

## CORRESPONDENCE



# The COVID-19 pandemic: an opportunity to strengthen telemedicine in low and middle-income countries

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### IMPACT

- During the peak of the COVID-19 pandemic the healthcare systems of several countries came under strain and were even crippled, especially in LMICs, necessitating the exploration of alternate mechanisms for scaling-up healthcare services.
- Telemedicine can be an invaluable modality for complementing standard modes of pediatric healthcare delivery, not only during crises like the COVID-19 pandemic, but also for reducing the inequities that exist in access and delivery of pediatric healthcare in LMICs.
- A well-coordinated approach in health policy, development of infrastructure, and effective community participation is required for effective integration of pediatric telemedicine in LMICs healthcare systems.

*Pediatric Research* (2023) 93:463–464; <https://doi.org/10.1038/s41390-022-02167-9>

The Coronavirus Disease 2019 (COVID-19) pandemic has brought into sharp focus the fragility of healthcare systems in low- and middle-income countries (LMIC)<sup>1</sup>. These systems struggled to rapidly scale up healthcare services, ensure equitable access to healthcare to populations from all socio-demographics, and maintain non-COVID-19 healthcare services, including pediatric services, during the pandemic<sup>2</sup>. Telemedicine saw increased adoption in LMICs during the pandemic as a time-saving and cost-effective solution to address some of the above challenges. However, much remains to be done to effectively integrate telemedicine in LMIC healthcare systems. Major impediments include the high initial set-up cost, lack of infrastructure, electricity outages, and poor broadband internet connectivity, especially in remote locations<sup>3, 4</sup>. High-speed internet is crucial for establishing good communication between the patient and teleconsultant, and for uploading high-resolution radiographs. Self-sufficient mobile telemedicine vans that regularly navigate such areas can be an elegant solution for the above challenges until full-fledged infrastructure can be set up. Installation of solar panels in peripheral health centers hosting telemedicine can circumvent the frequent power and internet outages. An equally important challenge is the lack of awareness, lack of smartphone devices, and resistance to adoption at the patient's end. While the COVID-19 pandemic has sensitized many patients, patient awareness camps, sensitization of village heads, sensitization through community health workers, information and educational material, and automated short messages can go a long way towards improving adoption<sup>5</sup>. Such information, education and communication activities can be especially helpful to teach patients hands-on how to register themselves, how to upload necessary investigations and make them comfortable with the entire process. Training and sensitization of anxious parents by pediatric teleconsultants can also help reassure and instill confidence in the parents. Community telemedicine call centers, mobile telemedicine vans, and door-to-door community health workers can be equipped with communal

smartphone devices that can be used by patients who cannot afford them. The smartphone market is undergoing an exponential growth in several LMICs, along with the emergence of local smartphone companies and service providers. These companies market low-cost, durable smartphones that can be procured by the government without incurring high set-up costs. Local mobile telephony service providers also market low-cost, unlimited internet connections<sup>6</sup>. Even two-to-three low-cost smartphones per center or telemedicine van, equipped with low-cost, unlimited internet subscriptions, can help to implement telemedicine services in remote locations. National programs and organizations in LMICs, for example the Ayushman Bharat, National Digital Health Mission, mHealth programs and Indian Space Research Organization (ISRO) in India, are motivated to make such investments<sup>7</sup>. Funds can also be generated through various national and international agencies, philanthropic bodies, crowd funding, and corporate social funding. As mobile telephony networks expand into remote areas of a country, multiple companies may be allowed to compete for licenses, which will further bring down the cost of mobile internet services. Investment in such low-cost smartphones can simultaneously be utilized for managing antenatal care, childhood vaccinations, pediatric tuberculosis and other national programs. Besides smartphone devices, LMIC governments can also reduce the set-up cost of other telemedicine equipment by waiving off import taxes.

