

**Opportunity for Innovation: Experiences in implementing Telehealth Services to enhance Access to Healthcare during COVID-19 Pandemic in Sri Lanka: A Case Study**

**Abstract**

Telehealth is the delivery of health-related services and information using electronic information and communication technologies. Telehealth enables the health service providers to connect with a remote patient to provide care, advice, reminders, education, intervention, monitoring and facilitates remote admissions. Due to COVID-19 related travel restrictions, disruptions in access to healthcare were observed in Sri Lanka. Therefore, a telehealth solution to connect patients where specialist medical doctors were inaccessible or unavailable, was planned and implemented in the North Central province of Sri Lanka in 2020. The objective of this case study is to describe the experience during the planning and implementation of the telehealth intervention. Issues faced during planning and implementation were securing adequate funds, limited knowledge of information technology among the health staff, the reluctance of patients to explain and show the signs through video consultation, and difficulties faced during the allocation of responsibility at each step of the telehealth services and provision of network facilities to peripheral hospitals. These issues were overcome by creating awareness among the key stakeholders on telehealth and its advantages, addressing concerns of the patients and conducting awareness campaigns on telehealth, streamlining the maintenance of equipment and most importantly, addressing concerns of the administrators, including health officials, and obtaining their consensus for the implementation of telehealth services. If these key issues can be forecasted and addressed timely, telehealth services could be successfully implemented in a resource-limited country like Sri Lanka.

**Keywords**

## Introduction

Three broad terms are adopted for the application of digital solutions in prescriber and patient interactions. “Telehealth”, “Telemedicine”, and “Digital Health” are being used to describe these digital solutions in the said instances. Though some use these three terms interchangeably, they stand for different functions. Telehealth generally implies electronic and telecommunications technologies and services applied to deliver care and services to individuals from faraway places. In contrast, telemedicine is the practice of medicine using technology to deliver care at a distance. A physician in one location uses a telecommunications infrastructure to provide care to a patient at a remote site. Telehealth is a broader term than telemedicine. Telemedicine focuses on the provision of solutions for diagnosis, services. Digital health is a broader term which incorporates personalized medicine, mobile health (mHealth) apps, electronic health records (EHRs), electronic medical records (EMRs), wearable devices, telehealth, and telemedicine [1-4].

Over several years, the common problem identified in healthcare delivery is that all who require medical attention do not attend hospitals to seek medical care. This could be due to a wide range of reasons, including the lack of time and transport facilities, cost of acquiring healthcare, reluctance due to embarrassment and undue stigma attached to certain illnesses such as sexually transmitted diseases and psychiatric disorders. Furthermore, this non-treatment-seeking behaviour is commonly seen among the females and younger generation. Unfortunately, this hesitancy has even led to adverse consequences, such as seeking treatment for the first time, at an advanced stage of an illness, where the prognosis may be unsatisfactory even after treatment. There are major benefits of adopting telehealth into practice. It can increase patient-physician interaction, which will improve access to care resulting in better health outcomes. These improved health outcomes can be achieved in telehealth by facilitating appropriate care interventions at a lower cost. This is critical in patients needing long term care and treatment. However, the use of telehealth should be implemented in a coordinated manner. It is essential to have a work plan for follow-up the patient, including the responsibility and

confidentiality in sharing personal health information using technology. Therefore, telehealth requires careful planning and implementation to reap the benefits [5-8].

COVID-19 pandemic during the past two years has changed the socioeconomic and cultural landscape of almost all communities around the world. The single most impacted aspect of the life of the human being is the restriction of mobility, either enforced or voluntary. With the aim of reducing transmission, travel limitations have been employed and enforced globally. People with co-morbidities and chronic diseases are at most risk of poor outcomes. There are instances where people delay seeking medical attention during the pandemic due to issues on physical, socio-cultural, and financial access which can result in adverse outcomes. Sometimes, individuals' fear of contacting COVID-19 has resulted in either delay, diversion, or non-seeking of medical attention. Sri Lanka is no exception. Sri Lanka was severely affected by the COVID-19 with multiple lockdowns. The pandemic and resulting cascade of outcomes have ensued disrupted access to health care in Sri Lanka. In these circumstances, technological advances provide new alternatives. COVID-19 accelerated the need for efficient ways to use present technologies to assist standard service delivery while reducing the hazard of direct person-to-person exposure [9-10]

Therefore, we planned and implemented a telehealth solution to connect patients where qualified medical specialists were not available around the clock in the North Central province of Sri Lanka with a central telehealth center in the provincial capital, namely Anuradhapura. This paper aims to describe our experience in planning and implementing telehealth solutions.

