The perceived need for evidence-based COVID-19 management and Tele-education in the North-East region of India: a cross-sectional survey

Vivek Singh Malik¹ · Kusum Singal¹ · Manvi Singh² · Vipin Gupta¹ · Meenu Singh¹

Accepted: 30 January 2022 / Published online: 4 August 2022
© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2022

Abstract
Due to the sudden rise in the cases of COVID-19 in the North-Eastern region of India, this study was conducted to survey the felt needs of the medical professionals with regards to education on the evidence-based management of COVID-19. A total of 25 North-East leaders were recruited and a baseline survey was conducted through the digital medium. Out of 25 North-East leaders, 52% were undergoing training in evidence-based medicine in the capacity-building program for evidence-based child health. Participants (48%) strongly agreed and 40% agreed on the possibility of enhanced care by capacity building in the areas of COVID-19 management through discussing cases. Out of 25 North East leaders, 48% agreed to join both as a speaker as well as a participant. Various priority topics on COVID-19 management e.g. childhood, adult, ocular manifestation, ICU management, telemedicine, vaccines, lab protocols, psychological distress, and treatment strategy have emerged. We have presented the findings of the survey which will help guide the mentoring program focusing on evidence-based management of COVID-19 in remote areas through Tele-education.

Keywords India · North-East region · Tele-education · Remote areas · COVID-19

Highlights
• The use of evidence-based medicine in remote areas is increasing.
• Telemedicine and Tele-education can serve the need for capacity building.
• Various priority topics on COVID-19 management have emerged.
• This Survey evaluated the felt needs of medical professionals with regards to education on evidence-based management of COVID-19 through discussing cases.

Meenu Singh
meenusingh4@gmail.com

Vivek Singh Malik
viveksinghmalik28@gmail.com

Kusum Singal
kusumsingal1731@gmail.com

Manvi Singh
drmanvisingh89@gmail.com

Vipin Gupta
gvipin0545@gmail.com

¹ Department of Pediatrics, Post Graduate Institute of Medical Education and Research (PGIMER), 160012 Chandigarh, India
² Department of Telemedicine, Postgraduate Institute of Medical Education and Research (PGIMER), 160012 Chandigarh, India
The study setting was across the North-Eastern healthcare professionals in July–August 2021. The questionnaire was designed and circulated using Google Forms. We circulated the questionnaire to a cohort of 80 Participants.

Data Collection The questionnaire was designed based on the currently available information about COVID-19 according to the literature and available recommendations. The validity of constructs was evaluated by a professional practitioner involved in a healthcare setting. The questionnaire consisted of the working sector, designation, department, field of expertise, previous participation in the capacity building for evidence-based medicine program, interest in COVID-19 case series, possibilities of capacity building in the areas of COVID-19 through online teaching mode partnering with ECHO, suitable day, suitable time, and topic of interest related to COVID-19 infection.

Results

Characteristics of the sample A total of 25 North-East leaders successfully filled out the online survey. The Male to Female ratio of the participants was 1.27. Both government (72%) and private (28%) sector leaders participated in the survey. The highest participation was seen from basic scientists (24%), clinicians (20%), students (16%), and public health experts (08%) (Table 1). All the participants were from diverse backgrounds covering pharmacology, community medicine, clinicians, and researchers. Most of the respondents were from Assam (68%), Tripura (20%), Arunachal Pradesh (04%), and Manipur (04%). Previous participation of the capacity building for evidence-based child health program were highest from Assam (32%), Tripura (16%), and Arunachal Pradesh (04%) out of the 25 responses. Perceived opportunity for capacity building in COVID-19 management through ECHO platform using digital technology was seen most in Assam [strongly agree (40%), agree (20%), and neutral (08%)], Tripura [strongly agree (08%), and agree (04%), and Arunachal Pradesh [strongly agree (08%)]. Interest in participation as a speaker was highest from Assam (36%) and Arunachal Pradesh (08%). Similarly, interest in joining as a participant was also highest from Assam (16%), Tripura (20%), and Manipur (04%). Suitable days and times to join the online case series for participation, as well as speakers, were Wednesday (56%), Saturday (32%), and post-lunch (80%).

