COVID-19 infection among health care workers: A hospital based study from Indian state of Meghalaya

Md Jamil¹, Prasanta K. Bhattacharya¹, Bhupen Barman¹, Noor Topno², Naku Narang³, Pranjal Phukan⁴, Biswajit Dey⁵, Bishwajeet Saikia⁶, Gwenette Andrea War¹, Yasmeen Hynniewta¹

Departments of ¹General Medicine, ²General Surgery, ³Surgery, ⁴Radiology, ⁵Pathology and ⁶Anatomy, North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences (NEIGRIHMS), Shillong, Meghalaya, India

Abstract

Background: COVID-19 can infect any individual, but the group most susceptible is the Health Care Workers (HCWs) who are directly involved in COVID-19 patient care. Despite adhering to the recommended personal protective equipment, a disproportionately large number of cases of COVID-19 were reported among the HCWs. Aims and Objectives: To study the burden of COVID-19 infection among the HCWs and to study the probable factors associated with increased risk of COVID-19 infection among HCWs.

Materials and Methods: A hospital-based prospective cross-sectional study was conducted at a tertiary care teaching institute in the state of Meghalaya, India for the period between 1st May 2020 and 30th June 2021 and included only laboratory-confirmed COVID-19 cases. Data collected included: A) Demographic data – age, gender, category of HCW, B) History of exposure, place of posting, C) Clinical presentation and disease category.

Results and Observations: A total of 144 cases were included in the study. The mean age of affected HCWs was 33.83 ± 1.408 years and male to female ratio was 0.47:1. The commonest age group affected was 18 to 30 years of age (45.14%). The majority of the HCWs were Nursing Officers (staff) (52.78%) followed by Resident Doctors (18.06%). Out of all cases, 135 (93.75%) were either asymptomatic or had mildly symptoms. In 96 (66.67%) HCWs, there was high-risk contact with a known case of COVID-19. High-risk contact outside the COVID-19 designated area of the hospital was noted in 53 (36.81%) cases; however, only 22 (15.27%) patients had a history of working in the COVID-19 designated area at the workplace.

Conclusion: The most common group that got infected was the nursing staff followed by the resident doctors, with more than ninety percent of the cases having either mild symptoms or were asymptomatic. The risk of contracting COVID-19 infection was higher in non-COVID-19 areas as compared to COVID-19 designated areas of the hospital.

Keywords: Clinical feature, COVID-19, health care workers, Meghalaya, SARS CoV-2

Introduction

The present novel coronavirus diseases 2019 (COVID-19) pandemic has not spared any region in the world and as of 31st July, 2021, the total number of cases reported worldwide were more than 198 million with mortality exceeding 4.2 million.¹ The first case of the suspected, present-day COVID-19 was reported from Wuhan in Hubei Province of China in the month of December, 2019.² It was later proven to be caused by a coronavirus and named “severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2),” a virus from the same family that was responsible for multiple outbreaks of viral pneumonia in the recent past, notably the Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS).³ The COVID-19 disease was declared a global pandemic on 11th March 2020 by World Health...

Access this article online

Quick Response Code:  
Website: www.jfmpc.com
DOI: 10.4103/jfmpc.jfmpc_1733_21

How to cite this article: Jamil M, Bhattacharya PK, Barman B, Topno N, Narang N, Phukan P, et al. COVID-19 infection among health care workers: A hospital based study from Indian state of Meghalaya. J Family Med Prim Care 2022;11:1898-901.
Organization (WHO). In India, the first case of COVID-19 was reported from Kerala on 30th January 2020 and since then till 31st July 2021, more than 31 million cases have been reported with more than 4.2 lakh mortality.[5] The spread of COVID-19 across India was not uniform, states in northeast India in general were affected much after the rest of the country. Meghalaya reported its first case of COVID-19 infection as late as 13th April, 2020. Although COVID-19 can virtually infect any individual, the group most susceptible are the Health Care Workers (HCWs) who are directly involved in COVID-19 patient care. Despite adhering to the recommended personal protective equipment (PPE), a disproportionately large number of cases of COVID-19 were reported among the HCWs.[8] Earlier studies have reported a seroprevalence of up to 17.4% among the HCWs,[6-11] and there is a 12-fold higher risk of contracting COVID-19 infection among HCWs as compared to the general population.[12] COVID-19 infection has not only affected the physical health of the HCWs but has also impacted their psychological health, further aggravating the burdened health force.[8] Better knowledge on the prevalence of COVID-19 infection among the HCWs and the factors attributable to this risk may help formulate guidelines to reduce the infection amongst them.

