Assessment of Risk to Healthcare Workers During the COVID-19 Pandemic: A Tertiary Care Facility Based Cross-sectional Study in Pakistan

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ABSTRACT

Objective: To assess the risk of COVID-19 to healthcare workers (HCWs) in Tertiary care hospitals and its association with demographic factors.

Study Design: Cross-sectional analytical study.

Place and Duration of Study: Tertiary Care Hospital, Rawalpindi Pakistan, from May to Dec 2020.

Methodology: Healthcare workers working in a designated COVID-19 Tertiary care hospital were included in the study. A modified "Risk assessment and management of exposure of HCWs in the context of COVID-19 tool" was distributed. HCWs were categorized as "high risk" and "low risk" of COVID-19 infection. Frequency and percentages were computed for demographic variables.

Results: A total of 182 healthcare workers were included, and 167(91.7%) returned the study questionnaire. Most of them were nurses (n=65, 40.1%) working in the medical unit (n=99, 61.1%). Low risk HCWs were 73.5%(n=119) and only 26.5%(n=43) were high risk. Gender (*p*-value: .02) and type of HCWs (*p*-value: .01) were significantly associated with the risk of COVID-19.

Conclusion: One-fourth of HCWs were at high risk of COVID-19 virus infection. Female gender and nurses were more likely to acquire COVID-19 infection.

Keywords: COVID-19, Healthcare workers, Risk assessment, Tertiary care facility.

INTRODUCTION

Evidence suggests that the constant increase in the number of COVID-19 infections is associated with a parallel increase in COVID-19 cases, and the proportion of HCWs infected with SARS-CoV-2 ranges from 0.9% to 19% in various studies.[1,2] Evidence from South Asia reported similar morbidity statistics as Yasmin *et al.* documented in a study conducted in Bangladesh that nurses and doctors were the most affected health personnel, and nurses (40.54%) were affected more than physicians (24.32%).[3,4]

COVID-19 affects the HCWs and ultimately impacts the healthcare system in handling the crisis. The healthcare systems in the worst-affected countries are already overburdened as cases continue to rise.[5,6] Similarly in Pakistan, evidence indicated that the pandemic had strained Pakistan's already crippled health system due to limited resources and the indifferent attitude of the public towards general protective measures further made the situation worse.[7,8] In addition, the paucity of literature documenting the risk assessment of HCWs working in COVID-specific settings in Pakistan highlights the need to assess risk factors for infection in

HCWs. Therefore, the study was conducted to assess the risk to HCWs working under COVID-19 and find the association of socio-demographic factors with the risk of COVID-19 infection.

METHODOLOGY

The cross-sectional analytical study was conducted from May to December 2020 at the designated COVID-19 Tertiary Care Hospital in Rawalpindi. Ethical approval was taken from the Ethical Review Committee (ERC/ID/87). A sample size of 139 was calculated using the WHO sample size calculator based on an anticipated HCW population proportion of 10% HCWs,[9] a confidence level of 95% and absolute precision of 0.05%.

Inclusion Criteria: The study population included HCWs such as medical specialists, house officers and resident doctors, nurses and laboratory personnel, technicians and administrative staff.

Exclusion Criteria: Healthcare workers having a chronic disease or terminal or psychiatric issues were excluded from the study.

The modified structured questionnaire, "Risk assessment and management of exposure of HCWs in the context of COVID-19 tool,"[8] was administered in person for data collection. A similar questionnaire was

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Received: 17 Aug 2021; revision received: 05 Dec 2021; accepted: 17 Dec 2021

used in Ghana in COVID-specific settings.[9] A 42-item questionnaire consisted of demographic characteristics, HCW activities performed on COVID-19 patients, adherence to IPC measures during healthcare interaction, adherence to IPC measures when performing AGPs, and any accident with biological material.

Exposure to the COVID-19 virus was assessed by providing direct care to a COVID-19 patient, presence during aerosol-generating procedures (AGPs) and direct contact with the environment where the confirmed COVID-19 patient has been cared. Responses were recorded as nominal variables.

HCWs were categorized as "high risk" if the respondent mentioned, "always as recommended". Similarly "low risk" category was assigned to any other response. Data were analyzed using IBM SPSS Statistics for Windows, version 22.0. Frequency and percentages were calculated for categorical variables, while mean and standard deviation were calculated for numerical variables. The Chi-Square test was applied to determine the association between the outcome and independent variables. The *p*-value of ≤0.05 was considered statistically significant.

