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Original Research Article

Prevalence of COVID19 infection in health care workers in first wave of pandemic and role of hospital infection control committee in subsequent waves of pandemic

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ABSTRACT

Background: Corona virus disease 2019 (COVID-19) is a new emerging infectious disease, first identified in China in December 2019, caused by severe acute respiratory syndrome corona virus 2 (SARS-CoV-2).
Objective: To study and analyze the prevalence, demographic characteristics of healthcare workers (HCWs) who tested positive for COVID-19 in a dedicated Covid hospital in Mumbai.
Materials & Methods: This was a retrospective observational study of HCWs with COVID-19 in a dedicated Covid Hospital, Mumbai from April to October 2020.
Results: HCW tested positive for COVID-19 was 55 from April to October 2020.The percentage of infected hospital staff was 9.8%. Most of the infected HCWs were in the age group of 51 to 60. Mean age was 42 years. Mortality was 0.1%. Majority HCWs (70.9%) acquired infection from community; 20% acquired from the hospital and 9.1% acquired infection from infected coworkers. Majority of the affected HCWs were nurses followed by doctors. Comorbidities were reported in 23.6% of infected HCWs. 5.4% of infected HCWs received infection because of aerosol generated procedures. 58.1% of HCWs got infection despite receiving prophylaxis like HCQ, Arsenicumalbicum.
Conclusion: HCWs are at an increased risk of COVID-19 in the workplace. Preparedness of HICC (Hospital Infection Control Committee), frequent training sessions and mock drills are of paramount importance in preventing spread of infectious disease. Coordination between Hospital Administrators, Public Health Officials of national and international organizations, Engineering Department, Occupational Health and Safety staff is essential in combating pandemic.

1. Introduction

Corona virus disease was declared a pandemic by WHO (World Health Organization) on 10^{th} March, 2020. Several countries around the globe have seen a two-wave pattern of reported cases. The similarities and differences between the characteristics of the two waves remain largely unknown.[1] Healthcare workers (HCWs) are particularly at risk of acquiring SARS-CoV-2 infection, due to repeated occupational exposure. India has a very sharp rise in cases and deaths among the HCWs.[2] Transmission of infection from HCWs to patients, community and families are a possibility. Covid infection affects physical health as well as mental health of HCWs. It also causes depletion in the workforce of hospitals. This can adversely affect patient care in overburdened hospitals in pandemic.

This study analyses the characteristics, prevalence of Covid infection in HCW and discusses the role-played by HICC in tertiary Railway Multispecialty hospital in Mumbai. This was converted to dedicated Covid Hospital from 22^{nd} March 2021. *HICC* is already established and working in hospital since its inception in 1958 but its

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vital role is addressed during such a kind of pandemic. It comprises Medical Director, Microbiologist, Pathologist, Physician, Surgeons, Anesthetic Pharmacists, Infection Control Nurse, Chief Health Inspector and Janitor. HICC had planned, implemented and monitored infection control policies very meticulously since beginning. Surveillance of new cases and enquiry reports of infected cases of HCWs were reviewed from time to time. Weekly meetings of committee members were conducted for monitoring of implementation of protocols and practices. All updated guidelines issued by ICMR, Union Ministry of Health & Family Welfare for Infection Control were strictly followed time to time. [3,4]

Literature and studies of infection in the general public are in plenty but very few studies about infected HCW and role of HICC are available. In such pandemics HICC also plays a role in guiding, involving and coordinating with Hospital Administrators, Public Health Officials of national and international organizations, Engineering Departments, Occupational Health and Safety staff. This will reinforce the infection control practices, help in early detection of cases and identify the lacunae in current practices and combat further spread of infection. Implementation of lessons learnt from the first wave of pandemic will help in combating the subsequent wave of pandemic.

2. Materials and Methods

This is a retrospective observational study carried over a 7-month period from April to October 2020.

2.1. Telephonic interviews

Participants were telephonically contacted by the researchers to introduce themselves, verify identities and get relevant information. At the close of the interviews, participants' queries related to COVID-19 were addressed. A brief 10-item interview schedule was developed to elicit the information on key issues, such as Name, Address, department, designation and duty period travel history, symptoms, and use of personal protective equipment (PPE). Among exposure variables, the HCW was asked about contact with suspected or confirmed COVID-19 patients on ventilator and involvement in aerosol-generating procedures (AGPs) such as nasopharyngeal swab collection, endotracheal intubation and respiratory suction. A history of prophylactic medicine details was also obtained.

3. Inclusion Criteria

HCWs who were Covid positive by RT-PCR or Antigen test included.

