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# Perspective of Doctors for COVID-19 Pandemic Readiness in Government Hospitals of Nepal

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## ABSTRACT

**Background:** The study assesses the perspective of doctors working in government hospitals of Nepal regarding hospital preparedness for infection prevention measures, isolation services provisions, critical care service readiness, and training of staff for COVID-19 pandemic management.

**Methods:** This cross-sectional study was done in central, provincial, and local level health centers of the Government of Nepal to assess the perspective of medical doctors regarding COVID-19 pandemic readiness in their facility. Nonprobability sampling was used to collect 56 responses from doctors working in different hospitals of Nepal. An online survey was performed using a questionnaire tool, which was adapted from the guidelines of the World Health Organization and the Centers for Disease Control and Prevention.

**Results:** Most of the participants were medical officers with an MBBS degree (32) followed by anesthesiologists (10). Thirteen participants worked in central hospitals (23.2%), 24 in provincial hospitals (42.8%) and 19 in local health centers (33.92%). The availability of adequate facemask was 84% in central hospitals, which was higher than provincial hospitals (66.7%), and local level health centers (77.8%). There were only 53.8% trained critical care providers in central hospitals and 29.2% in provincial hospitals. Nearly 38.5% (5) of central hospitals had measures for airborne isolation in place, whereas this was only found in 8.3% (2) of provincial hospitals surveyed for critical care facilities. Overall, only 2 hospitals had the provision of a negative pressure room with air exchanges. Only 8 participants working in central hospitals (61.5%) and 14 working in provincial hospitals (58.3%) had performed hands-on training for donning and doffing personal protective equipment.

**Conclusions:** The majority of medical doctors working in government hospitals of Nepal perceive that provision of facemask distribution, airborne isolation rooms, critical care preparedness, and hands-on training to staff were not adequate.

**Keywords:** COVID-19; Government of Nepal; pandemic; readiness.

## INTRODUCTION

After the declaration of the COVID-19 pandemic by the World Health Organization (WHO), the first confirmed case of COVID-19 from Nepal was reported in January 2020.[1,2] Since then, COVID-19 positive cases have surged beyond 14000, with 30 deaths till July 1, 2020.[3] Different hospitals have been identified and assigned different levels of services based on their geographic locations and the type of general service they provide.[2,4] With the knowledge that even the affluent countries were overwhelmed and found it extremely difficult to contain the spread of infection during the surge[5,6] it was important that Nepalese healthcare facilities made their best effort to prepare and combat the pandemic in a short period of time.[7,8] The aim of the study is to assess the perspective of medical doctors working in government hospitals regarding hospital readiness in infection prevention measures, isolation services management, critical care service readiness and training related to COVID-19 in government hospitals of Nepal.

## METHODS

This cross-sectional study was performed as an online survey among doctors working in 56 different

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government hospitals of Nepal from April, 08 to 29, 2020. The questionnaire was adapted from the checklist developed by the World Health Organization[9] and the Centers for Disease Control and Prevention (CDC), United States[10], and modified to meet local standards. The tool was developed by investigators from the government hospitals of Nepal. Questions related to infection prevention measures, hand hygiene, availability of face masks, airborne isolation room provisions, components related to critical care preparedness, and level of training of the healthcare staff were included. The study population comprised of medical doctors with or without specialties (Figure 1) working in central hospitals, provincial hospitals and local level health centers. Only primary health centers of the local level were included as local level health centers. Only one response from one government hospital of Nepal was included in the final analysis. In the case of multiple responses from the same facility, respondents with a specialty degree were preferred. If there were multiple responses from doctors with a specialty degree working in the same hospital, the response received first was included. The provisions of critical care and airborne isolation were only assessed in central and provincial hospitals, considering that these facilities have these provisions as per the standards of the Government of Nepal. If any response had an incomplete entry, it was excluded from the study. Only those replies from a medical doctor working in a government hospital with a complete entry were included in this study. Nonprobability purposive sampling of data was done. Data related to the availability of polymerase chain reaction (PCR) tests and rapid diagnostic tests (RDT) were not sought as it was known that there is only limited COVID-19 testing in most government hospitals of the country. Other aspects of preparedness such as the formation of outbreak management team, triaging provision, availability of personal protective equipment, and staff management were also not assessed. Pretesting of the question was not done due to complexities arising from the pandemic, as patient care and research activities need to be carefully balanced during crisis.[11]

Participants of the survey provided consent after they were explained the details of the study. Ethical approval for the study was taken from the Nepal Health Research Council Ethical Review Board. To maintain the confidentiality of the participants, direct data identifiers were removed from the data set and indirect identifiers were modified. Data were entered in Microsoft Excel 2019 and analyzed using SPSS version 26. Data are presented as numbers and percentages.