The topic of interest From Assam (32%) and Arunachal Pradesh (08%) “COVID-19 in children and adults” emerged as the major topic of interest. Similarly, “COVID-19 and telemedicine” (16%), “Treatment strategies” (36%), “Vaccines in COVID-19” (24%), “Epidemiology” (28%), “Pregnancy and perinatal care” (12%), and “Multisystem...
inflammatory syndrome in children” (08%) also emerged as potential topics from North-East region of India (Table 2). Novel topics were also suggested by the survey participants from Arunachal Pradesh and Assam for discussion. Long COVID, newer drugs, mental illness, COVID-19 in oral, and complications related to the COVID-19 after recovery

### Table 1  Characteristics of the North-East participants and its frequency

| Variables                                      | Assam  | Meghalaya | Mizoram | Sikkim | Arunachal Pradesh | Nagaland | Manipur | Tripura |
|------------------------------------------------|--------|-----------|---------|--------|-------------------|----------|---------|---------|
| Gender                                         | 07 (28%) | -        | -       | -      | 02 (08%)          | -        | 05 (20%) |
| • Male                                         | 10 (40%) | -        | -       | -      | -                 | 01 (04%) | -       | -       |
| • Female                                       | -       | -        | -       | -      | -                 | -        | -       | -       |
| Working sector                                 | 12 (48%) | -        | -       | -      | 02 (08%)          | -        | 04 (16%) |
| • Government                                   | 05 (20%) | -        | -       | -      | -                 | 01 (04%) | 01 (04%) |
| • Private                                      | -       | -        | -       | -      | -                 | -        | -       | -       |
| Department                                     | 01 (04%) | -        | -       | -      | -                 | 01 (04%) | 03 (12%) |
| • Pharmacology                                 | 02 (08%) | -        | -       | -      | -                 | -        | 02 (08%) |
| • Community Medicine                          | 01 (04%) | -        | -       | -      | -                 | -        | -       | -       |
| • Physiology                                   | 01 (04%) | -        | -       | -      | -                 | -        | -       | -       |
| • Pediatrics                                   | 01 (04%) | -        | -       | -      | -                 | -        | -       | -       |
| • Psychiatry                                   | 03 (12%) | -        | -       | -      | -                 | -        | -       | -       |
| • Dental & Oral Surgery                        | 01 (04%) | -        | -       | -      | -                 | -        | -       | -       |
| • Pharmacy                                     | 02 (08%) | -        | -       | -      | -                 | -        | -       | -       |
| • Biotechnology                                | 01 (04%) | -        | -       | -      | -                 | -        | -       | -       |
| • Research and development                     | 01 (04%) | -        | -       | -      | -                 | -        | -       | -       |
| • Anatomy                                      | 02 (08%) | -        | -       | -      | -                 | -        | -       | -       |
| • Microbiology                                 | 01 (04%) | -        | -       | -      | -                 | -        | -       | -       |
| • Health & Family Welfare                      | 00 (00%) | -        | -       | -      | 01 (04%)          | -        | -       | -       |
| Field of expertise                             | 06 (24%) | -        | -       | -      | -                 | 01 (04%) | -       | -       |
| • Basic Scientist/Researcher                  | 05 (20%) | -        | -       | -      | -                 | -        | 01 (04%) |
| • Clinician                                    | 04 (16%) | -        | -       | -      | -                 | 01 (04%) | 02 (08%) |
| • Student                                      | 02 (08%) | -        | -       | -      | 01 (04%)          | 01 (04%) | -       | -       |
| • Public Health Expert                         | 01 (04%) | -        | -       | -      | -                 | -        | -       | -       |
| • Scientist                                    | -       | -        | -       | -      | -                 | -        | -       | -       |
| Beneficiary of capacity building for evidence-based child health program | 08 (32%) | -        | -       | -      | 01 (04%)          | -        | 04 (16%) |
| • Yes                                          | 03 (12%) | -        | -       | -      | -                 | -        | -       | -       |
| • No                                           | -       | -        | -       | -      | -                 | -        | -       | -       |
| • Don’t know                                   | -       | -        | -       | -      | -                 | -        | -       | -       |
| Possibilities of capacity building in the areas of COVID-19 through the ECHO platform | 10 (40%) | -        | -       | -      | -                 | -        | 02 (08%) |
| using digital technology                       | 05 (20%) | -        | -       | -      | 02 (08%)          | -        | 01 (04%) |
| • Strongly agree                               | -       | -        | -       | -      | -                 | -        | -       | -       |
| • Agree                                        | -       | -        | -       | -      | -                 | -        | -       | -       |
| • Neutral                                      | -       | -        | -       | -      | -                 | -        | -       | -       |
| • Disagree                                     | -       | -        | -       | -      | -                 | -        | -       | -       |
| Interested in starting COVID-19 case series in the North-East region | 01 (04%) | -        | -       | -      | -                 | -        | -       | -       |
| • As speaker                                   | 04 (16%) | -        | -       | -      | 01 (04%)          | 05 (20%) | -       | -       |
| • As participant                               | 09 (36%) | -        | -       | -      | 02 (08%)          | -        | -       | -       |
| • Both                                         | 02 (08%) | -        | -       | -      | -                 | -        | -       | -       |
| • Not Interested                               | -       | -        | -       | -      | -                 | -        | -       | -       |
| Suitable day                                   | 02 (08%) | -        | -       | -      | -                 | -        | 01 (04%) |
| • Monday                                       | 03 (12%) | -        | -       | -      | -                 | -        | -       | -       |
| • Tuesday                                      | 09 (36%) | -        | -       | -      | 02 (08%)          | 01 (04%) | 02 (08%) |
| • Wednesday                                    | 02 (08%) | -        | -       | -      | -                 | 01 (04%) | -       | -       |
| • Thursday                                     | 02 (08%) | -        | -       | -      | -                 | -        | -       | -       |
| • Friday                                       | 08 (32%) | -        | -       | -      | -                 | -        | -       | -       |
| • Saturday                                     | -       | -        | -       | -      | 02 (08%)          | -        | 01 (04%) |
| • Sunday                                       | -       | -        | -       | -      | -                 | -        | -       | -       |
| Suitable time                                  | -       | -        | -       | -      | 02 (08%)          | -        | 01 (04%) |
| • Before lunch                                 | 15 (60%) | -        | -       | -      | -                 | -        | 04 (16%) |
| • Post lunch                                   | 02 (08%) | -        | -       | -      | -                 | -        | -       | -       |
| • Both                                         | -       | -        | -       | -      | -                 | -        | -       | -       |
were suggested for capacity building and Tele-education (Table 3). Apart from this, the North-East leaders were happy to be a part of the capacity-building program and expressed their interest in joining similar sessions in the future.