RESULTS

One hundred and sixty-seven HCWs (91.7%) returned the questionnaire. Five incomplete forms were discarded, and 162 forms were included. To ensure equal participation, the questionnaire was distributed to doctors (n=36), nurses (n=73), paramedics (n=33), administrative staff (n=29) and technical staff (n=11). The majority were females (n=95, 58%) and males (n=68, 42%) whereas most of the HCWs (n=92, 56.8%) were of the younger age group of 20-30 years. The highest preponderance among study participants was of nurses (n=65, 40.1%), and the majority were working in the medical unit (n=99, 61.1%). For the majority (n=66, 40.7%), the period since the first interaction was from 17-20 weeks. The majority HCWs (n=98, 60.5%) perceived to have interacted with almost 100 and 200 patients and only (n=11, 8%) had interaction with almost 400 confirmed COVID-19 patients (Table-I).

Almost all (n=161) adhered to IPC procedures performed on COVID-19 patients (Figure-1). The majority of HCWs wore single-use gloves (n=153, 94.3%), N95 masks (n=148, 91.4%) and disposable gowns (n=153, 94.4%) "Always as recommended". Most HCWs (n=157, 96.9%) performed hand hygiene before and after aseptic procedures and before and after touching the patient (n=148, 91.4%) "Always

as recommended". Most of the HCWs wore face shields/protective glasses (n=145, 89.5%), used waterproof aprons (n=141, 87%) and don and doff PPE according to the protocol (n=146, 90.1%) "Always as recommended," as shown in Figure-2.
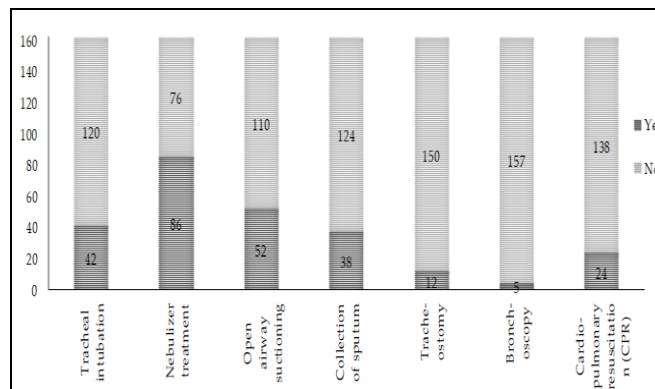

Figure-1: Healthcare Worker's Adherence to IPC Procedures during AGPs (n=162)

Table-I: Sociodemographic Characteristics of Study Participants (n=162)

| Characteristics	n(%)
Gender	
Male	68(42)
Female	94(58)
Age(years)	
20-30	92(57)
31-40	36(22))
41-50	26(16)
51-60	8(5)
Type of HCW	
Medical doctor	32(20)
Registered nurse	65(40)
Assistant nurse	29(18)
Administrative staff	26(16)
Technical staff	10(06)
Department of HCW	
Outpatient department	15(9)
Medical unit	99(61)
Emergency	24(15)
Intensive Care unit	13(08)
Laboratory	11(6.8)
Perceived Number of Patients	
Almost 100	48(30)
Almost 200	50(31)
Almost 300	35(21)
Almost 400	11(07)
Almost 500	18(11)
Approximate Number of Weeks Since First Interaction	
1-4 weeks	7(4)
5-8 weeks	11(7)
9-12 weeks	28(17)
13-16 weeks	50(31)
17- 20 weeks	66(41)
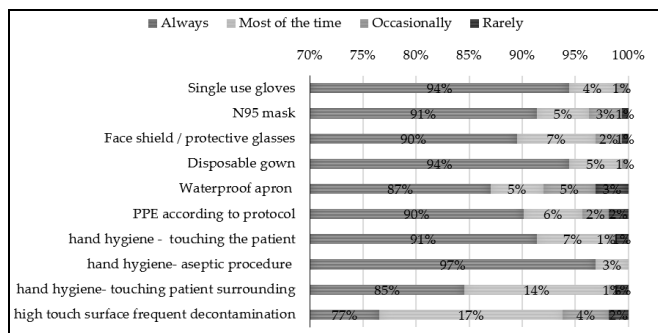
Figure-2: Healthcare Worker's Adherence to IPC Procedures during AGPs (n=162)

Although direct care was provided by most HCWs (n=148, 91.4%), the majority (n=119, 73.5%) of participants were categorized as "low risk", and almost one-fourth (n=43,26.5%) were found to be "high risk" of COVID-19. The chi-square test of association revealed a significant association between the gender of HCW (*p*-value: 0.02) and the type of HCW (*p*-value: 0.01). Female gender and nurses were most at risk of acquiring COVID-19 infection as shown in the Table-II.

