ORIGINAL ARTICLE

Compliance and Difficulties Faced by Health Care Providers with Variants of Face Masks, Eye Protection and Face Shield

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ABSTRACT

Aim: To assess the compliance and difficulties faced by health care providers with variants of mask, eye protection and face shields.
Methodology: This cross sectional study took place from 2nd April 2020 till 30th April 2020. All participants meeting inclusion criteria filled online questionnaire regarding type of mask, eye protection and face shields they use in their outpatient clinics, ward rounds and while performing surgical procedures, which is their favorite feature of these, which of the characteristic of particular equipment, how often they readjust the mask and how long do they wear it daily on an average.
Results: A total of 196 participants were recruited in the study. The frequency of mask readjustment was most frequent by house officers 35(48.6%). Five (10.4%) of the consultants and 1(1.7%) of the medical students do not wear mask at all. In present study, the highest compliance was with N95 mask with filter 68(33.6%) 31(14.8%) wear goggles, 33(16.3%) wear face shield. The most comfortable characteristic of mask was chosen to be elastic ear loops 72(36.5%) voted by most of the house officers 27(37.5%) in which 40% wear it daily for 8 to 2 hours straight. Goggles leads to troublesome fogging interfering to an extent of limiting their performance and efficacy p <0.001. Luckily, 9(0.4%) came out to be positive in our research (p 0.47).
Conclusion: The choice of PPE should be based on the nature of interactions with patients and the modes of transmission but sadly it is seen to be much impacted by the discomfort faced by our front line worriers while wearing it that will adversely affect themselves the most.
Keywords: COVID-19, health care workers, personal protective equipment's

INTRODUCTION

The deadliest pandemic in human history was in 1918–1919, pandemic influenza appeared nearly simultaneously around the globe and caused extraordinary mortality .[1] Some of the other biggest in the history to fetch the attention of health care workers (HCW) are avian influenza H5N1 Flue in 2009, severe acute respiratory syndrome corona virus (SARS) 2002, and Ebola virus outbreak that lasted from 2013 to 2016[2,3,4].

Since the first pandemic, the protective equipment's for HCW are constantly evolving .N 95 mask is considered the best of all as it protects against respiratory droplets[3]. Since breathing while wearing the N95 mask is harder, it is not recommended for the elderly, claustrophobics, and individuals suffering from lung diseases as it may exacerbate their pre-existing conditions[3] these masks need to be properly fitted to ensure maximal protection. This can be difficult to achieve in individuals with facial hair and in children.[3] it can also lead to frequent adjusting the mask, which further increases the risk of transmission[3]. The tight seal, on the other hand, leads to the build-up of heat within the mask causing difficulty in breathing[5] most recently introduced mask are filtering face piece or FFP. Filter efficiency ranging from 80 to 99%[6].

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According to a meta-analysis, eye protection by goggles or face shields confers additional benefit while dealing with airways of COVID -19 positive patient[7,8,9].
There is a variety of these gadgets commercially available and health care workers indifferent setups are not unanimously using it. There is a difference in compliance reported to different components of PPE due to communication hustle, breathing difficulty, lightheadedness and dizziness with mask, fogging and claustrophobia when using eye protection and face shields[1,2,3,4,5,6,7,10].

In this war against this lethal virus, the challenges faced by front line worriers should be addressed and adaptive measures should be taken to increase their compliance with the personal protective equipment's. Our objective was to evaluate the compliance and difficulties faced by health care providers with variants of face mask, eye protection and face shields.

MATERIAL AND METHODS

After approval from institutional review board of Combined military hospital Lahore (IRB number 209/2020) , this cross sectional study was conducted via questionnaire made on Google Forms via internet to accessible contacts in the English Language after electronic consent from 2nd April 2020 till 30th April 2020. All health care workers including age ranged between 20 to 60 years were included. Health care workers not practicing currently in Pandemic were excluded. The questionnaire requires information regarding

demographic variables, current country of practice, and type of mask, eye protection and face shields they use in their routine activities. Sample size was calculated with Rao software sample size calculator, confidence interval 95% and 5% margin of error was 137%. All data was entered in SPSS, Version 22. Mean and standard deviation were calculated for quantitative variables. Frequency and percentages were computed for qualitative variables. Chi square and T test was applied for statistical analysis. P value ≤ 0.05 was considered statistically significant.