## **Methods**

The health team in the provincial health department at North Central province commenced planning a telehealth solution to address the disruption in access to health services in the province in April 2020 during the initial lockdown period to mitigate the transmission of COVID-19. North Central Province is the largest province in Sri Lanka which covers 16% of the entire country's land area [11]. Therefore, the need for a solution to poor access to health services was critical during the lockdown period. The urgency for a swift solution prevented the provincial health team from conducting a comprehensive situation analysis. However, five key

informant interviews (KIIs) were conducted. Key informants included peripheral medical practitioners, regular clinic patients of peripheral health centers and a digital health expert. Following the KIIs, many issues were identified which acted as bottlenecks for access to health facilities. They are

1. Constraints in physically accessing the regular health center, specialized tertiary care health institutions and medical practitioners for the continuation of treatment for chronic illnesses Minimum credible sources to receive personalized health advice during the lockdown period
2. Inability of peripheral health staff to continue to provide services 24 hours a day and 7 days per week due to human resources and transport issues
3. The inability for Medical Specialists to conduct outreach clinics and travel to the province as residences of most of these officers are in Colombo and suburbs (Close to 200 km away from North Central Province).

Following brainstorming by the provincial health team, the investigation team planned to implement the telehealth solution in 4 phases to prioritize health care issues which require urgent attention and manage budgetary limitations.

### **Phase One**

Operational hours- 8 am to 4 pm, all seven days of the week

Functions- Initiation of Telehealth hotline number

Consultation over the phone (Medical Officer/ Nurse/ Public Health Midwife)

Video consultation facility for patients attending selected 3 peripheral health units

Dispatch ambulance for emergencies

### **Phase Two**

Operational hours- 24 hours, all seven days of the week

Functions- Identical to Phase one

### **Phase Three**

Functions- Continuation of phase two operations  
Introduction of telehealth services for accident and emergency units and routine clinics  
Establishment of “model hospitals” in the periphery/ remote areas  
Establishing a network of video consultation facilities for referred patients to be seen by specialists at the main hospital and for outreach clinics conducted by these medical specialists

### **Phase Four**

Functions- Continuation of operations implemented in phase three  
Implementation of “virtual ward round” for selected remote hospitals  
Initiation of a telehealth service where a medical specialist follows up a patient at a peripheral hospital in the case of unavailability of space at the main hospital

Phase one and two were implemented in October 2020 during the subsequent lockdown period. phase three was initiated in January of 2021 and phase four is planned to be implemented in 2023 after necessary budgetary allocations and human resource training.

Telehealth hotline was managed at an operational unit set up at the Office of Provincial Director of Health Services. Depending on the time of the day either Regional Supervising Public Health Nursing Officer or a public health nurse managed the hotline. A roster was maintained so that around the clock a medical doctor was available for consultation over the phone. If the case required the attention of a medical doctor it was referred to doctor on duty. Figure 1 illustrates the basic facility of videoconferencing at the periphery in phase three. The medical doctor at the peripheral hospital, first takes a brief history and examines the patient and then connects the patient for a telemedicine session with the specialist from periphery. Figure 2 and 3 illustrate the overall picture of the telehealth services with the specialist connecting from the tertiary care referred center and the medical doctor and the patient connecting from the model peripheral hospital.