**Discussion** Digitalization has played a major role in transforming medical education through Tele-education as well as through Telemedicine. With the rise in the cases of COVID-19 in the North-East region of India, it was a felt need of the healthcare professionals to build evidence-based COVID-19 management strategies and Tele-education in remote areas. This cross-sectional study presents the findings of an online survey that will guide the mentoring as well as build capacity for evidence-based COVID-19 management.

There have been studies before the COVID-19 pandemic, in which the impact of capacity building [9] and Tele-nursing education [10] has been reported. During the COVID-19 pandemic, it was realized that healthcare professionals were facing pressure to provide clinical care as well as follow the education and training curriculum [11]. To address these issues, Telemedicine and Tele-education have gained much attention [11]. One study, conducted across 10 countries, has reported that the Tele-education environment fosters student satisfaction [12]. Tele-education has a huge potential in capacity building, which is supported by the previous studies on the knowledge and the perception among healthcare workers [13, 14]. We observed that “COVID-19 and Telemedicine,” “treatment strategies,” “vaccines,” “perinatal care,” “multisystem inflammatory syndrome” are the major topics of interest. Similar studies on the perceived needs showed interest in the topics like “COVID-19 and children with cancer [15],” “psychological impact on healthcare workers and its mitigation strategies [16],” “determinants of COVID-19 vaccine acceptance [17, 18],” “perceived stress, anxiety, and depression [19],” “COVID-19 in critical care units [20],” “COVID-19 Racism and mental health [21],” “patient education in triage during COVID-19 [22],” “the impact on Ophthalmology residency training [23],” and “nurses perception about the care needs of patients with COVID-19 [24].”

