



# Healthcare Professionals' Preparedness for COVID-19 Pandemic: A Cross-Sectional Survey in Northern India

Suresh K Sharma<sup>1</sup>, Shiv Kumar Mudgal<sup>2</sup>, Priya Sharma<sup>2</sup>

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## Author's Affiliation:

<sup>1</sup>Professor and Principal; <sup>2</sup>Tutor, College of Nursing, All India Institute of Medical Sciences, Rishikesh

## Correspondence

Prof. Suresh K Sharma  
sk.aiims17@gmail.com

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## ABSTRACT

**Background:** Health care agencies have framed guidelines for healthcare professionals (HCPs) to manage COVID-19 pandemic but still there is paucity of Indian data on HCPs preparedness.

**Aim:** To assess level of perceived preparedness of healthcare professionals against COVID-19.

**Method:** This cross-sectional study included 1218 HCPs (nurses, physicians and technicians) from government and private institutes through convenience sampling technique. Online survey was done to assess preparedness of HCPs against COVID-19, using self-structured questionnaire based on HCPs preparedness checklists released by WHO and CDC.

**Results:** Only 42.4% HCPs considered themselves prepared for donning and doffing of PPE and around 65.8% were confident in providing direct patient care. Gender had significant difference ( $P < 0.001$ ) on level of perceived preparedness of HCPs. Younger participants shown higher level of preparedness than older participants ( $P = 0.022$ ). Technicians were less prepared with significantly low mean scores  $10.36 \pm 2.55$  than nurses ( $11.45 \pm 2.45$ ) and physicians ( $11.68 \pm 2.17$ ;  $p = .038$ ). HCPs working in tertiary level institutes had significantly higher mean preparedness scores ( $11.86 \pm 2.89$ ;  $P < .001$ ) than those working in primary ( $10.49 \pm 2.68$ ) and secondary level institutes ( $10.57 \pm 2.35$ ).

**Conclusion:** All HCPs should be strongly encouraged for regular participation in training and simulation exercises arranged by institute as continuing education, which may enhance their preparedness against COVID-19 pandemic.

**Keywords:** COVID-19, healthcare professionals, preparedness, SARS-CoV-2

## INTRODUCTION

On 31<sup>st</sup> December 2019, China reported to the World Health Organization (WHO) regarding unusual cases with symptoms of respiratory illness with unknown etiology, which were later reported to be linked to an open seafood and animal market of Wuhan city, China.<sup>1</sup> With Human-to-human transmission, SARS-CoV-2 has rapidly spread globally. On 30<sup>th</sup> January 2020; it was announced as a public health emergency of international concern.<sup>2</sup>

COVID-19 is a highly contagious disease, and it was declared pandemic by WHO on 11<sup>th</sup> March, 2020. As on 11<sup>th</sup> June 2020, about 213 countries got affected with 7273958 confirmed cases and 413372 mortalities around the globe. India had reported 286579 confirmed cases with 8102 deaths.<sup>3</sup>

This recent outbreak of SARS-CoV-19 led global health care facilities on alert; therefore, World Health Organization (WHO), the Centers for Disease Control and Prevention (CDC) and other organizations have formulated and issued policies on

preparedness for prevention of SARS-CoV-19 infection to strengthen health care facilities and safeguard health care professionals. Healthcare professionals need to be skilled and competent to identify suspected and confirmed cases of COVID-19, and reply accordingly to any risk, in order to ensure protection from SARS-CoV-2 for themselves and others.<sup>2,4,5</sup>

Healthcare professionals are in continuous contact of COVID-19 patients and therefore, they have relatively higher risk of contracting the infection as compared to other people. Their preparedness in dealing the cases of the SARS-CoV-2 is demanded to prevent further spread of COVID-19 disease.<sup>6</sup>

However, data regarding the healthcare facilities and healthcare professionals' preparedness in managing the SARS-CoV-2 infection is still lacking. Therefore, it has paramount importance to initiate preparedness and awareness measures for healthcare professionals for combating the COVID-19 outbreak.<sup>7,8</sup>

As the threat of SARS-CoV-2 increases, the authors tried to identify the preparedness level of HCPs to manage this threat. With the authors' best knowledge, this is the first such study to assess perceived level of preparedness of HCPs in India.