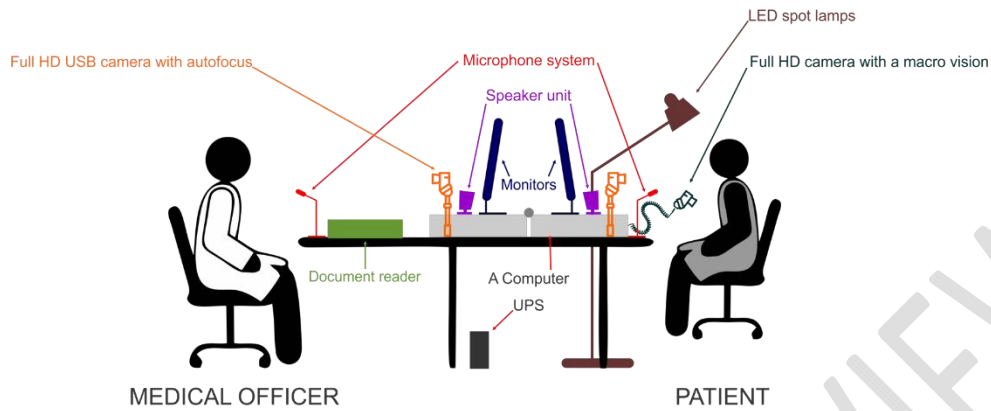


Figure 1: Telehealth set up at a peripheral hospital

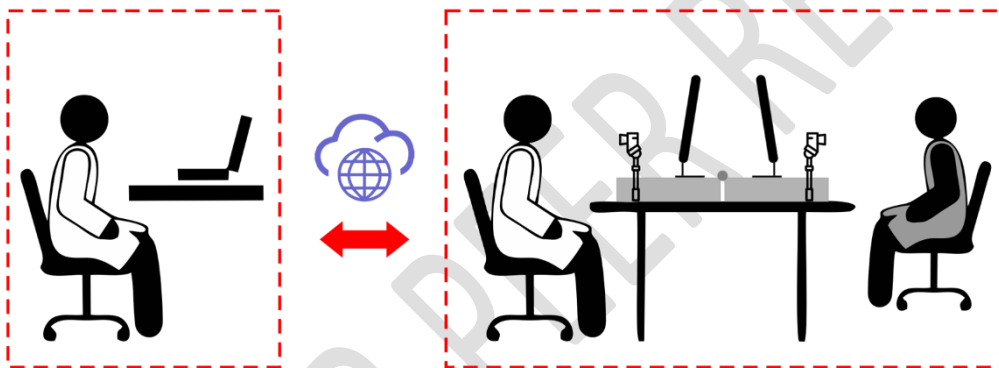


Figure 2: Overall setup of telehealth service connecting the provincial center to the peripheral hospital



Figure 3: Photographs of videoconferencing at phase 3 connecting periphery with the specialist at the central institute

## Results and Discussion

Implementation of phase one, two and three was completed in March 2021 and is continuing up-to-now. The following sections discuss the issues that were faced and the steps that were taken to overcome the below-mentioned issues.

1. Securing funding for the implementation of telehealth services
2. Limited knowledge of information technology among the health staff in North Central Province
3. The reluctance of patients to explain and show the signs through video consultation
4. Difficulties faced during the allocation of responsibility at each step of the telehealth services, including equipment
5. Provision of network facilities to peripheral hospitals

## **Securing funding for the implementation of telehealth services**

Sri Lanka spent 1.6% of the GDP on public health expenditure in 2018. Though Sri Lanka compared well with regional neighbours in South Asia (0.9% of GDP) and lower-middle-income nations (1.3%), a comparison with the upper-middle-income countries revealed unsatisfactory allocation. Moreover, North Central province despite being the largest province by land area in the country, was only allocated 4.7% among all provinces from budgetary provisions, with only two provinces allocated less than North central province in 2018. Therefore, the team was compelled to search for alternative funding sources for this project. Following a tedious process of finding a financial backer, the Provincial Council of North Central province and local business communities came forward to support this project. This enabled us to move forward with the project and successfully implement the project [12].

## **Limited knowledge of information technology among the health staff in North Central Province**

Lack of IT and computer literacy among the health staff was a major issue during the implementation of the telehealth facility at the peripheral hospital. This was more evident among the older health staff. The lack of computer knowledge and skills is not confined to health staff in North Central province. A study by the Department of Census and Statistics revealed that 44% of Government and semi-government employees lack computer literacy. Director-General of the department further stated that 62% were unable to use an email account among these government employees. To overcome this issue, we arranged two separate programs for the peripheral health staff of the selected hospitals. One program was focused on the familiarization and operation of hardware equipment (figure 1) required for the telehealth facility. The second programme was conducted to train the staff on the basic computer skills required to function in the telehealth facility. Following the said programs, the staff displayed the necessary confidence and willingness to participate in phase one of the telehealth projects. We used apps like “TeamViewer” to promptly attend to any issue at the periphery [13].

## **The reluctance of patients to explain symptoms and show the signs through video consultation**

Sri Lankan patients prefer to communicate in person rather than through video consultation [14]. Our key informants were too agreed that general preference of Sri Lankan communities is towards communicate in person for treatment. However, this does not necessarily mean that the Sri Lankan communities reject the idea of the video consultation. It was identified that this issue could act as a barrier to implementation and the sustainability of the project. In government clinics, there is considerable waiting time in Sri Lanka. We used this time to introduce telehealth to the patients. We specifically stressed upon the advantages of telehealth to them keeping the local context in mind. We explained the difficulty faced due to lack of human health resources and telehealth facilities could improve access to specialist doctors and advanced care. The reception towards telehealth did improve considerably following our intervention in these selected peripheral hospitals. COVID-19 pandemic has resulted in improved acceptability for telehealth not only among Sri Lankan communities but also in most parts of the world [15].