This study found Wednesday, Saturday, and post-lunch the most suitable day and time for Tele-education. Similar time preferences have been reported in a study by T.

### Table 2: Topic of interest on the COVID-19 management

| COVID-19 (Theme/Topic)                                         | Assam | Meghalaya | Mizoram | Sikkim | Arunachal Pradesh | Nagaland | Manipur | Tripura |
|---------------------------------------------------------------|-------|-----------|---------|--------|-------------------|----------|---------|---------|
| COVID-19 in children/adult                                    | 08 (32%) | -         | -       | -      | 02 (08%)          | -        | -       | -       |
| COVID-19 and the upper respiratory manifestation              | 02 (08%) | -         | -       | -      | -                 | -        | -       | -       |
| COVID-19 and the ocular manifestation                          | 01 (04%) | -         | -       | -      | -                 | -        | -       | -       |
| COVID-19 and ICU management                                   | 01 (04%) | -         | -       | -      | -                 | -        | -       | -       |
| COVID-19 and Telemedicine                                      | 02 (08%) | -         | -       | -      | 02 (08%)          | -        | -       | -       |
| COVID-19 treatment strategy                                   | 04 (16%) | -         | -       | -      | 01 (04%)          | 01 (04%) | 03 (12%)| -       |
| Vaccines in COVID-19                                          | 03 (12%) | -         | -       | -      | 02 (08%)          | -        | -       | -       |
| COVID-19 lab protocols                                        | 01 (04%) | -         | -       | -      | -                 | -        | -       | -       |
| COVID-19 and the pulmonary manifestation                       | 02 (08%) | -         | -       | -      | -                 | -        | -       | -       |
| COVID-19 and epidemiology                                     | 04 (16%) | -         | -       | 01 (04%)| 00 (00%)          | 00 (00%) | 02 (08%)| -       |
| COVID-19 pregnancy and perinatal care                         | 03 (12%) | -         | -       | -      | -                 | -        | -       | -       |
| COVID-19 and psychological issues                             | 05 (20%) | -         | -       | -      | -                 | -        | -       | -       |
| COVID-19 and Multisystem inflammatory syndrome in children    | 02 (08%) | -         | -       | -      | -                 | -        | -       | -       |

### Table 3: Novel topics suggested by survey participants

| COVID-19 Topic of Interest                                    | Assam | Meghalaya | Mizoram | Sikkim | Arunachal Pradesh | Nagaland | Manipur | Tripura |
|---------------------------------------------------------------|-------|-----------|---------|--------|-------------------|----------|---------|---------|
| Long COVID                                                    | -     | -         | -       | -      | 02 (04%)          | -        | -       | -       |
| Newer drugs in COVID-19                                       | 01 (04%) | -         | -       | -      | -                 | -        | -       | -       |
| COVID-19 in severely mentally ill                            | 01 (04%) | -         | -       | -      | -                 | -        | -       | -       |
| Treatment using medications for COVID-19                     | 01 (04%) | -         | -       | -      | -                 | -        | -       | -       |
| The maxillofacial region in patients of Guwahati, Assam      | 02 (08%) | -         | -       | -      | -                 | -        | -       | -       |
| Signs & Symptoms of COVID-19 in Oral                         | 02 (08%) | -         | -       | -      | -                 | -        | -       | -       |
| Complications related to COVID-19 after recovery              | 02 (08%) | -         | -       | -      | -                 | -        | -       | -       |
Muthuprasad [25] during the pandemic on Indian students’ perception and preference for online education.

In previous studies, authors have raised concern over the efficacy of Tele-education in medical settings [26–28]. Limited resources, poor infrastructure, and technical difficulties are major barriers to adapting the Tele-education, [8, 11] especially in remote areas. Some novel topics e.g. long COVID, newer drugs, and complications related to COVID-19 after recovery were also suggested by the healthcare professionals.