RESULTS

A total of 196 participants were recruited in the study. Predominant respondents were from Pakistan 164(84.2%) followed by Australia and India 7(3.6%) and 6(3'1%) respectively. Females were the majority 100(51%). All participants were further categorized according to their job description into consultants, residents, house officers, medical students and nurses.

Most frequent age group amongst consultants was in age range of more than 56 years (41.7%), residents 26 to 36 years (91.5%), house officers less than 25 years (79.2%), medical students less than 25 years (79.2%) and nurses 46 to 55 years (27.6%).

Table 1 describes the experience of health care providers with mask. Compliance with eye protectants while dealing with COVID-19 positive patient was 15.8% mostly followed by house officers 11(5.6%) while 64(32.6%) respondents do not wear it at all as 55(8%) are not uncomfortable with any of its variants and most common reason was fogging that interfere with performance 121(61.7%) *p ≤ 0.001*

Seventy nine (40.3%) of the participants do not wear face shield at all while 42(21.4%) wear it while dealing with a COVID-19 positive patients. P ≤0.001, even 157(80.1%) felt it vital to wear p 0.19. Best compliance was practiced by residents 15(76.5%). p ≤0.001, light weight face shield was preferred by majority of the respondents

Graph 1: Illustrates the view of respondents which component of PPE adversely affect their performance the most and do they wish any amendments in currently commercially available PPE.

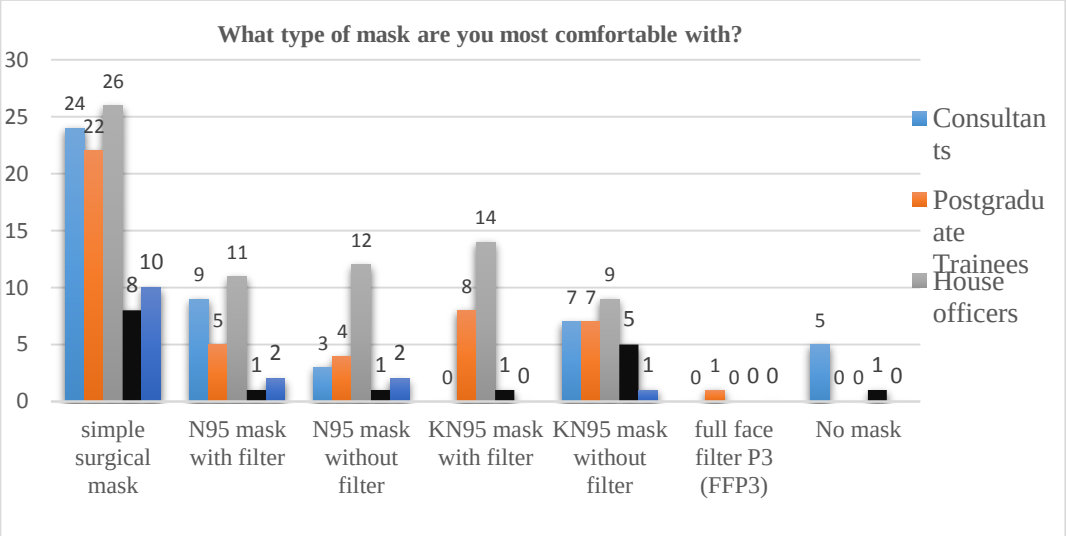

Table 1: Compliance of health care providers with personal protective equipment's (n=196) – Mask