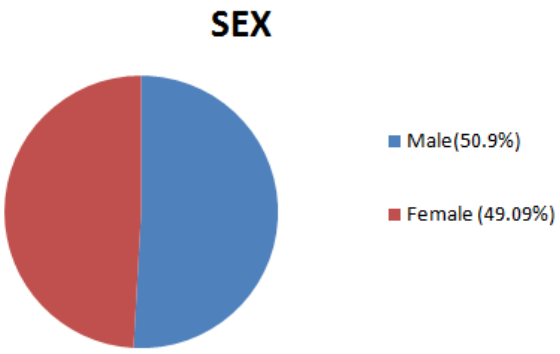

Fig. 1: Male to female distribution

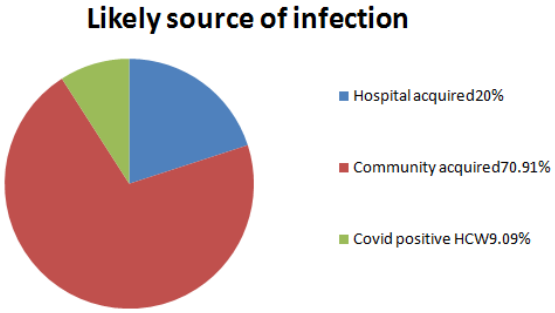

Fig. 2: Different types of acquisition of Covid-19 infection

Table 1: Age distribution of infected hcws

Age	No. of cases	Percentage
21-30	15	27.20
31-40	12	21.08
41-50	10	18.1
51-60	18	32.70

Table 2: Different types of acquisition of Covid-19 infection

Hospital acquired	11
Community acquired	39
COVID co-worker Contact	5

4. Results

Health care workers working during the pandemic from April to October 2020 was 557. Out of these 557 HCWs, 55 were infected. Prevalence of infection in HCW was 9.8%. Most of the infected HCWs were in the age group of 51 to 60 (Table 1). The mean age of HCWs in this study was 42 years. Out of 55 cases, 28 of infected cases were males and 27 were females (Figure 1). Mortality was 0.1%. Amongst infected, 7.3% HCWs were posted in Triage area and 45.4% were posted in isolation ward, 47.3% staff was not exposed to COVID patients directly.

Table 3: Number of infected HCWS according to designation

Designation	No. of infected cases	Strength
Doctors	7	96
Nurses	19	190
Health attendant	7	20
Pharmacist	6	16
Dresser	1	32
Chief health inspector	1	1
Radiographer	1	8
Helper	2	28
Housekeeping attendant	2	87
Ministerial staff	1	08
Lab technicians	3	17
Multipurpose worker	5	42
Ayah	0	6
Other paramedical*	0	6

*Other paramedical included physiotherapist, occupational therapist, psychologist, dialysis technician

Table 4: Monthly infected numbers of HCWS with Covid-19 infection

Month in 2020	No. of cases
April	1
May	9
June	13
July	8
August	3
September	18
October	3

The likely source of infection in 70.9% of HCWs was community acquired, 20% acquired from hospital and 9.1% acquired from infected coworkers (Table 2,Figure 2). Majority of the affected HCWs were nurses followed by doctors (Table 3). Co morbidities were reported in 23.6% of infected HCWs. Diabetes and Hypertension were the most common comorbidities reported. Maximum cases of infection were noted in the month of September (Table 4).

PPE breach was reported in 1 HCW. HCWs involved in Aerosol generating procedures were 5.4% of the total infected HCWs.

5. Discussion

Most studies of COVID-19 have focused at the general population and specific subsets of patients. However, very few have studied COVID-19 in HCWs, who are one of the most vulnerable subsets of the population. Our review showed that the overall prevalence of HCWs, who were COVID-19 positive, was 9.8%. Prevalence was 11% by Mahajan NN eta.[5], 10.6% Al Ajmi J etal.[6] and 3% in a study done by Behera V et al.[2]The mean age of HCWs in this study was 42 years, which is close to the average national community age. Similar results were found in study by Alajmi J etal.[6]Male to female ratio was 1.03:1. Infected HCW included 50.9%males and 49.09% females (chart 1). Female preponderance was seen in the Studies of Behera etal[2], Mahajan NN etal.[5], Xianquan Lai etal.[7] Maximum number of infected HCWs were in the age group of 51-60 years (32.7%), followed by 21-30 years (27.2%), 31-40-21.8% ,41 to 50 – 18.1% (Table 1).

In our study 70.9% of HCWs acquired infection from the community, 20% from hospital and 9.09% from infected co-workers in Hospital campus (Table 2) (chart 2). In a similar study by Xianquan Lai etal[7]110 out of 9684 HCWs, infection rate was 1.1%. Community acquired infection 12.7%; Contact with Covid patient 59.1% and Covid infected health care worker 10.9% were the main routes of exposure of HCWs.High transmissibility of this novel virus explains its contagiousness.[8] The HCWs were advised to take prophylactic medications of either Hydroxychloroquine or Tablet Arseniumalbicum. In this study, 58.1% of HCWs got infected despite receiving HCQ prophylaxis. In a study by Al Maskari et al[9], out of 204 infected HCW only one developed severe disease despite HCQ prophylaxis. However no studies mention the definitive role of HCQ prophylaxis in preventing Covid 19 infection.

Most of infected HCWs in this study got community acquired infection (70.9%) This is likely because of travelling by Public transport for coming to hospital. Also 5 HCWs were residing in hotspot areas. Hospital acquired infection in this study is lower (20%). This can be explained on the basis of the role-played by HICC. Infection Prevention and Control guidelines by Ministry of Health and Family Welfare Government of India were followed.[3]

Safety of HCW was considered of utmost importance in combating the spread of infection.