The present study is intended to provide insight into the COVID-19 infection among the HCWs in northeast India. Data relating to COVID-19 cases from this region of the country is very limited[13-15] and to the best of our knowledge, till date there is no published literature on COVID-19 infection among HCWs from northeast India. The study was conducted at a tertiary care and teaching institute in northeast India which was pivotal to the management of COVID-19 cases.

The aims and objectives: To study the burden of COVID-19 infection among the HCWs and to study the probable factors associated with increased risk of COVID-19 infection among HCWs.

Methodology

The design was a hospital-based prospective cross-sectional study conducted at a tertiary care and teaching institute in the state of Meghalaya, India. It was duly approved by the Institute Ethics Committee. The data were collected for the period between 1st May 2020 and 30th June 2021. The study included HCWs who were laboratory-confirmed COVID-19 cases and reported to the hospital. It included both admitted cases and those opting for home isolation. Cases with incomplete data were excluded from the study. The data collected included: A) Demographic data—age, gender, category of HCWs. B) History of exposure, place of posting. C) Clinical presentation and disease category. Continuous variables were expressed as mean with standard deviation.

Ethical clearance

Ethical approval was obtained from the Institutional Board vide letter No. M12/F28/2020 dated 07/09/2020, and informed consent was taken from all participants in the study based on the tenets of the declaration of Helsinki (modified 1989).

Results and Observations

During the study period from 1st May 2020 to 30th June 2021, a total of 144 laboratory-confirmed COVID-19 cases among the HCWs were included in the study. Of the total patients, 46 (31.94%) males and 98 (68.06%) females were males, with a male to female ratio of 0.47:1. The commonest age group affected was 18 to 30 years of age (45.14%), followed by 31 to 40 years of age (34.72%), 41 to 50 years of age (15.97%), and above 50 years of age (4.17%). The age and sex distribution of the cases is shown in [Table 1].

The mean age of affected HCWs was 33.83 ± 1.408 years. Categories of the HCWs affected are shown in [Table 2].

The majority of the HCW were Nursing Officers (staff) (52.78%) followed by Resident Doctors (18.06%). Disease severity among the HCWs is depicted in [Table 3]. 135 (93.75%) of cases were either asymptomatic or had mild symptoms.

In 96 (66.67%) HCWs, there was high-risk contact with a known case of COVID-19 either in the hospital, home, or other places. In 6 cases (4.17%), there was a recent history of travel outside the state, in 42 cases (29.17%) there was no known source of COVID-19 infection. A scenario that may have put the HCWs at risk of transmission is shown in [Table 4].

Of all the HCW who tested positive, the largest group had a history of high-risk contact outside the COVID-19 designated area of the hospital. Of the total 144 HCWs only 22 (15.27%) had a history of working in the COVID-19 designated area within 3 weeks before the diagnosis of COVID-19. None of the HCWs in the study population died of COVID-19.