Variables	Consultants	Postgraduate Trainees	House officers	Medical students	Nurse	Total
Which type of mask do you wear in your outpatient practice?						
simple surgical mask	24(50)	22(46.8)	26(36.1)	8(57.1)	10(66.7)	90
N95 mask with filter	9(18.8)	5(10.6)	11(15.3)	1(7.1)	2(13.3)	28
N95 mask without filter	3(6.3)	4(8.5)	12(16.7)	1(17.1)	2(13.3)	22
KN95 mask with filter	0	8(17)	14(19.4)	1(17.1)	0	31
KN95 mask without filter	7(14.6)	7(14.9)	9(12.5)	2(14.3)	1(6.7)	18
full face filter P3 (FFP3)	0	1(2.1)	0	0	0	1
no mask	5(10.4)	0	0	1(7.1)	0	6
p value < 0.001						
Which type of mask do you wear in daily inpatient ward rounds?						
simple surgical mask	26(54.2)	23(48.9)	26 (36.1)	10(71.4)	5(33.3)	90
N95 mask with filter	11(22.9)	2(4.3)	14(19.4)	1(7.1)	4(26.7)	31
N95 mask without filter	1(2.1)	2(4.3)	10(13.9)	0	4(26.7)	18
KN95 mask with filter	0	12(25.5)	14(19.4)	1(7.1)	0	33
KN95 mask without filter	4(8.3)	7(14.9)	7(9.7)	1(7.1)	2(13.3)	15
full face filter P3 (FFP3)	0	1(2.1)	0	0	0	1
no mask	6(12.5)	0	1(1.4)	1(7.1)	0	8
p value < 0.001						
Which type of mask do you wear while treating a COVID-19 positive patient?						
simple surgical mask	4(8.3)	8(17)	8(11.1)	4(28.6)	0	23
N95 mask without filter	18(37.5)	13(27.7)	23(31.9)	6(42.9)	7(9.7)	59
N95 mask with filter	16(33.3)	4(8.5)	21(29.2)	0	23(31.9)	53
KN95 mask without filter	7(14.6)	8(17)	10(13.9)	0	21(29.2)	26
KN95 mask with filter	1(2.1)	9(19.1)	10(13.9)	2(14.3)	10(13.9)	22
full face filter(FFP3)	2(4.2)	5(10.6)	1(1.4)	2(14.3)	10(13.9)	11
no mask	0	0	0	0	0	1
p value < 0.001						
What type of mask are you most comfortable with?						
simple surgical mask	35(72.9)	28(59.6)	41(56.9)	10(71.4)	8(53.3)	122
N95 mask without filter	5(10.4)	1(2.1)	3(4.2)	0	1(6.7)	10
N95 mask with filter	3(6.2)	7(14.9)	11(15.3)	1(7.1)	3(20)	25
KN95 mask without filter	2(4.2)	3(6.4)	5(6.9)	0	1(6.7)	11
KN95 mask with filter	0	5(10.6)	8(11.1)	2(14.3)	2(13.3)	17
full face filter(FFP3)	3(6.2)	2(4.3)	3(4.2)	1(7.1)	0	9
no mask	0	1(2.1)	1(1.4)	0	0	2
p value < 0.001						
What characteristics of mask are you most comfortable with?						
Elastic Ear loops	14(29.2)	12(25.5)	27(37.5)	11(78.6)	8(53.3)	72
Overhead loops	3(6.3)	9(19.1)	14(19.4)	0	0	26
Rubber loops	2(4.2)	0	6(8.3)	0	1(6.7)	9
soft fabric loop	6(12.5)	7(14.9)	5(6.9)	1(7.1)	1(6.7)	20
Tie over loops	23(47.9)	19(40.4)	20(27.8)	2(14.3)	5(33.3)	69
p value < 0.001						
Which of the following issues you face while wearing face mask?						
fogging	35(72.9)	24(51.1)	21(29.2)	4(28.6)	10(66.7)	94
difficulty in communication	25(52.1)	15(31.9)	37(51.4)	7(50)	10(66.7)	94
headache	30(62.5)	1(2.1)	27(37.5)	4(28.6)	2(13.3)	64
eye irritation	27(56.3)	10(21.3)	35(48.6)	8(57.1)	3(20)	83
humidity	30(62.5)	30(63.8)	25(34.7)	9(64.3)	5(33.3)	99
suffocation	26(54.2)	41(87.2)	22(30.6)	8(57.1)	10(66.7)	107
breathing difficulty	25(52.1)	42(89.4)	49(68.1)	9(64.3)	11(73.3)	136
pain on nasal bridge	48(100)	26(55.3)	33(45.8)	7(50)	6(40)	120
nasal irritation	25(52.1)	23(48.9)	33(45.8)	10(71.4)	7(46.7)	98
ski rashes, allergy and acne	8(16.7)	9(19.1)	13(18.1)	3(21.4)	2(13.3)	35
malodor	21(48.3)	23(48.9)	32(44.4)	6(42.9)	7(46.7)	89
anxiety	22(45.8)	23(48.9)	32(44.4)	6(42.9)	7(46.7)	89
dizziness	8(16.7)	16(34)	14(19.4)	1(7.1)	15(100)	54
p value < 0.001						