## RESULTS

A total of 56 respondents with medical doctors of different specialties each working in a different government hospital were included in the study. Medical officers accounted for most of the participants 32(57.2 %) followed by anesthesiologists 10(17.9 %) (Figure 1).

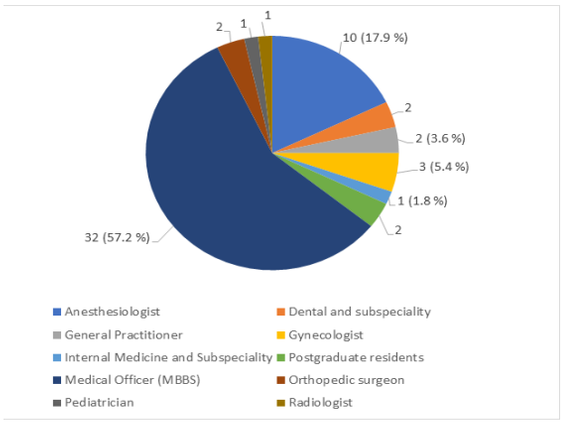


**Figure 1. Respondent distribution by specialty.**

There were 13 responses from doctors working in central hospitals (23.2%), 24 from provincial hospitals (42.8%), and 19 from local level health centers (33.92%) (Figure 2).

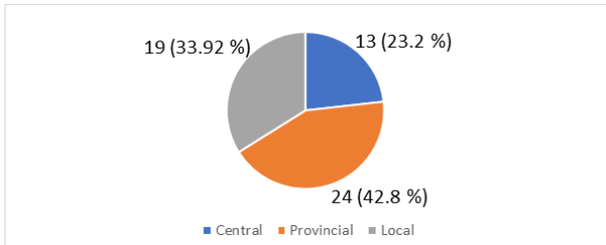


**Figure 2. Respondent distribution by federal system of Government of Nepal.**

Hand hygiene provisions in government hospitals of Nepal ranged from 37-49 (66.1-87.5 %) of the responses with maximum facilities in the fever clinic and least in the wards and emergency rooms. (Table 1).

The provision of facemask was 11 (84.6 %) in the central hospital which was higher than provincial hospitals 16 (66.7 %) and local health centers 15 (78.9%) (Table 2).

Various provisions of critical care facilities available in government hospitals of Nepal are listed in Table 3. Critical care provider was more commonly present in central hospitals (53.8 %) compared with provincial hospitals (29.2 %). The provision of airborne isolation and separate donning and doffing areas for personal protective equipment (PPE) in critical care facilities are less in both central and provincial hospitals (Table 3).

**Table 1. Hand Hygiene provision in different designated areas of the hospital and health centers.**

| Level of hospitals and health centers | Fever clinic | | Emergency | | Ward | Isolation room | |
|---|---|---|---|---|---|---|---|
| | Soap and water (%) | Alcohol-based sanitizer (%) | Soap and water (%) | Alcohol -based sanitizer (%) | Soap and water or alcohol-based sanitizer (%) | Soap and water (%) | Alcohol-based sanitizer (%) |
| Central (n=13) | 8 (61.5) | 11 (84.6) | 10 (76.9) | 12 (92.3) | 11 (84.8) | 9 (69.2) | 12 (92.3) |
| Provincial (n=24) | 18 (75.0) | 19 (79.2) | 17 (70.8) | 19 (79.2) | 18 (75.0) | 20 (83.3) | 17 (70.8) |
| Local (n=19) | 14 (73.7) | 19 (100.00) | 10 (52.6) | 18 (94.7) | 9 (47.4) | 12 (63.2) | 12 (63.2) |
| Total (n=58) | 40 (71.4) | 49 (87.5) | 37 (66.1) | 49 (87.5) | 38 (67.9) | 41 (73.2) | 41 (73.2) |

**Table 2. Facemask* provision to healthcare personnel in hospitals and health centers.**

| Level of hospitals and health centers | Healthcare personnel (%) |
|---|---|
| Central (n=13) | 11 (84.6) |
| Provincial (n=24) | 16 (66.7) |
| Local (n=19) | 15 (78.9) |
| Total (n=58) | 42 (75.0) |

Facemask* here means surgical or N95 or N95 equivalents.