Discussion

The present study is the first one to provide insight into COVID-19 infection among the HCWs in northeast India. The study showed disproportionately higher female HCWs were affected as compared to males with a male to female ratio of 0.47:1. The mean age of infection among male HCWs and female HCWs was 38.98 years and 31.36 years, respectively. The main reason for a higher number of females in the study group is due to the employment of more females as nursing officers (staff) than males, and nursing officers (staff) were the most commonly affected group in the study. The mean age of the HCWs affected in the study was 33.83 ± 1.408 years, which shows that relatively younger HCWs were mostly affected, this is explained by the fact that as per our institute policy, HCWs above 60 years and those with significant comorbidities were exempted from COVID-19 duty. Other studies have reported similar findings where HCWs affected with COVID-19 were younger compared to the general population and were more...
When we looked at the scenarios that might have predisposed the HCWs to a higher risk of contracting COVID-19, an interesting fact was noted; in our study only 15.27% of HCWs who got infected with COVID-19 were posted to COVID-19 designated area within three weeks before the diagnosis. On the other hand, 36.81% of the HCWs who contracted COVID-19 reported high-risk contacts with COVID-19 cases outside the COVID-19 designated patient care area. High-risk exposure outside COVID-19 designated areas happened when the initial COVID-19 screening test of patients at admission showed a negative result but developed features of COVID-19 after admission for other illnesses or contracted COVID-19 from other asymptomatic persons, therefore tested positive on repeat test. This situation was unique in our institute as it catered to both COVID-19 and non-COVID-19 patients in carefully segregated sections. Another plausible reason for the higher infection in non-COVID-19 as compared to COVID-19 patient care areas may be the different PPE protocols practised in both these areas. In COVID-19 areas, coverall/overall type of single-use PPE gown with face shield/goggles, gloves, and N95 mask are mandatory with proper donning and doffing whereas in non-COVID-19 patient care area only 3 ply surgical masks are used by the HCWs. Similar findings were reported from Qatar where only five percent (5%) of total COVID-19 infection among HCWs was reported from COVID-19 designated facilities. Lower infection was reported from non-intensive care units dealing with COVID-19 and non-COVID-19 patients as compared to the intensive care unit (ICU) dealing with COVID-19 and non-COVID-19 patients. This may be explained by the fact the in the ICU care setting, exposure to the patient tend to be more intense and for a longer duration. In the present study, 13.19% had high-risk exposure to COVID-19 cases outside the hospital setting also notably 29.17% of total COVID-19 infection among HCWs was reported from COVID-19 designated areas.

The COVID-19 pandemic seems to be continued and is not showing any signs of a return to normalcy in health care system within the near future. The primary care physicians (PCPs) therefore will remain on the frontlines of control strategy of any such type of national outbreak. Primary care is inseparable from public health efforts in any pandemic, for a health care system without effective and strong primary care supports will lack the critical ability to quickly identify cases and support a suitable and robust infection prevention response. As the community cases of COVID-19 are still on the rise, the role PCPs to profess a steadfast commitment to COVID-19 pandemic preparedness is the need of the hour.

Health care workers are a vulnerable population of becoming positive themselves or to spread infection to their patients, families, and co-workers during the COVID-19 pandemic. There is the need for strict adherence to PPE protocol and infection control measures regardless of workplace environment and common among female HCWs. The majority of the HCWs infected in the present study were the nursing officers (staff) followed by the resident doctor. The reason may be that both these groups of HCWs have close and prolonged contact with the COVID-19 cases due to their direct involvement with patient care. A similar pattern has been reported from other studies where it was shown that nursing staff is at higher risk of contracting COVID-19 as compared to any other group.\(^\text{17,38}\)

### Table 1: Age and sex distribution of the cases

| Age Group     | Male, n (%) | Female, n (%) | Total, n (%) |
|---------------|-------------|---------------|--------------|
| 18-30 Years   | 24 (16.67%) | 41 (28.47%)   | 65 (45.14%)  |
| 31-40 Years   | 18 (12.5%)  | 32 (22.22%)   | 50 (34.72%)  |
| 41-50 Years   | 2 (1.39%)   | 21 (14.58%)   | 23 (15.97%)  |
| Above 50 years| 2 (1.39%)   | 4 (2.8%)      | 6 (4.17%)    |
| Total         | 46 (31.94%) | 98 (68.06%)   | 144 (100%)   |