Trained community health workers, who are often women, can become an effective bridge between mothers or parents who are reluctant to adopt telemedicine and teleconsultants. These healthcare workers can effectively convince and motivate such subgroup of hesitant patients. Other peripheral healthcare workers like pharmacists can also be deployed to connect parents with teleconsultants and furnish timely prescriptions for their children, as has been done successfully in some countries<sup>8</sup>. Often the telemedicine software itself becomes an impediment for poorly educated, elderly and digitally inexperienced parents. Voice-enabled, user-friendly telemedicine software can be designed that allows the patient to communicate with the healthcare provider in their local language without having to navigate a complex user-interface. In LMICs, the migrant labor workforce

Received: 7 February 2022 Revised: 27 May 2022 Accepted: 4 June 2022  
 Published online: 21 June 2022

comprises a sizable population in every province. These populations are often unable to access healthcare services due to language, cultural and administrative barriers. Better administrative coordination, community telemedicine centers, mobile telemedicine units, along with culturally and language sensitive telemedicine applications can bridge these gaps for migrant populations. Administrative coordination remains a hurdle in telemedicine services in LMICs like India and this substantially affects migrant workers. A worker's telemedicine registration is tied up to the province he or she is a domicile of. Once the worker moves to another province for work, the worker is unable to access the local telemedicine services of that province. This becomes a hurdle when the teleconsultant asks the worker to bring the child in for physical treatment and management. The worker is left with no choice but to access a different pediatrician in the province he or she is working in. Since the child's previous health records are tied up with the domiciliary province, those records can't be accessed in other provinces. These hurdles also affect various maternal and child health services, and vaccination services for migrant children. The migrant workforce in LMICs is often financially vulnerable. If a worker's child falls ill, the worker has to miss his or her work for the day, and that translates into no wages for the day. The daily wages are itself meagre considering the high living costs in many regions. Such situations often cripple these impoverished families. Mobile telemedicine vans or access to the nearest community telemedicine center can reduce the time and money spent by such workers in getting their children appropriate medical attention. These problems were glaringly evident during the COVID-19 pandemic. The above administrative initiatives once incorporated into national and provincial policy can further ensure that the migrant's employers, who are often private contractors, install telemedicine services at the worksite itself and persuade mobile telemedicine vans to reach worksites that are far from the closest peripheral health center.

Hesitancy to adopt telemedicine can also be seen in healthcare providers, including pediatricians<sup>9</sup>. Formal training of healthcare providers and inclusion of telemedicine in medical and nursing curricula can sustainably integrate telemedicine in LMIC healthcare systems. This can be integrated through change in national and provincial medical education policy. Integrating telemedicine services in existing peripheral and community health centers should go hand-in-hand with telemedicine services in tertiary care referral centers. Equipping remote centers with inexpensive but essential equipment like digital weighing machine, stadiometer, digital thermometer and pulse-oximeter can help in better assessment of the patient rather than a mere verbal teleconsultation with the tertiary care expert. As a practicing pediatric teleconsultant the author recommends that peripheral healthcare workers are trained in sickness scores for children for more objective evaluation, triage and follow-up. Pediatric teleconsultants also need to maintain a low threshold for basic investigations like complete blood counts, urine microscopy and radiography. These are often unavailable at remote centers due to lack of trained personnel and infrastructure, leading to critical delays in instituting appropriate care. A cost-effective solution for this can be the institution of trained personnel and infrastructure in peripheral centers by the adopting tertiary care center that is providing telemedicine in the region. Often funds are available with the government for instituting resources and trained personnel in the periphery, but they still end up in implementation failure. Frequently, either the equipment or the trained personnel are missing at such locations. Lack of trained personnel is often due to an unwillingness of trained workers to work in such remote locations. And lack of equipment often happens due to non-utilization of funds due to lack of trained personnel. Hence, regional tertiary care centers can be engaged to build the resources and trained personnel in the peripheral health centers attached with them. This will decentralize the process, and the regional tertiary care center will be more effective at providing training to motivated

local personnel and then deputing them to the periphery on a rotary basis. Simultaneous installation of equipment at the peripheral centers will help prevent implementation failure. Tertiary care centers will be willing to hand-hold peripheral centers because improvement of health in their region comprises a key mandate for such centers<sup>10</sup>. Telemedicine becomes an important part of this process because it helps build-up and interconnect services in the catchment of peripheral health centers until further investments and progress can be made to establish more advanced centers of care. Such decentralization and network integration can be introduced by change in national level policy. With such networks in place, laboratory results generated in the periphery can also be seamlessly communicated to teleconsultants. As a corollary, rural patients with chronic diseases like diabetes and epilepsy can be trained when discharged from tertiary care centers to utilize telemedicine for follow-up, avoiding arduous and expensive journeys to the hospital. A well-integrated telemedicine network can thus become an effective first point of care for timely triage and referral. Involving private healthcare institutions can further expand such networks and rapidly scale up services in future pandemics and emergencies.

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#### DATA AVAILABILITY

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

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#### COMPETING INTERESTS

The author declares no competing interests.

#### ADDITIONAL INFORMATION

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