According to the participants, most central, as well as provincial hospitals, relied on the provision of a well-ventilated room with air exhaustion outside with or without the use of exhaust fan for airborne isolation (Table 4). Four among 13 responders (30.8 %) working in central hospitals, and three among 24 responders (12.5 %) working in provincial hospitals reported that their hospital has the provision of airborne isolation with air exhausted directly outside. Only two doctors surveyed in the central hospitals in the study reported the facility of a negative pressure room.

**Table 3. Different critical care provision in central and provincial hospital.**

| Level of hospitals | Mechanical Ventilator (%) | Oxygen supply$^{\delta}$ (%) | Trained critical care provider$^{\#}$(%) | Trained critical care nurse$^{\ddagger}$ (%) | Provision of Airborne Isolation*(%) | Separate donning and doffing area for PPE(%) |
|---|---|---|---|---|---|---|
| Central (n=13) | 11 (84.6) | 11 (84.6) | 7 (53.8) | 7 (53.8) | 5 (38.5) | 6 (46.2) |
| Provincial (n=24) | 7 (29.2) | 8 (33.9) | 7 (29.2) | 6 (25.0) | 2 (8.3) | 7 (29.2) |
| Total (n=37) | 18 (48.6) | 19 (51.3) | 14 (37.8) | 13 (35.1) | 7 (18.9) | 13 (35.1) |

*AIIR provision means any provision as per the Table 4 criteria, ‡Trained critical care nurse means any certified nurse with some form of training short and long in critical care, $^{\delta}$Oxygen supply denotes pipeline system, #Trained critical care provider may not necessarily mean certified intensivist or anesthesiologist but had short or long-term training and capable of providing some form of airway support and use of mechanical ventilator

According to the participants, only 8 medical doctors working in central hospitals (61.5 %), and 14 doctors working in provincial (58.3%) hospitals had performed hands-on training for the proper use of personal protection equipment (Table 5).

**Table 4. Airborne isolation room (AIIR) provision in central and provincial hospitals.**

| AIIR* | Central (%) (n=13) | Provincial (%)(n= 24) |
|---|---|---|
| Negative pressure room with air exchanges | 2 (15.4) | 0 |
| Air exhausted outside directly | 4 (30.8) | 3 (12.5) |
| High Efficiency Particulate Air Filter (HEPA) | 2 (15.4) | 1 (4.2) |
| Well-ventilated room with exhaust fan | 4 (30.8) | 4 (16.7) |

*The criteria are adapted from the checklists of the World Health Organization[9,12] and the Centers for Disease Control and Prevention, United States[10]

**Table 5. Hands-on training of healthcare worker.**

| Level of Hospitals (n=58) | Hand hygiene* (%) | Personal protective equipment's (PPE) (%) |
|---|---|---|
| Central (n=13) | 6 (46.2) | 8 (61.5) |
| Provincial (n=24) | 14 (58.3) | 14 (58.3) |
| Local health centers (n=19) | 12 (63.2) | 8 (42.1) |

*Hand hygiene means use of soap and water

## DISCUSSIONS

A published survey done in first week of April 2020, provided some information on the lack of preparedness in different service components in public and private Nepalese hospitals.[13] However, in the published study, there were no specific questions related to individual facilities in various sections of the hospitals. To date,

most of the COVID-19 patients in Nepal have been treated in government hospitals; the focus of this study is on the perception of the medical doctors working in these hospitals.

Proper hand-hygiene is the proven evidence-based method to disrupt the spread of COVID-19 infection. A global report on healthcare facilities for water, sanitation, and hygiene done in Nepal in 2019 found that only 46% of facilities have hand hygiene availability at point of care, and 59% of facilities had availability of disinfectants in the outpatient department.[14] A nationwide survey done in hospitals during the phase of local transmission showed that 65.6% of facilities have provisions for hand-wash. However, only 30.5% of the government hospitals and 24.4% of the national academies of the country were accounted for in the survey, and there are no details on individual sections of the hospitals. In our survey, we found an improvement in hand-hygiene provisions compared with the existing data. However, there were lots of differences in handwashing provisions in central hospitals compared with provincial hospitals. Handwashing facilities both with soap and water and alcohol-based disinfectants were present in approximately 61-85% of fever clinics, 76-93% of emergency rooms , 84.6% of wards, 69-92% of isolation rooms of central hospitals, whereas it was as low as 47% of wards and 52% of emergency rooms in local health centers (Table 1).

In the current pandemic, the rationale use of facemask has been a contentious issue as unnecessary use of facemasks by the general public has diverted these valuable resources away from hospital supply chains.[15] The provision of adequate facemasks is nearly 85% in central hospitals, followed by 67% in provincial hospitals (Table 2). Although there is an increased international as well as domestic production of facemasks in recent times, availability is still low in the provincial and local level health centers.