### Table 2: Categories of the Health Care Worker infected with COVID-19

| Category                  | Number | Percentage |
|---------------------------|--------|------------|
| Nursing Officer (staff)   | 76     | 52.78%     |
| Resident Doctor           | 26     | 18.06%     |
| Ward Attendants           | 15     | 10.42%     |
| Technician                | 9      | 6.25%      |
| Cleaner/Sanitation Staff  | 2      | 1.39%      |
| Faculty                   | 3      | 2.08%      |
| Others                    | 13     | 9.03%      |
| Total                     | 144    | 100%       |

### Table 3: Severity categories

| Severity       | Number | Percentage |
|----------------|--------|------------|
| Asymptomatic   | 48     | 33.33%     |
| Mild COVID-19  | 87     | 60.42%     |
| Moderate COVID-19 | 98      | 5.56%      |
| Severe COVID-19| 01     | 0.69%      |
| Total          | 144    | 100%       |

### Table 4: Scenario that may place the HCWs at risk for COVID-19 infection

| Scenario                           | n    | Percentage | Cumulative n (%) in reference to risk of exposure |
|------------------------------------|------|------------|---------------------------------------------------|
| Posted at COVID-19 ICU             | 10   | 6.94%      | 22 (15.27%)                                       |
| Posted at COVID-19 Ward            | 7    | 4.86%      |                                                   |
| Posted at COVID-19 screening area  | 5    | 3.47%      |                                                   |
| Non-COVID Ward/ICU                 | 42   | 29.17%     | 53 (36.81%)                                       |
| Non-COVID-19 ICU                   | 11   | 7.64%      |                                                   |
| Travel History                     | 6    | 4.17%      | 27 (18.75%)                                       |
| Outside patient care area          | 2    | 1.39%      |                                                   |
| High risk contact outside hospital | 19   | 13.19%     |                                                   |
| Not Known                          | 42   | 29.17%     | 42 (29.17%)                                       |
| Total                              | 144  | 100%       | 144 (100%)                                        |

The COVID-19 pandemic seems to be continued and is not showing any signs of a return to normalcy in health care system within the near future. The primary care physicians (PCPs) therefore will remain on the frontlines of control strategy of any such type of national outbreak. Primary care is inseparable from public health efforts in any pandemic, for a health care system without effective and strong primary care supports will lack the critical ability to quickly identify cases and support a suitable and robust infection prevention response. As the community cases of COVID-19 are still on the rise, the role PCPs to profess a steadfast commitment to COVID-19 pandemic preparedness is the need of the hour.

Health care workers are a vulnerable population of becoming positive themselves or to spread infection to their patients, families, and co-workers during the COVID-19 pandemic. There is the need for strict adherence to PPE protocol and infection control measures regardless of workplace environment and common among female HCWs. The majority of the HCWs infected in the present study were the nursing officers (staff) followed by the resident doctor. The reason may be that both these groups of HCWs have close and prolonged contact with the COVID-19 cases due to their direct involvement with patient care. A similar pattern has been reported from other studies where it was shown that nursing staff is at higher risk of contracting COVID-19 as compared to any other group.\(^{17,38}\)
whether any patients or co-workers are known to be COVID-19 infected or not. Our study data may provide lessons on how best to protect the community going forward as communities reopen and consider guidance on masking and checking the clinical signs and symptoms of COVID-19 infection.

**Conclusion**

The most common HCWs group that got infected with COVID-19 were the nursing staff followed by the resident doctors, with 90% of cases being either asymptomatic or harboring mild symptoms.

The risk of contracting COVID-19 infection was higher in non-COVID-19 as compared to COVID-19 designated areas of the hospital; also the risk of COVID-19 infection was higher in the ICU setting. High-risk exposure within the hospital was present in about a half (50%) of the cases but almost one-third of cases did not have any known high-risk exposure.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Coronavirus Cases-Worldometer. 2021. Available from: https://www.worldometers.info/coronavirus/. [Last accessed on 2021 Jul 31].

2. Coronavirus disease 2019 (COVID-19) Situation Report - 94, World Health Organization. 2021. Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200423-sitrep-94-covid-19.pdf/. [Last accessed on 2021 Jul 18].

3. Dhama K, Khan S, Tiwari R, Sircar S, Malik YS, et al. Coronavirus disease 2019-2019. Clin Microbiol Rev 2020;33:e00028-20.

