for protection. It is a known fact that cloth masks cannot be an efficient way of protection against coronavirus when compared to other specialized face masks.[20] In all, 19% of respondents of our study responded in favor of cloth mask. It may be due to ongoing propaganda in print and social media. In resource-limited country like ours, although inefficient, the usage of cloth mask may still prove of some use. Other studies have also highlighted similar findings with the conclusion that cloth mask, reuse, and extended use of mask makes it ineffective. It is our observation that wearing the same mask without removing it between patient interactions and disposing it properly following biomedical waste guidelines at the end of the day is best practice in current scenario.[21,22]

In an intention-to-treat analysis conducted by MacIntyre et.al, rates of clinical respiratory illness [relative risk (RR) 0.61, 95% CI 0.18 to 2.13], ILI (RR 0.32, 95% CI 0.03 to 3.13) and laboratory-confirmed viral infections (RR 0.97, 95% CI 0.06 to 15.54) were consistently lower in the mask arm compared to control although not statistically significant.[23] The study indicates a potential benefit of medical masks for source control, thus reinforcing our hypothesis for usage of mask all the times and correctly in prevention of coronavirus disease spread.

In a study by Lyu and Wehby, it was found that mandating face mask use in public is associated with a decline in the daily COVID-19 growth rate by 0.9, 1.1, 1.4, 1.7, and 2.0 percentage points in 1–5, 6–10, 11–15, 16–20, and 21 or more days after govt. of USA made face mask use mandatory. Estimates suggest that as a result of the implementation of these mandates, more than 200,000 COVID-19 cases were averted by May 22, 2020.[24] The findings suggest that requiring face mask use in public could help in mitigating the spread of COVID-19. There is no sufficient evidence which can prove that wearing a surgical mask will lead to protection from COVID-19. The current recommendations are that only healthcare workers, sick individuals, and those who are in close contact with them need to wear a mask for protection against COVID-19. Sixty percent of the respondents of our study answered that wearing a surgical mask can protect them as against 70.9 in study by WHO.[25]

The WHO established a color-coded bin system for proper disposal of biomedical waste in hospitals.[26] However, when it was assessed among our participants, 80.1% disposed the mask in the yellow-coded bag for in contrast with 44.9% in the study by Kumar et al.;[15] this showed deficiency in knowledge of teaching faculties regarding the safe disposal of biomedical waste in our study but low value in other study could be due to different composition of study groups.

Problems with face mask use reported by participants in the study by MacIntyre et al., in Sydney, Australia, during winter influenza season in 2006 to 2007, reported being uncomfortable (17%), forgot to wear (9%), child did not like it (6%), and others (19%).[6] In the same study, 49% reported suffering no problem, while in our study 29% reported none of the problems. A study by Lim et al. describes the phenomenon of headaches associated with the use of the N95 face mask. About a third of healthcare providers surveyed in their study reported headaches with the N95 face-mask use, and it identified preexisting headaches and prolonged duration of N95 face mask wear as important risk factors for the development of these headaches.[27] In our study with surgical face mask, only 11% reported headaches.

Conclusion

Ours is the first study in the region about use of face mask in India regarding the knowledge, attitude, and practice of faculty, medical officers and postgraduate trainees in a teaching hospital. To make it useful for quality improvement, the respondents, when provided with correct responses post survey, showed significant improvement in their knowledge reaching 100% efficiency. During the period of preparation of this manuscript we are observing that attitude and practices are evolving and improving with each passing day.

A few limitations of this study include the study being limited to a single government teaching hospital. Further longitudinal multicenter studies need to be carried out on a larger sample size before the results could be generalized. The scope of these surveys can be increased by including paramedics and general public in the study. Also, different types of masks can be compared to draw elaborate conclusions.

Studied subjects had a positive attitude but poor level of knowledge and good practice regarding the use of surgical face mask. Teaching faculty as well as general public awareness campaigns regarding the proper use of face mask by utilizing all forms of available media and resources would be helpful during this pandemic. We strongly recommend usage of surgical face mask, if unavailable, then any form of face mask by everyone in proper manner to limit COVID-19 pandemic.

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