## **Difficulties faced during the allocation of responsibility at each step of the telehealth services, including equipment**

The Sri Lankan government has acknowledged the need for information and communication technologies (ICT) since 2000 for the efficient provision of government services to the public. In 2002, the government initiated a large-scale project called e-Sri Lanka targeted at utilizing the capacity of ICT for national development covering all government services [16-17]. Despite, telehealth gaining mainstream attention in Sri Lanka, minimal attempt was taken to streamline and regularize the process. Sri Lanka neither have a national agency committed to develop and promote telehealth nor policies or legislature on the practice of telehealth [14]. We initially believed that all officers at all levels would support the telehealth project. However, during the planning and implementation of the project, we faced resistance from some of the officers due to numerous reasons. In order of the magnitude of the resistance, the following causes were identified.

1. The perception that implementation of telehealth will be an added burden

2. Lack of awareness of telehealth
3. Poor knowledge of maintenance of ICT equipment at hospitals

Resistance to digital solutions in the government sector is not unique to the health sector. It was persistent during past decades among some government officials in different sectors at different capacities. First, we conducted one-to-one meetings with the health officers, namely the medical officer in charge of the peripheral hospital, medical officer-OPD, and nursing officer-OPD, to improve their knowledge on telehealth. We demonstrated to these officers that the implementation of telehealth would benefit both the patients and the health staff. We developed a maintenance and support plan for ICT equipment for telehealth services at peripheral hospitals. Above-described intervention alleviated the fear of the peripheral health officials regarding the maintenance of these equipment. Thereby, we successfully obtained the support of the peripheral health officials for this project [18].

### **Provision of network facilities to peripheral hospitals**

Comparatively, poor network coverage is available in North Central province, with catchment areas restricted to urban areas and close to major roads. Therefore, the provision of reliable network facilities to the selected peripheral hospitals was a challenge. Therefore, we carefully explored the available options. In Sri Lanka, two types of connections are available for the users, namely “Fixed Broadband” and “Mobile Broadband”. “Fixed” doesn’t essentially mean wires trailing from the nearest telephone pole and includes a 4G router facility provided by fixed-line operators, namely SLT, Lankabell and Dialog. Dialog and SLT are the only internet service providers that offer both mobile and fixed broadband connections. Therefore, we narrowed down our options to selecting either a 4G router by Mobitel/ Dialog or a wired network facility by SLT. Due to limited mobile 4G connectivity within the province, it was decided to go ahead with the wired internet connectivity from SLT. This choice provided us with an added advantage as all peripheral health institutions were already equipped with fixed-wired landline connections from SLT. However, we observed frequent disturbances to the connectivity during evening hours. The disturbances were closely followed by the adverse weather, which is common after 12 noon in certain months of the year in North Central province. Therefore, we restricted video

consultations to morning hours, whereas we continued the hotline and audio conversations until 4 pm with the availability of an ambulance to be dispatched in an emergency [19-20].

### **Limitations**

Telehealth intervention being discussed was only implemented in a selected province in Sri Lanka, and barriers to implementation could be different in different socio-cultural contexts within Sri Lanka itself. Therefore, we have limited our discussion on issues and how we addressed these issues. We did not conduct a structured post-implementation survey to assess user satisfaction or economic evaluation to assess the cost-effectiveness of the telehealth service.

### **Conclusion**

Telehealth services could be successfully implemented in resource-limited countries like Sri Lanka if the policymakers, planners, and administrators are prepared to conduct a proper situation analysis, accommodate and address key stakeholders' concerns, and conduct appropriate training for users at both ends.