## METHODOLOGY

**Study Design and Duration:** This cross-sectional, structured questionnaire based online survey was carried out using Survey Monkey© to ascertain the level of preparedness of healthcare professionals to deal with COVID-19 outbreak. The first phase of this online survey started from 11<sup>th</sup> May 2020 to 15<sup>th</sup> May 2020 and follow-up from 18<sup>th</sup> May to 21<sup>st</sup> May 2020.

**Ethical Consideration:** Ethical approval was taken from institutional ethics committee vide letter no. AIIMS/IEC/20/244 dated 09.05.2020. The purpose of the survey was well informed to all the participants and all of them were anonymized by name and institute. An informed electronic written consent was obtained from each participant before they responded for the online survey questions.

**Study Participants:** Healthcare professionals of selected government and private hospitals were included as study population, including nurses, physicians and technicians. We enrolled only those HCPs who are or were working in any area designed to deal with COVID-19 cases. A total of 1990 healthcare professionals including 1330 nurses, 370 physicians and 290 technicians from all states of north India were contacted for this survey. The survey participants were enrolled using convenience sampling technique and participants who

have not been assigned duties in COVID-19 units or not willing to participate were excluded.

**Sample Size Estimation:** Although it is necessary to estimate adequate sample size to provide reliable results, which can provide a strong basis for recent evidences,<sup>9</sup> but in the present study we did not restrict number of health facilities and number of participants because it was a multi-centric online survey. Furthermore, a large sample survey provides more accurate and generalizable results.

**Study Instrument and Questionnaire Design:** The online survey was conducted using a structured questionnaire. It was developed with modification of WHO, CDC checklist and previous studies on preparedness of healthcare professionals to deal with COVID-19 outbreak.<sup>2,7,8</sup> The survey questionnaire has twenty questions. The first six questions provided demographic information of the participants and subsequent fourteen questions ascertained, how much confident HCPs considered themselves in different management areas of COVID-19. There were only yes/no type questions in part-B and to perform quantitative analysis, it was required to score the responses, i.e. 'yes' scores '1' while 'no' score '0'. The total maximum and minimum score was 14 and 0 respectively. The questionnaire was validated by a panel of experts including three physicians, two epidemiologists, three nurses and one native English speaker. To determine the reliability of the questionnaire, Cronbach's alpha was calculated and it was 0.83 which indicated the good internal consistency of all items in the tool. Further, this questionnaire was piloted on 30 healthcare professionals and found feasible.

## Data Analysis

The collected data was organized by Google Sheets and transferred to excel sheets. The statistical computer package, IBM Statistical Package for the Social Sciences (SPSS 23.0) was used for statistical analysis. Descriptive and inferential statistics were used for data analysis. Participants' demographic characteristics and level of preparedness were presented in frequency and percentage; the difference between participants' level of preparedness and their demographic variables was tested by using ANOVA.

## RESULTS

A total of 1218 healthcare professionals including 82.3% nurses, 10.6% physician and 7.1% technicians submitted the complete survey questionnaire, resulting in 61.2% response rate overall. More than half (54.4%) of the participants were male. The majority of the participants (69%) were

belonging to 26 to 35 years age group. In terms of their types and level of institutes, 79.4% were working in government institutes and 65.1% in tertiary care institutes. As different working areas in the institute, a majority of the participants (31.9%) were working in isolation area. Table 1 depicts the statistical information of the participants' demographic characteristics.

