

## Establishing a paediatric telemedicine centre in a low-resource setting: Experience and challenges from a teaching hospital in Kaduna, Nigeria

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### Abstract

**Background:** Telemedicine has the potential to revolutionize healthcare delivery, particularly in underserved and remote areas. It can help bridge the gap in access to care by using telecommunication technology to connect patients with healthcare providers. However, establishing a telemedicine centre is a complex process, particularly in low-resource settings.

**Objective:** To describe the experience of and challenges faced in establishing a telemedicine centre in the Paediatric Department of Barau Dikko Teaching Hospital (BDTH) in Kaduna, Nigeria.

**Method:** The process of setting up the telemedicine centre and the challenges faced by the hospital are described.

**Results:** The hospital faced several challenges, including a lack of infrastructure, dearth of resources and a lack of trained personnel. Despite these challenges, the hospital was able to establish a telemedicine centre and begin providing services to patients. The telemedicine centre had a positive impact on patient care by increasing access to care for those in remote areas or to those not able to travel to the hospital. It also allowed the hospital to expand its reach and utilize its resources more efficiently.

**Conclusions:** The establishment of a telemedicine centre at the Paediatric Department of BDTH, Kaduna, Nigeria, has had a significant impact on patient care, particularly for children who may not have had access to specialist care otherwise. Lack of infrastructure, dearth of resources and a lack of

trained personnel were the main challenges in the establishment of the telemedicine centre.

(Key words: Telemedicine, Paediatrics, Remote healthcare, Medical technology, Experiences and challenges, Low-resource setting)

### Introduction

Telemedicine is known to have transformed the delivery of healthcare in resource-limited areas by offering access to specialized medical services and expertise, particularly in paediatrics<sup>1</sup>. Telemedicine, the use of electronic communication and information technology to provide clinical healthcare from a distance, has the potential to improve access to healthcare in underserved and remote areas in Nigeria<sup>2</sup>. Patients and families in these resource-limited settings often face challenges such as a lack of access to paediatric specialists and difficulties with long-distance travel<sup>3,4</sup>.

However, implementing telemedicine can be challenging in resource-limited settings where infrastructure and trained personnel may be scarce<sup>5</sup>. In addition to a shortage of resources and trained telemedicine providers, there are currently no established guidelines, regulations, or protocols to standardize the practice of telemedicine. This can make it difficult to implement telemedicine services effectively and ensure the quality of care provided through this method<sup>6</sup>. Telemedicine has the potential to greatly improve the healthcare sector in Nigeria and save many lives, but there are currently challenges and difficulties that need to be addressed to fully realize this potential. By implementing telemedicine in a strategic and effective way, it is possible to overcome these challenges and make the most of this technology in the healthcare sector in Nigeria.

**Objectives:** To describe the experience of and challenges faced in establishing a telemedicine centre in the Paediatric Department of Barau Dikko Teaching Hospital (BDTH) in Kaduna, Nigeria.

### Method

The establishment and launch of telemedicine at BDTH were supported by various stakeholders, including the government and international non-governmental organisations. Initially, it was necessary to address the lack of infrastructure and

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resources at the hospital to begin offering telemedicine services. One major challenge was the hospital's unreliable internet connection, which needed to be improved to provide a stable and reliable connection for telemedicine. The hospital had to invest in the acquisition of routers and computers. The telemedicine devices and other accessories required for it, including the videoconferencing software, a pan zooming camera with electronic stethoscopes, were shipped to the country from the United States as donations.

As part of the process of establishing the telemedicine centre, it was important to assemble a team of clinicians, nurses, and information technology specialists at the hospital and provide them with training in telemedicine. Many of the healthcare providers at the hospital were not familiar

with telemedicine and needed to be trained to use the technology effectively. This began before the devices even arrived in the country and continued for weeks after the installation of the devices. The training was conducted to ensure that healthcare providers focused on the use of telemedicine technology, as well as the principles of telemedicine and how it can be utilized to enhance patient care. The topics covered during the training included how to use videoconferencing software, how to communicate with patients remotely, and how to diagnose and treat patients using telemedicine.

After establishing the necessary infrastructure and training healthcare providers in the use of telemedicine, the hospital had to consider various factors to ensure a smooth start (Box 1).