Strength of the study These findings from a cohort of thought leaders residing in remote areas of the country can be applied to similar settings, where Tele-education has a huge opportunity to strengthen medical education.

Limitation of the study One major limitation of this study is its sampling technique. We approached a cohort of healthcare workers in the North-East via email and the response received was limited. Most of the responses were from the participants of the capacity-building program as reported above. The highest need was reported from a few states only, while others were not able to fill the survey link. This might be due to their posting/residence in remote areas where network issues could be a major barrier. In future studies, we plan to address such limitations targeting a wider and more diverse sample of the population.

Conclusions This exercise was focused on the North-East region of India, in starting the newer case series and building capacity by evidence-based case discussions among healthcare professionals. Assam, Tripura, Arunachal Pradesh, and Manipur healthcare professionals were found to be more enthusiastic and showed their interest to join the case series. We recommend that Tele-education and evidence-based COVID-19 management need be incorporated in remote areas through the digital medium, seeing the current COVID-19 situation worldwide.

Acknowledgements ICMR, New Delhi, North East participants, and ICMR, CAR-EBCH Centre, PGIMER, Chandigarh.

Funding: Not Applicable.

Availability of data and material: Raw data available with authors.

Code Availability Not applicable.

Declarations

Conflict of interest/competing interest: None.

Ethics approval: PGI/IEC/2018/000943.

Consent to participate: Not applicable.

References

1. Jaber, R. M., Mafrachi, B., Al-Ani, A., & Shkara, M. (2021). Awareness and perception of COVID-19 among the general population: A Middle Eastern survey. PLoS ONE, 16(4), e0250461.

2. Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., et al. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet, 395(10223), 497–506.

3. Cao, J., Tu, W. J., Cheng, W., Yu, L., Liu, Y. K., Hu, X., et al. (2020). Clinical Features and Short-term Outcomes of 102 Patients with Coronavirus Disease 2019 in Wuhan, China. Clin Infect Dis, 71(15), 748–755.

4. Malik, V. S., Ravindra, K., Attri, S. V., Bhadada, S. K., & Singh, M. (2020). Higher body mass index is an important risk factor in COVID-19 patients: a systematic review and meta-analysis. Environ Sci Pollut Res Int, 27(33), 42115–42123.

5. Rothan, H. A., & Byrareddy, S. N. (2020). The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. J Autoimmun, 109, 102433.

6. Guan, W. J., Ni, Z. Y., Hu, Y., Liang, W. H., Ou, C. Q., He, J. X., et al. (2020). Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Med, 382(18), 1708–1720.

7. Elayeh, E., Aleidi, S. M., Ya’acoub, R., & Haddadin, R. N. (2020). Before and after case reporting: A comparison of the knowledge, attitude and practices of the Jordanian population towards COVID-19. PLoS ONE, 15(10), e0240780.

8. Saeed, B. Q., Al-Shahrabi, R., & Bolarinwa, O. A. (2021). Socio-demographic correlate of knowledge and practice toward COVID-19 among people living in Mosul-Iraq: A cross-sectional study. PLoS ONE, 16(3), e0249310.

9. Farmer, T., Robinson, K., Elliott, S. J., & Eyles, J. (2006). Developing and implementing a triangulation protocol for qualitative health research. Qual Health Res, 16(3), 377–394.

10. Asiri, H., & Househ, M. (2016). The Impact of Telenursing on Nursing Practice and Education: A Systematic Literature Review. Stud Health Technol Inform, 226, 105–108.

11. Sharma, D., & Bhaskar, S. (2020). Addressing the Covid-19 Burden on Medical Education and Training: The Role of Telemedicine and Tele-Education During and Beyond the Pandemic. Front Public Health, 8, 589669.

12. Kerzic, D., Alex, J. K., Pamela Balbontin Alvarado, R., Bezerra, D. D. S., Cheraghi, M., Dobrowolska, B., et al. (2021). Academic student satisfaction and perceived performance in the e-learning environment during the COVID-19 pandemic: Evidence across ten countries. PLoS ONE, 16(10), e0258807.