Table 2 shows perceived preparedness of the health care professionals' to manage COVID-19 outbreak and study findings have shown that maximum participants perceived themselves prepared. On the contrary, it was noticed that only 42.4% HCPs were confident to perform donning and doffing of PPE. It was observed that 72.2% HCPs were confident in performing hand hygiene practice as per protocol. In regard to recent information on COVID-19 preparedness, majority of physicians (94.6%) were found to be aware followed by 90.0% nurses and 88.5% technicians. Around 65.8% HCPs stated that they feel themselves trained and confident in providing direct care to patients with COVID-19. All HCPs were found to be aware in terms of their roles and responsibilities as a health team member in COVID-19 situation. Around 73.8% HCPs expressed that they have undergone trainings on preparedness of COVID-19 and 73.6% were found to be aware about guidelines on preparedness offered by Govt. of India. It was observed that awareness about the precautions to be

taken while working in COVID-19 areas was more among nurses (92.9%) than physicians and technicians.

**Table 1: Healthcare professionals' demographic characteristics (n=1218)**

| Demographic Characteristic            | Participants (%) |
|---------------------------------------|------------------|
| <b>Gender</b>                         |                  |
| Male                                  | 662 (54.4)       |
| Female                                | 556 (45.6)       |
| <b>Age in years</b>                   |                  |
| Younger than 25                       | 265 (21.8)       |
| 26-35                                 | 841 (69)         |
| 36-45                                 | 101 (8.3)        |
| Older than 45                         | 11 (0.9)         |
| <b>Profession</b>                     |                  |
| Nurses                                | 1002 (82.3)      |
| Physicians                            | 129 (10.6)       |
| Technicians                           | 87 (7.1)         |
| <b>Type of Institute</b>              |                  |
| Government                            | 967 (79.4)       |
| Private                               | 251 (20.6)       |
| <b>Level of Institute</b>             |                  |
| Primary                               | 156 (12.8)       |
| Secondary                             | 269 (22.1)       |
| Tertiary                              | 793 (65.1)       |
| <b>Area of Working</b>                |                  |
| Out Patient Department and laboratory | 315 (25.9)       |
| Emergency, ICU and OT                 | 173 (14.2)       |
| In Patient Department                 | 342 (28.1)       |
| Isolation/COVID areas                 | 388 (31.9)       |

**Table 2: Healthcare professionals' perceived preparedness to manage COVID-19 outbreak for each item and overall**

| Perceived preparedness   | Nurses (n=1002)(%) | Physician (n=129)(%) | Technician (n=87) (%) | Total (N=1218) |
|--|--------------------|----------------------|-----------------------|----------------|
| I am confident to perform hand hygiene practice as per protocol.   | 742 (74.1)         | 90 (69.8)            | 48 (55.2)             | 880 (72.2)     |
| I am aware about all recent information on COVID-19 preparedness.  | 902 (90.0)         | 122 (94.6)           | 77 (88.5)             | 1101(90.4)     |
| I know that there is adequate supply of PPE and other resources to deal with COVID-19 situation.                   | 917 (91.5)         | 124 (96.1)           | 80 (92.0)             | 1121(92.0)     |
| I know that the quality of PPE and other resources is good to deal with COVID-19 situation.                        | 887 (88.5)         | 118 (91.5)           | 75 (86.2)             | 1080(88.7)     |
| I am confident to perform donning and doffing of PPE as per guidelines on COVID-19 preparedness.                   | 440 (43.9)         | 46 (35.7)            | 31 (35.6)             | 517 (42.4)     |
| I have undergone trainings on COVID-19 preparedness regularly.   | 740 (73.9)         | 100 (77.5)           | 59 (67.8)             | 899 (73.8)     |
| I am aware about COVID-19 preparedness guidelines, which are offered by Govt. of India.                            | 753 (75.1)         | 92 (71.3)            | 51 (58.6)             | 896 (73.6)     |
| I feel myself trained and confident to provide direct care for patient with COVID-19.                              | 673 (67.2)         | 83 (64.3)            | 46 (52.9)             | 802 (65.8)     |
| I am aware about the precautions taken when working in COVID-19 areas.   | 931 (92.9)         | 120 (93.0)           | 81 (93.1)             | 1132(92.9)     |
| I know my roles and responsibilities as a health team member in COVID-19 situation.                                | 1002 (100)         | 129 (100)            | 87 (100)              | 1218 (100)     |
| I am aware about the contact person or authorities to whom I can contact during emergency.                         | 905 (90.3)         | 116 (89.9)           | 77 (88.5)             | 1098(90.1)     |
| I am aware that there is adequate and prompt support system in the institute to deal with any emergency situation. | 905 (90.3)         | 116 (89.9)           | 77 (88.5)             | 1098(90.1)     |
| I am aware about the barriers, facilitators and policies for COVID-19 preparedness in my institute.                | 860 (85.8)         | 112 (86.8)           | 75 (86.2)             | 1047(86.0)     |
| I am confident to implement emergency plan to manage COVID-19 outbreak.  | 821 (81.9)         | 105 (81.4)           | 72 (82.8)             | 998 (81.9)     |