Table-II: Association of Risk of COV-19 with study Variables (n=162)

Variables	High Risk n (%)	Low Risk n(%)	*p*-value
Gender			
Male	12 (7.0)	56 (35.0)	0.02
Female	31 (19.0)	63 (39.0)	
Type of HCW			
Medical doctor	8(5.0)	24(15.0)	
Registered nurse	26(16.0)	39(24.0)	
Assistant nurse	6(4.0)	23(14.0)	0.01
Laboratory personnel	0(0)	10(6.0)	
Administrative staff	2(1.0)	24(15.0)	
Age			
20-30	31(19.0)	61(38.0)	
31-40	7(4.0)	29(18.0)	0.07
41-50	5(3.0)	21(13.0)	
51-60	0	8(5.0)	
Department			
Outpatient department	3(2.0)	12(12.0)	
Medical unit	27(17.0)	72(44.0)	
Emergency	3(2.0)	10(6.0)	0.84
Intensive Care unit	8(5.0)	16(10.0)	
Laboratory	2(1.0)	9(6.0)	
Weeks Since First Interaction			
1-4 weeks	1(0.6)	6(4.0)	
5-8 weeks	3(2.0)	8(5.0)	
9-12 weeks	9(6.0)	19(11.0)	0.22
13-16 weeks	18(11.0)	32(20.0)	
17- 20 weeks	12(7.4)	54(33.0)	
No of Patients			
Almost 100	15(9.0)	33(20.0)	
Almost 200	11(7.0)	39(24.0)	
Almost 300	7(4.0)	28(17.0)	0.32
Almost 400	5(3.0)	6(4.0)	
Almost 500	4(2.0)	14(9.0)	

DISCUSSION

HCWs are at risk of contracting COVID-19 infection and transmitting it to family members and other contacts in community and healthcare settings. Although few studies were done to assess the risk of COVID-19 to HCWs, all those studies were conducted online.[11,12] The median age of HCWs in this study was 31.7 years, and the majority were between 20-30 years, similar to another study conducted in Peshawar, Pakistan.[13] There was a greater preponderance of female participants (n=94, 58%) than males (n=68, 48%), which is similar to a study conducted in IRAN,[14] and most of the participants were nurses 65(40.1%) similar to a research conducted in Italy.[15] More than half of the participants (61.8%) were working in a medical unit, and direct care was provided by 148(91.1%) HCWs which is consistent with evidence from Italy.[16]

In this study, a significant association was found between the gender of HCWs and the risk of COVID-19 infection, and females were more at risk of COVID-19 in agreement with a study by De Kock *et al.* in the United Kingdom. Their serious concern for finances and take more stress while at work compared with other groups made them more vulnerable to acquiring COVID-19 infection.[17] Our findings are supported by evidence from China, where the female gender was identified as an independent risk factor for acquiring COVID-19.[18] The findings of this study indicate that nurses are the most at-risk group for contracting COVID-19 infection as nurses have more prolonged and frequent contact with patients, as documented in another study conducted in China.[19] The healthcare setting in which HCW worked at the time of the study did not affect the risk of COVID-19 infection, which is consistent with evidence from the USA.[20] There was no significant association between the age of HCW and the risk of COVID-19 in our study, which is attributed to adherence to IPC procedures in our study and in contrast to a study conducted in China which documented that the younger age group of HCWs was more vulnerable to get infected with COVID-19.[21] The findings of our study revealed that the majority of HCWs (76.5%) performing duties in COVID-specific settings were at low risk, and almost one-fourth (23.5%) were at high risk.

Although our study provided some interesting insights, it had limitations. First, the self-reported data providers' social desirability bias was observed, as they would want to project a greater sense of preparedness than they do. Secondly, since COVID-19 virus expo-

sure was self-reported and may be subject to recall bias, this study was spanned over a few months. Long-term research topic experience will be a worthwhile path to pursue in the future.

CONCLUSION

Despite the high level of exposure, one-fourth of HCWs was at high risk of COVID-19 virus infection. Female gender and nurses were more likely to acquire COVID-19 infection. No significant association between age, department and number of patients, duration and risk of COVID-19. The findings of this study can be used to educate current and future COVID-19 pandemic response efforts and calls for better implementation of f protective measures by HCWs to decrease infection rates in these groups. Hospital administration should develop internal mechanisms to ensure HCWs work in full PPE and properly follow IPC guidelines. Regular training should be conducted to educate the HCWs regarding the proper use of PPE and adherence to IPC procedures.

Conflict of Interest: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

BASA & SM: Conception, study design, drafting the manuscript, approval of the final version to be published.

SFM & SN: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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