Critical care facilities can significantly improve mortality statistics in COVID-19 outbreak situations. A survey in 2020 found only 480 intensive care unit (ICU) beds, 480 ventilators, and 800 trained critical care nurses in Kathmandu with only 150 critical care beds in the government hospitals equipped for rapid surge of the outbreak.[16] Health sector emergency response plan shows 194 hospitals have ICU facilities with 1595 ICU beds and 840 ventilators all over the country.[4] Only 32% of the participants replied of providing critical care services in a recent nationwide survey for COVID-19 pandemic preparedness.[13] The actual count of mechanical ventilators in government hospitals is not within the scope of our study; however, we wanted to assess various provisions that are required for running a proper critical care unit. In our survey, 48.6% of participants reported the provision of mechanical ventilation, and 51.3% reported adequate oxygen supply in central and provincial hospitals. There is a lack of provision of airborne isolation prevention (19%), and separate donning and doffing area for personal protective equipment (35%). Additionally, there were only a few trained critical care providers (37%), both in central (53%) and provincial (30%) hospitals. Similarly, critical care nurses (35%) are scarce in central (53%) and provincial (25%) hospitals. These are worrying statistics for an appropriate response to the COVID-19 outbreak in critical care units.

In the interim guidelines for COVID-19 preparedness for airborne infection, the WHO recommends natural ventilation with at least 160 liters air per second per patient, or a negative pressure room with at least 6-12 air exchanges per hour with controlled direction of airflow while performing aerosol-generating procedures.[12] Similarly, the CDC recommends a minimum of 6 air exchanges per hour, with air exhausted directly outside or filtered through HEPA, with the provision of daily negative pressure air when occupied by patients.[17] A multinational survey found that only 37% of ICU in Asian countries have provisions for AIIR, referring to negative pressure rooms. If adequate physical distance can be maintained, a single room with good ventilation and exhaust, shared by COVID-19 patients is an acceptable provision in an outbreak situation, particularly in resource-limited settings.[18] In our survey, we found that provisions for airborne isolation were rarely available in government hospitals. Only 15% of central government hospitals had such a provision, and there was no such provision in provincial hospitals (Table 3). In our survey, only two participants reported the provision of a negative pressure room (Table 3). This data is comparable to another study which found the availability of negative pressure rooms in only 6.9% of the surveyed hospitals. Nearly 30 % of the participants from the central hospitals reported the provision of a well-ventilated room with or without an exhaust fan in their hospital (Table 4). Figures for similar provisions were only 15% among provincial hospitals. It is possible that an overzealous focus on increasing mechanical ventilator beds and developing isolation rooms may also have overshadowed other infection prevention modalities in these hospitals.

Inadequately trained staff with improper personal protective equipment pose a threat to the proper safety of the healthcare provider at the scene and raise issues of contamination, particularly at the time of doffing.[19,20]

All healthcare workers dealing with COVID-19 patients must perform supervised hands-on training for donning and doffing of PPEs and for hand-hygiene. Even in central hospitals, only 46% and 61% participants reported performing supervised hands-on training for hand-washing and PPE use, respectively. Hands-on training for PPE use was even less frequent in participants working in provincial hospitals and local health centers.

Since this study is not randomized, there is the possibility of selection bias among respondents. Respondents are assumed to be updated on the preparedness measures in their hospitals. For obvious reasons, it was not possible to obtain responses from medical doctors working in all government hospitals of Nepal. Studies that involve direct observation of the facility by an expert in all relevant areas of the hospital can be more accurate. As we did not perform any pretesting, respondents may not have understood some questions properly. Despite these limitations, some of which inherent to all online survey studies, we believe our data adds some valuable information in our fight against the COVID-19 pandemic in Nepal.

## CONCLUSIONS

In our survey, most of the medical doctors perceive that several provisions related to the availability of facemask, airborne isolation system, critical care preparedness, and training to healthcare staff were not adequate. Hand sanitizing facilities were well-prepared in most facilities. There was also a lack of critical care preparedness in areas such as proper airborne isolation provision, separate donning and doffing areas for PPE use, and the number of trained critical care providers and nurses. There was a lack of proper hands-on training for the use of PPE. This information may be useful for stakeholders to develop focused strategies to combat the pandemic in government facilities that are currently struggling with a lack of adequate resources.

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## CONFLICT OF INTEREST

We declare no conflict of interest.