**Table 3: Differences in preparedness scores with participants' demographic characteristics**

| Characteristics                             | Mean $\pm$ SD    | 95% CI      | F value | P value |
|---|------------------|-------------|---------|---------|
| <b>Gender</b>                               |                  |             |         |         |
| Male  | 11.64 $\pm$ 2.44 | 11.45-11.83 | 14.66   | 0.000*  |
| Female                                      | 11.11 $\pm$ 2.40 | 10.91-11.31 |         |         |
| <b>Age group (in years)</b>                 |                  |             |         |         |
| < 25  | 11.49 $\pm$ 2.50 | 11.19-11.80 | 3.29    | 0.022*  |
| 26-35                                       | 11.45 $\pm$ 2.41 | 11.28-11.61 |         |         |
| 36-45                                       | 10.97 $\pm$ 2.30 | 10.52-11.42 |         |         |
| >45   | 9.64 $\pm$ 3.32  | 7.40-11.87  |         |         |
| <b>Profession</b>                           |                  |             |         |         |
| Nurses                                      | 11.45 $\pm$ 2.45 | 11.30-11.60 | 3.276   | 0.038*  |
| Physicians                                  | 11.68 $\pm$ 2.17 | 11.04-11.80 |         |         |
| Technicians                                 | 10.36 $\pm$ 2.55 | 10.22-11.30 |         |         |
| <b>Type of Institute</b>                    |                  |             |         |         |
| Government                                  | 11.45 $\pm$ 2.36 | 11.30-11.60 | 2.242   | 0.135   |
| Private                                     | 11.20 $\pm$ 2.61 | 10.86-11.53 |         |         |
| <b>Level of Institute</b>                   |                  |             |         |         |
| Primary                                     | 10.49 $\pm$ 2.68 | 10.06-10.91 |         |         |
| Secondary                                   | 10.57 $\pm$ 2.35 | 10.28-10.85 | 44.043  | 0.000*  |
| Tertiary                                    | 11.86 $\pm$ 2.89 | 11.70-12.02 |         |         |
| <b>Area of Working</b>                      |                  |             |         |         |
| Out Patient Departments (OPDs)              | 11.42 $\pm$ 2.75 | 10.12-11.73 |         |         |
| Emergency, ICU & OT                         | 11.86 $\pm$ 2.36 | 11.52-12.19 | 25.185  | 0.147   |
| In Patient Department (IPDs)                | 11.86 $\pm$ 2.18 | 11.63-12.09 |         |         |
| Isolation Wards                             | 11.59 $\pm$ 2.23 | 11.36-11.81 |         |         |
| Overall scores for healthcare professionals | 11.40 $\pm$ 2.43 | -           | -       | -       |

\* Statistically significant at 0.05 level of significance.