4. Andrews MA, Areekal B, Rajesh KR, Krishnan J, Suryakala R, Krishnan B, et al. First confirmed case of COVID-19 infection in India: A case report. Indian J Med Res 2020;151:490-2.

5. Nguyen LH, Drew DA, Graham MS, Joshid AD, Guo CG, Ma W, et al. Coronavirus pandemic epidemiology consortium. Risk of COVID-19 among front-line health-care workers and the general community: a prospective cohort study. Lancet Public Health. 2020;5:e475-e483

6. Woon YL, Lee YL, Chong YM, Ayub NA, Krishnabahawan SL, Lau JF, et al. Serology surveillance of anti-SARS-CoV-2 antibodies among asymptomatic healthcare workers in Malaysian healthcare facilities designated for COVID-19 care. Lancet Reg Health West Pac 2021;9:100123.

7. Brant-Zawadzki M, Fridman D, Robinson PA, Zahn M, Chau C, German R, et al. SARS-CoV-2 antibody prevalence in health care workers: Preliminary report of a single center study. PLoS One 2020;15:e0240006.

8. Xiang B, Li P, Yang X, Zhong S, Manyande A, Feng M. The impact of novel coronavirus SARS-CoV-2 among healthcare workers in hospitals: An aerial overview. Am J Infect Control 2020;48:915-7.

9. Moscola J, Sembajwe G, Jarrett M, Faber B, Chang T, McGinn T, et al. Prevalence of SARS-CoV-2 antibodies in health care personnel in the New York City area. JAMA 2020;324:893-5.

10. Ng K, Poon BH, Kiat Puar TH, Shan Quah JL, Loh WJ, Wong YJ, et al. COVID-19 and the risk to health care workers: A case report. Ann Intern Med 2020;172:766-7.

11. Lai X, Wang M, Qin C, Tan L, Ran L, Chen D, et al. Coronavirus disease 2019 (COVID-19) infection among health care workers and implications for prevention measures in a tertiary hospital in Wuhan, China. JAMA Netw Open 2020;3:e209666.

12. Shreffler J, Petrey J, Huecker M. The impact of COVID-19 on healthcare worker wellness: A scoping review. West J Emerg Med 2020;21:1059-66.

13. Jamil M, Bhattacharyya PK, Barman B, Topno N, Barman H, Nongpiur VN, et al. Clinical and demographic profile of COVID-19 patients: A tertiary level hospital-based study from Northeast India. Cureus 2021;13:e18881.

14. Barman B, Marak A, Jamil M, Marak PS, War GA, Baruah A, et al. Dermatological manifestation can be an early sign in Covid-19: Report of three cases with a novel manifestation masquerading Steven Johnson syndrome. J Family Med Prim Care 2021;10:4299-302.

15. Das SK, Basumatary A, Rabha M, Biswas S. A study on clinico-epidemiological characteristics and psychological aspects of COVID-19 patients of two covid care centres in northeast India: A retrospective cross-sectional study. Assam J Inter Med 2021;11:8-15.

16. Kim R, Nachman S, Fernandes R, Meyers K, Taylor M, LeBlanc D, et al. Comparison of COVID-19 infections among healthcare workers and non-healthcare workers. PLoS One 2020;15:e0241956.

17. Hussien H, Alemu ZA. Risk of COVID-19 infection and associated factors among healthcare workers: A cross-sectional study at EkaKotebe treatment center in Ethiopia. Int J Gen Med 2021;14:1763-72.

18. Sabetian G, Moghadam M, Hashemizadeh Fard Haghighi L, Shahriarirad R, Fallahi MJ, Asmarian N, et al. COVID-19 infection among healthcare workers: A cross-sectional study in southwest Iran. Virol J 2021;18:58.

19. Alajmi J, Jeremijenko AM, Abraham JC, Alishaq M, Habibi M, Riley P, et al. Characteristics and transmission dynamics of COVID-19 in healthcare workers at a London teaching hospital. J Hosp Infect 2020;106:325-9.