### **COMPETING INTERESTS DISCLAIMER:**

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

### **References**

1. American Academy of Family Physicians. Telehealth and Telemedicine. December 2021. Available: <https://www.aafp.org/about/policies/all/telehealth-telemedicine.html> Accessed 1<sup>st</sup> March 2022.
2. American Academy of Family Physicians. What's the difference between telemedicine and telehealth? 2022. Available: <https://www.aafp.org/news/media-center/kits/telemedicine-and-telehealth.html> Accessed 5<sup>th</sup> March 2022.
3. John O, Sarbadhikari SN, Prabhu T, et al. Implementation and Experiences of Telehealth: Balancing Policies With Practice in Countries of South Asia, Kuwait, and the European Union. *Interact J Med Res.* 2022;11(1):e30755. Published 2022 Feb 8. doi:10.2196/30755
4. Bernstein C. Digital Health (Digital Healthcare). March 2021 Available: <https://www.techtarget.com/searchhealthit/definition/digital-health-digital-healthcare> Accessed 10<sup>th</sup> March 2022.
5. Smith AC, Thomas E, Snoswell CL, Haydon H, Mehrotra A, Clemensen J, et al. Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19). *J Telemed Telecare.*2020;1357633X20916567. <https://doi.org/https://doi.org/10.1177/1357633X20916567>.
6. Zhou X, Snoswell CL, Harding LE, Bambling M, Edirippulige S, Bai X, et al. The role of Telehealth in reducing the mental health burden from COVID-19. *Telemed E Health.* 2020. <https://doi.org/10.1089/tmj.2020.0068>.
7. Ohannessian R. Telemedicine: potential applications in epidemic situations. *Eur Res Telemed/Rech Eur Téléméd* 2015;4(3):95–98. <https://doi.org/https://doi.org/10.1016/j.eurtel.2015.08.002>.
8. Papadimos TJ, Marcolini EG, Hadian M, Hardart GE, Ward N, Levy MM, et al. Ethics of outbreaks position statement. Part 2: family-centered care. *Crit Care Med* 2018;46(11):1856–1860. <https://doi.org/https://doi.org/10.1097/CCM.0000000000003363>.
9. Kumarasinghe M, Danansuriya M, Kasturiaratchi K and de Sliva C. Brief Qualitative investigation on impact of COVID 19 on access to healthcare and treatment for Respiratory Tract Infections of 3-5-year-old children in Ratnapura district, Sri Lanka. *Academia Letters*, 2022;4948 Available: [https://www.academia.edu/74582450/Brief\\_Qualitative\\_investigation\\_on\\_impact\\_of\\_CO](https://www.academia.edu/74582450/Brief_Qualitative_investigation_on_impact_of_CO)

[VID 19 on access to healthcare and treatment for Respiratory Tract Infections of 3 5 year old children in Ratnapura district Sri Lanka](#) Accessed 23 March 2022.

10. Primary Health Care Promoting Initiative. Ensuring Access to Routine and Essential Services During Covid- 19 Through Utilizing Telehealth In Sri Lanka: COVID-19 promising practices. 07<sup>th</sup> January 2022. Available: <https://medicine.kln.ac.lk/depts/fmed/index.php/news-and-events/59-ensuring-access-to-routine-and-essential-services-during-covid-19-through-utilizing-telehealth-in-sri-lanka> Accessed 20th March 2022.
11. The State of Sri Lankan Cities. North Central Province. 2019. Available: <https://www.soslc.lk/en/provinces/north-central-province> Accessed 21st March 2022.
12. UNICEF. Budget Brief: Health Sector, Sri Lanka 2019. Available: <https://www.unicef.org/srilanka/media/1706/file/BUDGET%20BRIEF:%20HEALTH%20SECTOR.pdf> Accessed 15<sup>th</sup> March 2022.
13. Newsfirst. 44% of public sector employees lack computer literacy. 29<sup>th</sup> July 2018. Available: <https://www.newsfirst.lk/2018/07/29/44-of-public-sector-employees-lack-computer-literacy/> Accessed 10<sup>th</sup> March 2022.
14. Kulatunga GG, Hewapathirana R, Marasinghe RB, Dissanayake VHW. A review of Telehealth practices in Sri Lanka in the context of the COVID-19 pandemic. *Sri Lanka Journal of Bio-Medical Informatics* 2020; 11(1):8. Doi: 10.4038/sljbm.v11i1.8090
15. Basu A, Kuziemy C, Novaes MA, et al. Telehealth and the COVID-19 Pandemic: International Perspectives and a Health Systems Framework for Telehealth Implementation to Support Critical Response. *Yearb Med Inform* 2021; 30(01): 126-133. Doi: 10.1055/s-0041-1726484
16. Gunewardena RP. Introducing e-governance to education sector–national education information network launched. Daily News, February 13, 2002.
17. Gunewardena RP. Citizen friendly public service through e-governance. Daily News, March 1, 2002
18. Information and Communication Technology Agency (ICTA). The Catalyst (ICTA monthly newsletter). ICTA of Sri Lanka, July 2004.

19. nPerf. 3G / 4G / 5G in Anuradhapura coverage map, Sri Lanka. 2022. Available: <https://www.nperf.com/en/map/LK/1251081.Anuradhapura/7628.Mobitel/signal/?ll=6.949147408738895&lg=79.98550426214935&zoom=10> Accessed on 15<sup>th</sup> March 2022.
20. Team ReadMe. Internet in Sri Lanka: the state of affairs. 2014. Available: <https://readme.lk/internet-sri-lanka-state-affairs/> Accessed on 11<sup>th</sup> March 2022.

UNDER PEER REVIEW