Majority (90.1%) of the HCPs had awareness about whom to contact during an emergency and status of support system in the institute to deal with emergency situation. Majority of HCPs (86.0%) stated that they are aware about barriers and policies for COVID-19 preparedness and around 81.9% were confident on implementing emergency plan for COVID-19 outbreak management.

One-way analysis of variance tests revealed that except type of institutes and area of working where participants were working; all other demographic characteristics had significant difference in mean scores of the participants. Table 3 shows that there was a significant difference in mean scores for felt preparedness by profession among participants and Tukey's post hoc test shown that the physician mean score 11.68 $\pm$ 2.17 was significantly higher than technicians 10.36 $\pm$ 2.55 ( $P=0.29$ ) but not significantly higher than nurses 11.45 $\pm$ 2.45 ( $P=0.987$ ). Furthermore, a significant difference was found between the level of institute preparedness and age groups of the participants. Tukey's post hoc test revealed that participants who were working in tertiary care institute have significantly higher mean scores 11.86 $\pm$ 2.89 than those working in secondary 10.57 $\pm$ 2.35 ( $P=0.000$ ) and primary institutes 10.49 $\pm$ 2.68 ( $P=0.000$ ) but for age groups, there were no significant difference found by Tukey's post hoc test.

## DISCUSSION

During last two decades, there have been serious threats due to various infectious diseases like SARS-CoV (2002/2003), MERS-CoV (2012), Ebola virus (2013), Zika virus (2015/2016) and the most recent SARS-CoV-2 (2019/2020). These infectious diseases are posing serious threats to public health and studies performed on these diseases revealed deficient knowledge of health care professionals in managing these situations and highlighted their need for training and skill development.<sup>2,10,11</sup> Covid-19 pandemic can be extremely difficult and stressful to healthcare professionals, but this stress can be minimized to make them confident in managing cases of COVID-19 by initiation of adequate training and education on COVID-19 preparedness.<sup>12</sup>

As the male ratio is more than half in India (male: female = 52:48), the male population of participants was higher in this survey as well.<sup>13</sup> India has more than 65% of its population below the age of 35 and in this survey 21% of HCPs were younger than 25 years and 69% were low-middle-aged and working in government institutes. This shows that, HCPs in India working in government institutes were consistent with Indian demographics and relatively young compared to other countries like China, Japan and Malaysia.<sup>14</sup> In this survey majority of participants were nurses followed by physicians and technicians. These findings are in a loop with the

results of study where more than half (53.8%) were nurses followed by physicians and advanced clinical practitioners.<sup>2</sup> The present survey has shown that approximately two-third of participants were working in tertiary care institutes, suggesting that they may have experience to work during the emergencies like SARS-CoV, influenza A H1NI, MERS-CoV, Ebola virus and Zika virus. However, COVID-19 is new disease and very little is known about this; therefore, HCPs are expected to have more education and training so that they can effectively manage cases of this new disease.

This survey identified that HCPs felt somewhat less confident in how to don and doff PPE. This indicated the lack of infection prevention and control measures initiated by institutes and may place other patients and HCPs at high risk. This could also have a major risk factor for spreading this virus. This study suggests that institutes should motivate HCPs to attend demonstrations and simulation exercises on this area through integration of latest guidelines from infection prevention and control team.

In view of the fast growing number of COVID-19 cases and continuously changing information of this virus, it is crucial that HCPs must undergo regular training and continuing education programs for updating their knowledge and skills.<sup>2,3</sup> Therefore, it is necessary for health care institutes to arrange and ensure regular training and continuing education programs for their HCPs.

This survey also revealed that some of the HCPs perceived themselves less confident in providing direct patient care. It is vital that HCPs must feel confident enough to provide direct care to COVID-19 patients, so that these patients are cared properly, without putting other patients and HCPs at risk and the work of an institute should not get unnecessary compromised. Health care institutes have responsibility to train and prepare their staff to perform their primary role but in addition, HCPs also have commitment to their patients to provide evidence based care.<sup>2,15</sup> Therefore, institutes may initiate demonstration and skill training to make HCPs more confident in providing direct patient care.