DISCUSSION

Despondently till date data reports infected HCW to be 10% in Italy and 20% in Spain[11]. In the United States (US), approximately 3% of confirmed cases are HCWs, and 55% of these reported exposure to COVID-19 patients only in healthcare settings[12]. Protecting HCWs is of paramount importance to maintain continuous patient care and keep healthcare systems functioning[11].

It is recommended in National guidelines to wear Surgical/Medical mask/N95, gown and gloves in every outpatient settings with addition of eye protection in case of patient with respiratory symptoms[13,14]. In spite of it was found that 5(10.4%) of the consultants and 1(1.7%) of the medical students do not wear mask at all. Kumar J et al also reported that 21(5.3%) HCW do not wear mask at all in hospital premises[9].

National guidelines clearly recommends wearing surgical/Medical mask/N-95, gown, gloves, eye protection in form of goggles or face shield and apron for dealing with all COVID-19 patients and additional FFP3 filter when aerosol generating procedure is undertaken[10]. In present study, the highest compliance was with N95 mask with filter 68(33.6%), 31(14.8%) wear goggles, 33(16.3%) wear face shield. this compliance is alarmingly low then what is recommended.

Uncouthly, surgical masks are the most comfortable amongst all which is shown in our research 121(59.9%) and full face filter (FFP3) are least comfortable ones 9(44.5%) p value ≤ 0.001. The results are comparable with study conducted by MacIntyre CR ET al[15]. Most common cause of discomfort which leads to noncompliance is breathing difficulty 136(67.3%) followed by pain on nasal bridge 120(59.4%) and suffocation with p values <0.001. These are most commonly associated with simple surgical mask (p value 0.58, 0.58 and 0.65 respectively) Contrary to a recent publication in China in which most compliance was observed with N95 mask even being least comfortable[15].. This data reflects that HCW were not compliant and comfortable even with the basic mask available either due to unacceptance or lack of knowledge. Kortian RP et al. revealed 90.6% compliance to simple surgical mask[16].

Lim et al. concluded that headache due to long duration of PPE is most commonly due to N95 mask but contrary results are obtained in our study p value < 0.67[10]. This emphasis on the previously reported finding that mask of any type when wore for long duration leads to multiple adverse effects due to retention of CO_2[5].

Any equipment if not comfortable will lead to noncompliance especially worn for longer duration. The most comfortable characteristic of mask was chosen to be elastic ear loops 72(36.5%) voted by most of the house officers 27(37.5%) in which 40% wear it daily for 8 to 2 hours straight. Residents and consultants preferred tie over mask more although during wearing it at a stretch was 8 to 12 hours in 44.7% and 18.8% of residents and consultants respectively.

Fogging is a known problem and is very well addressed by WHO as well. [17] Sixty four (31.6%) respondents do not wear eye protection at all Most of them are uncomfortable with plastic tight fitting goggles that leads to fogging interfering to an extent of limiting their performance p <0.001 Even worse results are presented by Kortian RP et al where half of the respondents do not practice eye protectants[16,17]. Majority of our participants are non-compliant with face shield it even when they consider it to be important although it has been well emphasized in[18,19]

In present study, almost half of the respondents were tested for COIVD-19 showing that at some point there came in contact with infected patient most commonly house officers. Luckily, 9(0.4%) came out to be positive. It is statistically insignificant (p 0.47). However, this can rise if HCW failed to comply with standard protocols.

CONCLUSION

The choice of PPE should be based on the nature of interactions with patients and the modes of transmission but sadly it is seen to be much impacted by the discomfort faced by our front line worriers while wearing it that will adversely affect themselves the most. In this Pandemic, when there is everything already very stressful at least the wearables should be comfortable enough not to hamper the efficiency of the health care workers.

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