Recruitment of additional staff of all the designations was done by telephonic interviews. Proper arrangement for accommodation, food and transport of HCWs was made available free of cost by the institution. Quarantine for 7 days in institutional accommodation after 7 days of duty was followed to ensure safety of family members in case of infection in HCW. Grouping of Doctors and HCW was done for the management of Triage area, Covid ward and non-Covid management. HCW with co-morbidities were given duties in the clean zone of the Hospital for non-Covid patients.

All HCWs were given practical training on Infection Prevention Control Practices by hospital doctors from the beginning of the pandemic and before every duty period of HCW. It included Standard precautions, Hand hygiene, Personal Protective Equipment donning and doffing, social distancing, Sanitation protocols and biomedical waste management training. Posters, charts of this were displayed in each ward.

All HCWs were provided with scrub dress and high quality PPE. Donning area was nominated and two Doffing rooms were created. Buddy Nurse was posted in shifts for assisting Donning and Doffing of HCWs. Doffing room was fitted with UV lights to be operated every 8 hourly for half an hour. Post Doffing, 4 washrooms were set up for bathing. They were allowed sufficient hydration prior to donning. HCWs worked on 8 hour shifts, and they were not allowed to remove the PPE during the duty. In case of emergency they could come out then doff and donn again. A register was set up for PPE breach.

All the personnel entering the Hospital were screened with Infrared Thermometer, hand sanitization and asked for any symptoms of COVID. Register of staff was maintained.

Security was tightened with only one Entry and Exit to Hospital premises manned by Security personnel.

A separate Entry/Exit to patients and HCWs was set up. The Hospital Covid bed strength was reduced to 202 due to spacing of beds by 1.5 meters. All the wards were fixed with exhaust fans. Wards and Lifts for Suspect and Covid positive patients were nominated. Sufficient space in the Hospital was created for HCWs in a clean zone for doctors, Nurses and Paramedical staff. A negative pressure SICU (surgery intensive care unit) and MICU (medicine intensive care unit), Dialysis unit, and two Operating Rooms were set up with separate staff. All ICU beds and 126 beds in wards were covered with piped Oxygen Gas System. 100 jumbo Cylinders and 300 cylinders with 1320 L capacity were available in the Hospital.

Sanitization staff was sensitized for Hypochlorite spraying and 3 bucket systems for floor cleaning and surface cleaning. Sanitation was carried out every 8 hours. All waste from wards were segregated and disposed as per Biomedical Waste Management protocols. The Hospital linen washing was outsourced. Before the used linen was picked up, they were soaked in Hypochlorite solution for 30 minutes and then packed to be delivered to Laundry.

All the patients were provided with masks changed 12^{th} hourly.

In this cohort, 34.5% of the infected HCWs were nurses with an infection rate of 3.4% and 12.7% were Doctors with an infection rate of 1.25% (Table 3). Similar results were found in study by Alajmi J etal.[6] This is likely due to persistent and longer exposure of nurses while working in COVID-19 facilities. Environmental conditions of high temperature and humidity are also one of the factors responsible for breach in PPE. It was also observed that HCW during lunch breaks and after duty periods while in quarantine facility were not following social distancing.

Among the categories of infected HCWs, 23.6% had co-morbidity. Amongst the co-morbidities 46.1% were diabetic, 30.7% were hypertensive, 15.3% were k/c/o IHD and 7.6% were asthmatic. In a similar study by Mahajan NN etal[6], 19% of infected HCW were co-morbid; Hypertension and diabetes being the most common comorbidity. We analyzed the incidence of death among the affected HCWs. Mortality rate among HCWs was 0.1%. It is close to the study of Behera V et al.[2]This might be explained by the early accessibility of HCWs to the healthcare system, and their better understanding of the disease process.

In this cohort study, the majority (32.7%) of HCWs acquired the infection during the month of September 2020 (Table 4). This coincided with the period after hospital acquisition among HCWs increased in the last months of the study period.

5.1. Limitations

All infected cases that were asymptomatic or mild might not be included. Serology Covid antibody positive cases not included. This is a single centre study.

6. Conclusion

HCWs are at a high risk of acquiring COVID-19 in the workplace. It can be attributed to non- compliance with infection control measures during patient care, unmasking during eating times and transmission from asymptomatic cases. Routine screening and testing can identify asymptomatic cases early and prevent infection spread. Hospital Infection Control Committee plays a vital role in guiding, involving and coordinating with Hospital Administrators, Public Health Officials of national and international organizations, Engineering Department, Occupational Health and Safety staff. Newer insights in pathogenesis of diseases, treatment modalities continue to evolve in case of novel infection but basic syndromic approach for infection prevention and control practices remains same in respiratory infections. The infection control measures must be applied meticulously in the hospital among HCWs to prevent hospital acquired infection. Preparedness of HICC, frequent training sessions and mock drills are of paramount importance in infectious com batting pandemic.

7. Source of Funding

None.

8. Conflict of Interest

None.

9. Acknowledgenent

Covid Warrior with and without PPE

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