- What patient population (age, geographic location, etc.) will receive care with the new method?
- How will telemedicine fit into the overall care plan for patients?
- What type of visit (preventative, follow-up, other) will be taken?
- What aspect of patient care (curative, diagnostic, preventive, follow up, monitoring) are we to use telemedicine for?
- Are there exclusions to the use of telemedicine?
- What are the criteria?
- Do we need to obtain consent from patients and their families to use telemedicine for their care?
- What will be the indices of the benefit of telemedicine, how will these be measured, and how frequently?
- How will you handle emergencies or urgent care situations that arise during a telemedicine visit?
- Will fees be charged for the telemedicine services, or will it be offered free?
- Who else (resident doctors, nurses, paediatricians from outside the facility or country, support staff, therapists, etc.) will be part of the care team and what will be their roles?
- What would prevent us from using telehealth in our practice and what are the contraindications to the use of telemedicine?
- How do we keep clinical records of patients seen with telemedicine and how do we integrate this with previous records?

**Box 1: Factors considered prior to deployment of telemedicine service in Barau Dikko Teaching Hospital**

Telemedicine service was integrated into the existing child healthcare services at the hospital with a focus on subspecialties including cardiology, neurology, endocrinology and gastroenterology but was made available to all patients. The centre started providing services to patients. Telemedicine consultations were conducted using video conferencing software and were led by paediatric healthcare providers, including paediatricians, senior registrars in paediatrics, nurses, specialists from the United States and the United Kingdom, as needed. The consultations followed the same structure as in-person visits, with patients receiving assessments, diagnoses, and treatment plans as needed. Telemedicine consultation was done at no cost to the child or his or her parents.

A screening process was conducted to assess the appropriateness of telemedicine consultation with a sub-specialty specialist for the child. Upon completion of the screening, the patient and the parents received counselling and were scheduled for an appointment. On the day of the appointment, the patient or a relative was required to sign a consent form.

### Results

The telemedicine centre in the Department of Paediatrics at BDTH came to fruition due to the combined efforts of multiple stakeholders. These individuals saw the potential of telemedicine to provide children in the area with easier access to specialists and provided the necessary funding and support to make it happen. By joining forces and resources, these stakeholders were able to

successfully establish a telemedicine centre that ultimately improved the healthcare options for children in the region by bringing specialist care within reach.

To address the issue of inadequate infrastructure and resources, the internet connection at the telemedicine centre was improved to provide a stable and reliable connection. Additionally, the provision of more computers facilitated the seamless integration of the telemedicine device with the hospital's electronic medical records system. A team of healthcare providers was formed to drive the process further. The team consisted of consultant paediatricians, nurses, information technology personnel and other supporting staff. They were

trained in the use of telemedicine technology to ensure that they could provide top-notch care to children through this medium.

A particularly problematic challenge in our experience was the lack of guidelines and regulations for the practice of telemedicine in the country. We had to create interim guidelines to ensure high-quality care during telemedicine consultations (Box 2). These guidelines addressed key practice and ethical concerns to be considered such as the process of selecting patients, obtaining consent, scheduling consultations, and handling data.

**General policies:**

- All telemedicine appointments must be conducted in a secure and confidential manner, free from distractions.
- All patient information must be stored securely and handled with discretion.

**Patient selection:**

- Patients are selected for telemedicine based on their medical needs.
- Patients must be medically stable.
- Patients or their caregivers must be able to communicate their medical history via the video conferencing process.
- Patients or their caregivers must be able to understand the risks and benefits of telemedicine.
- Patients or their caregivers are informed of the benefits and limitations of telemedicine and given the option to opt-out.

**Scheduling and appointment times:**

- Telemedicine appointments should be scheduled in advance, with patients given the option to choose their preferred appointment time.
- Telemedicine appointments must be scheduled during the working hours.
- Appointments must be confirmed with the specialist at least 24 hours in advance.
- Patients must be prepared to be connected on time for the appointment (at least 15 minutes before).
- A minimum of 15 minutes must be allotted for each appointment and consultation.
- Appointments must be rescheduled or cancelled at least 24 hours in advance.
- If the patient is unable to attend the scheduled appointment, they should be required to cancel or reschedule at least 24 hours in advance.

**Confidentiality and data security:**

- Telemedicine visits should be conducted in a private location to ensure confidentiality.
- The telemedicine platform should be secured and compliant with relevant laws and regulations.
- Patient data should be handled in accordance with established privacy policies and procedures.

**Box 2: Interim guidelines for telemedicine services in Barau Dikko Teaching Hospital**

In addition to improving patient care, the telemedicine centre also had several other benefits for the hospital and the community. It allowed the hospital to expand its reach and provide care to a larger number of patients. It also allowed the hospital to utilize its resources more efficiently, as healthcare providers were able to see more patients remotely rather than having to see each patient in-person. This has benefitted patients needing to see

subspecialists of paediatrics in the fields of cardiology, neurology, endocrinology, and gastroenterology.