## REFERENCES

1. Bastola A, Sah R, Rodriguez-Morales AJ, Lal BK, Jha R, Ojha HC, et al. The first 2019 novel coronavirus case in Nepal. Lancet Infect Dis. 2020;20(3):279–80. [Pubmed]
2. WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020 [Internet]. 2020. Available from: https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020
3. Coronavirus disease (COVID-19) Situation Report – 161 [Internet]. [cited 2020 Jun 29]. Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200629-covid-19-sitrep-161.pdf?sfvrsn=74fde64e_2
4. Health Sector Emergency Response Plan COVID-19 Pandemic. Government of Nepal Ministry of Health and Population May 2020; [Link]
5. Hospital preparedness for epidemics [Internet]. 2014 [cited 2020 May 5]. Available from: https://apps.who.int/iris/handle/10665/151281
6. Rodriguez-Llanes JM, Delgado RC, Pedersen MG, González PA, Meneghini M. Confronting COVID-19: Surging critical care capacity in Italy [Internet]. 2020 Apr [cited 2020 Apr 20]. Available from: http://www.who.int/bulletin/online_first/20-257766.pdf
7. Hamal PK, Dangal G, Gyanwali P, Jha AK. Let Us Fight Together against COVID-19 Pandemic. J Nepal Health Res Counc. 2020;18(1):I–II. [Pubmed]
8. Hospital Management Strengthening Program. Checklist to identify gaps in Minimum Service Standards of District Hospitals. Government of Nepal, Ministry of Health and Populations Curative Services Division. [Internet]. [cited 2020 Jun 1]. Available from: https://www.mohp.gov.np/downloads/HMSP_MSS_print_version.pdf
9. Hospital Readiness Checklist for COVID 19. World Health Organization, Regional office for Europe [Internet]. [cited 2020 Jun 1]. Available from: http://www.euro.who.int/__data/assets/pdf_file/0010/430210/Hospital-Readiness-Checklist.pdf?ua=1
10. Comprehensive Hospital Preparedness Checklist for Coronavirus Disease 2019 (COVID 19). U.S Department of Health and Human Services Centers for Disease Control and Prevention [Internet]. [cited 2020 Jun 4]. Available from: https://www.cdc.gov/coronavirus/2019ncov/downloads/HCW_Checklist_508.pdf
11. Angus DC. Optimizing the Trade-off Between Learning and Doing in a Pandemic. JAMA. 2020;323(19):1895-6. [Pubmed]
12. Immediate implementation of IPC measures. [Internet]. Clinical management of COVID-19: interim guidance, 27 May 2020. [cited 2020 Jun 10]. Available from: https://apps.who.int/iris/bitstream/handle/10665/332196/WHO-2019-nCoV-clinical-2020.5-eng.pdf?sequence=1&isAllowed=y

13. Shrestha GS, Paneru HR, Acharya SP, Shrestha SK, Sigdel MR, Tiwari S, et al. Preparedness for Coronavirus Disease in Hospitals of Nepal: A Nationwide Survey. J Nepal Med Assoc. 2020;58(224):248–51. [Pubmed]

14. WASH (Water, sanitation and hygeine) in health care facilities. Global Baseline Report 2019. World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) 2019. [Internet]. [cited 2020 Jun 2]. Available from: https://washdata.org/sites/default/files/documents/reports/2019-04/JMP-2019-wash-in-hcf.pdf

15. Feng S, Shen C, Xia N, Song W, Fan M, Cowling BJ. Rational use of face masks in the COVID-19 pandemic. Lancet Respir Med. 2020;8(5):434–6. [Pubmed]

16. Paneru HR. Intensive care units in the context of COVID-19 in Nepal: current status and need of the hour. Journal of Society of Anesthesiologist of Nepal. 2020;7(1):e291. [Google Scholar]

17. Additional Information about Airborne Infection Isolation Rooms, Respirators and Facemasks [Internet]. [cited 2020 Jun 3]. Available from: https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control-recommendations.html#take_precautions

18. Phua J, Faruq MO, Kulkarni AP, Redjeki IS, Detleuxay K, Mendsaikhan N, et al. Critical care bed capacity in Asian countries and regions: Crit Care Med. 2020;48(5):654–62. [Pubmed]

19. Honda H, Iwata K. Personal protective equipment and improving compliance among healthcare workers in high-risk settings. Curr Opin Infect Dis. 2016;29(4):400–6. [Pubmed]

20. Tomas ME, Kundrapu S, Thota P, Sunkesula VCK, Cadnum JL, Mana TSC, et al. Contamination of health care personnel during removal of personal protective equipment. JAMA Intern Med. 2015;175(12):1904-10. [Pubmed]