In present survey, HCPs showed serious concern about their roles and responsibilities in health team. Knowing their clear roles and responsibilities had a great impact on HCPs' preparedness.<sup>15</sup> Therefore, administrators of healthcare facilities provide clear policies to ensure their roles as a health team member and avoid any role conflicts. Clear guidelines about their roles help them to avoid role conflicts and enhance their level of preparedness.

Age played a significant role in healthcare professionals' felt preparedness for COVID-19. Healthcare professionals who were younger than 25 years had the highest mean scores ( $11.49 \pm 2.50$ ) while HCPs older than 45 years had the lowest mean scores ( $9.64 \pm 3.32$ ). This suggests that knowledge and skills were fresh in younger participants' mind and HCPs in higher age groups had not attended regular trainings. Hence, to update their knowledge and skills according to requirement, it is deemed necessary to participate in trainings as a continuing education program regularly.

Total mean scores for perceived preparedness were  $11.45 \pm 2.45$  and  $11.68 \pm 2.17$  for nurses and physicians respectively that were approximately equal but technicians had comparatively low mean scores ( $10.36 \pm 2.55$ ). Probable reasons for this may be lack of trainings and simulation exercises or they may be busy in lab related works. According to CDC,<sup>15</sup> all healthcare professionals need to be prepared for managing infectious diseases.<sup>7</sup> To resolve this problem, technicians should be encouraged to participate in compulsory training and simulation exercises as continuing education programs.

Apart from the above mentioned findings, in regard to the preparedness of the health care workers, immunity plays a vital role here. Research evidences have shown that vitamin-D helps to protect against bacterial, viral and fungal infections. As a part of preparedness of the health care workers, it is similarly evident that vitamin D supplementation may be suggested with a low dose of 1000-2000IU to help sustain the serum level.<sup>16</sup>

Government agencies have invested a huge fund and resources to train and educate HCPs, so that they can be prepared to manage COVID-19 pandemic. Study findings revealed that there was a difference in HCPs' preparedness based on the different level of institutes. This indicated that the fund and resources have mainly allotted to tertiary level institutes. The resources for managing the COVID-19 cases might have not been allotted equally to primary, secondary and tertiary level of institutes. Findings of this survey suggest that the existing system of fund and resources distribution may not be right way to manage this pandemic. Therefore, survey advocates equal allotment of resources to all level of institutes.

The results of this survey demonstrated moderate success of these measures of preparedness for HCPs with overall mean scores ( $11.4 \pm 2.43$ ) while maximum possible scores were 14. The moderate level of preparedness may be because HCPs received guidelines issued by WHO, CDC and other organizations on management of SARS-CoV-2 cases before this survey started. Furthermore, institu-

tions surveyed have also released their own customized guidelines.

## LIMITATIONS

Healthcare professionals in this survey were selected by using convenience sampling technique and may cause selection bias. In addition, all information was self-reported, and no cross validation of these data were made. Therefore, survey findings should be generalized cautiously.

## CONCLUSION

Health care professionals were quite confident in infection prevention and control measures, they were also aware about government guidelines and recent information on COVID-19. HCPs also demonstrated satisfaction with adequacy and quality PPE supply, preparedness and support system of the institute to fight with COVID-19 pandemic. However, they demonstrated lack of awareness about their role and responsibilities as COVID-19 team member and mentioned lack of regular training and education program for HCPs. Young and males HCPs working in tertiary health care institutes demonstrated higher preparedness score as compared to their counterparts. Moreover, highest preparedness score was demonstrated by physicians, followed by nurses and least preparedness score was found among technicians. Therefore, there is acute need of regular training for HCPs and clear communication about their roles and responsibilities as COVID-19 team member especially technicians and nurses.

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