**Discussion**

The creation of a telemedicine centre at the paediatric department of BDTH Kaduna, Nigeria was successful and received with joy by staff and patients alike. It involved the collaboration and

assistance of multiple stakeholders, as well as the establishment of necessary infrastructure and resources. This was a multifaceted process that required careful planning and coordination. A previous study assessed the readiness of 30 federally funded tertiary healthcare institutions in the six zones of Nigeria to implement telemedicine based on factors such as organizational readiness, processes, digital environment, human resources, regulatory issues, expertise, and found that these institutions were only at the 'beginner level of readiness' for telemedicine implementation<sup>7</sup>. In particular, the absence of vital resources presents a significant obstacle to the establishment of telemedicine centres in Nigerian tertiary care hospitals. The process of establishing the telemedicine centre has not been without challenges, particularly regarding the absence of infrastructure, and trained personnel. These obstacles serve to emphasize the necessity of having adequate infrastructure and skilled personnel in place to effectively implement telemedicine in resource-limited settings.

Before BDTH was able to deploy telemedicine devices and implement services, several foundational challenges were addressed. The first was to have an enthusiastic team to train. It has been shown that the success of a new telehealth service depends far more on changing the clinicians' and patients' expectations and patterns of behaviour than on technology<sup>8</sup>. One of the challenges we faced was the need to upgrade our infrastructure, specifically our internet connectivity. We created a plan of action to enhance our institutional readiness to effectively implement telemedicine services. A study has shown that barriers to the widespread adoption of telemedicine in Nigeria include the cost of data and internet services<sup>7</sup>. In Nigeria, as in many other places, we faced the challenges of the absence of laws or regulations regarding medical practice, accountability, financial compensation, patient safety, healthcare quality, and confidentiality of personal health information<sup>1</sup>.

There are several legal and ethical considerations surrounding the use of telemedicine that need to be addressed. Telemedicine is a relatively new and untested method of delivering healthcare, which has raised concerns about its potential risks to patients. Lack of clear guidelines creates uncertainty around issues such as payment platforms for medical services, data and record sharing between healthcare providers, and the applicability of laws in cross-border telemedicine cases. Without a dedicated telemedicine law, it can be very challenging to navigate through these complexities and ensure the smooth operation of telemedicine services in Nigeria<sup>9</sup>.

Professional organizations and associations should establish guidelines for telemedicine in their respective fields, including clinical, technical, operational, and ethical guidelines, as and when necessary. However, due to the limited number of telemedicine practitioners in Nigeria and particularly so in paediatrics, the implementation of telemedicine in this field may need to be built from the ground up. It was essential to establish standard operating procedures to address these issues and to carefully consider all aspects of telemedicine in paediatrics, including the appropriate guidelines and protocols to ensure the safety and effectiveness of this method of healthcare delivery. We have taken steps to address some of the regulatory barriers in a limited capacity. We have developed a guideline for the delivery of telemedicine services, which helps to provide some structure and clarity for the use of these services. While this guideline is not a comprehensive solution, it is a proactive step that can help to ensure the smooth operation of telemedicine in Nigeria. This has contributed to the smooth operation and success of our programme.

Our experience with the telemedicine programme has been one of success, with both patients and healthcare providers benefiting from this innovative form of providing healthcare. We have successfully applied telemedicine to increase access to cardiac subspecialists. Similar use of telemedicine in the field of cardiology is increasingly being reported<sup>10-13</sup>. This includes the use of electronic stethoscopes to transmit high-quality heart sounds<sup>14</sup> as well as the transmission of echocardiograms, ultrasonographic images, electrocardiograms, and other images electronically for evaluation as part of telecardiology programmes<sup>12</sup>.

Telemedicine is being increasingly utilized to improve access to care for children, particularly in situations where the paediatric subspecialist is in a remote location, leading to increased healthcare access, improved management of diseases, and more effective monitoring of health conditions<sup>17,18</sup>. We believe that telemedicine has an important role to play in the future of child healthcare and recommend its wider adoption in similar settings. However, telemedicine implementation and use in paediatric care come with a variety of experiences and challenges. To ensure the success of future telemedicine initiatives, it is important to carefully consider and address these challenges. By doing so, it is possible to improve patient care and increase access to care using telemedicine technology.

## Conclusions

The establishment of a telemedicine centre at the Paediatric Department of BDTH, Kaduna, Nigeria, has had a significant impact on patient care, particularly for children who may not have had

access to specialist care otherwise. Lack of infrastructure, dearth of resources and a lack of trained personnel were the main challenges in the establishment of the telemedicine centre.

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