13. Bhagavathula, A. S., Aldhaleei, W. A., Rahmani, J., Mahabadi, M. A., & Bandari, D. K. (2020). Knowledge and Perceptions of COVID-19 Among Health Care Workers: Cross-Sectional Study. JMIR Public Health Surveill, 6(2), e19160.

14. Ferdous, M. Z., Islam, M. S., Sikder, M. T., Mosaddek, A. S. M., Zegarra-Valdivia, J. A., & Gozal, D. (2020). Knowledge, attitude, and practice regarding COVID-19 outbreak in Bangladesh: An online-based cross-sectional study. PLoS ONE, 15(10), e0239254.

15. Darlington, A. E., Morgan, J. E., Wagland, R., Sodergren, S. C., Culliford, D., Gamble, A., et al. (2021). COVID-19 and children with cancer: Parents’ experiences, anxieties and support needs. Pediatr Blood Cancer, 68(2), e28790.

16. Blake, H., Bermingham, F., Johnson, G., & Tabner, A. (2020). Mitigating the Psychological Impact of COVID-19 on Healthcare Workers: A Digital Learning Package. Int J Environ Res Public Health, 17(9).
17. Al-Mohaithef, M., & Padhi, B. K. (2020). Determinants of COVID-19 Vaccine Acceptance in Saudi Arabia: A Web-Based National Survey. *J Multidiscip Healthc*, 13, 1657–1663
18. Ruiz, J. B., & Bell, R. A. (2021). Predictors of intention to vaccine against COVID-19: Results of a nationwide survey. *Vaccine*, 39(7), 1080–1086
19. Mrklas, K., Shalaby, R., Hrabok, M., Gusnowski, A., Vuong, W., Surood, S., et al. (2020). Prevalence of Perceived Stress, Anxiety, Depression, and Obsessive-Compulsive Symptoms in Health Care Workers and Other Workers in Alberta During the COVID-19 Pandemic: Cross-Sectional Survey. *JMIR Ment Health*, 7(9), e22408
20. Gonzalez-Gil, M. T., Gonzalez-Blasquez, C., Parro-Moreno, A. I., Pedraz-Marcos, A., Palmar-Santos, A., Otero-Garcia, L., et al. (2021). Nurses’ perceptions and demands regarding COVID-19 care delivery in critical care units and hospital emergency services. *Intensive Crit Care Nurs*, 62, 102966
21. Cheah, C. S. L., Wang, C., Ren, H., Zong, X., Cho, H. S., & Xue, X. (2020). COVID-19 Racism and Mental Health in Chinese American Families. *PEDIATRICS*, 146(5)
22. Petre, B., Servotte, J. C., Piazza, J., Ghysen, A., Margat, A., Gagnayre, R., et al. (2020). cEDRIC: Strategy for Patient Education During COVID-19 Triage. *West J Emerg Med*, 21(6), 52–60
23. Silva, N., Laiginhas, R., Meireles, A., & Barbosa Breda, J. (2020). Impact of the COVID-19 Pandemic on Ophthalmology Residency Training in Portugal. *Acta Med Port*, 33(10), 640–648
24. Galehdar, N., Toulabi, T., Kamran, A., & Heydari, H. (2020). Exploring nurses’ perception about the care needs of patients with COVID-19: a qualitative study. *BMC Nurs*, 19(1), 119
25. Muthuprasad, T., Aiswarya, S., Aditya, K. S., & Jha, G. K. (2021). Students’ perception and preference for online education in India during COVID-19 pandemic. *Soc Sci Humanit Open*, 3(1), 100101
26. Collaborative, T. M. S. (2021). The perceived impact of the Covid-19 pandemic on medical student education and training - an international survey. *BMC Med Educ*, 21(1), 566
27. Dost, S., Hossain, A., Shehab, M., Abdelwahed, A., & Al-Nusair, L. (2020). Perceptions of medical students towards online teaching during the COVID-19 pandemic: a national cross-sectional survey of 2721 UK medical students. *BMJ Open*, 10(11), e042378
28. O’Doherty, D., Dromey, M., Lougheed, J., Hannigan, A., Last, J., & McGrath, D. (2018). Barriers and solutions to online learning in medical education - an integrative review. *BMC Med Educ*, 18(1), 130

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.