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Is telemedicine prepared to overcome the barriers to access of health services in Brazil? TeleNordeste's experience report

A telemedicina está preparada para contornar as barreiras de implementação no Brasil? Experiências do TeleNordeste

¿Está la telemedicina preparada para superar las barreras de acceso a los servicios de salud en Brasil? Relato de experiencia do TeleNordeste

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Abstract

Problem: In Brazil, there is evidence that certain disadvantaged groups have lower survival rates and a higher probability of premature death. Health inequities are favored by the poor distribution of healthcare professionals, especially doctors, across the country. Telehealth has the potential to support the resolution of issues related to the population's health. This article described the implementation of a teleconsultation service for Primary Health Care (PHC) with secondary services through telemedicine. It includes challenges and barriers to implementation not commonly described in the literature. **Methods:** This is an experiential report on the implementation of TeleNordeste in Rio Grande do Norte. The project was developed in collaboration with the Brazilian Ministry of Health through the Support Program for Sustainable Development of the Unified Health System (PROADI-SUS) and built with the assistance of local professionals and managers based on the PASA model, linking teleconsultant doctors to Family Health Teams in the territory. **Results:** Several stages were necessary for implementation, such as situational diagnosis, approach visits, and collaboration contracts between municipalities and Moinhos de Vento Hospital Association (*Associação Hospitalar Moinhos de Vento* – AHMV). During implementation, barriers and challenges related to technological, human, and social aspects of the healthcare network, psychosocial and anthropological factors, as well as governmental and economic factors, were identified. **Conclusions:** Despite all the barriers and challenges encountered in the implementation process, it was possible to verify that teleconsultations have many advantages and also function as a strategy for continued education. The teleconsultation model implemented in Rio Grande do Norte has demonstrated a reduction in waiting time and resolved the majority of cases attended, reducing in-person referrals.

Keywords: Telemedicine; Primary health care; Barriers to access of health services.

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Resumo

Problema: No Brasil, há evidências de que alguns grupos desfavorecidos têm menos chances de sobrevivência, e maior probabilidade de morrer prematuramente. As iniquidades na saúde são favorecidas pela má distribuição de profissionais de saúde, especialmente de médicos, no país. A telessaúde tem o potencial de apoiar na resolução das problemáticas relacionadas à saúde da população. Este artigo descreve a implementação de um serviço de teleinterconsultas para a Atenção Primária à Saúde (APS), com serviços secundários, através de telemedicina. Além disso, aborda desafios e barreiras à implementação que não são comumente descritos na literatura. **Método:** Este é um relato de experiência da implementação do TeleNordeste no Rio Grande do Norte. O projeto foi elaborado em colaboração com o Ministério da Saúde do Brasil, através do Programa de Apoio ao Desenvolvimento Sustentável do Sistema Único de Saúde (PROADI-SUS). Foi desenvolvido com auxílio de profissionais e gestores locais, com base no modelo PASA, vinculando médicos teleconsultores às Equipes de Saúde da Família no território. **Resultados:** Para a implementação, foram necessárias algumas etapas, como diagnóstico situacional, visitas de aproximação e contratos de colaboração entre os municípios e a Associação Hospitalar Moinhos de Vento (AHMV). Durante a implementação foram identificadas barreiras e desafios relacionados às tecnologias, humanas e sociais, da rede de saúde, psicossociais e antropológicas, além de governamentais e econômicas. **Conclusões:** Apesar de todas as barreiras e desafios encontrados no processo de implementação, foi possível verificar que as teleinterconsultas têm muitas vantagens e funcionam, também, como estratégia de educação continuada. O modelo de teleinterconsultas implementado no Rio Grande do Norte tem demonstrado reduzir o tempo de espera e resolvido a maioria dos casos atendidos, reduzindo os encaminhamentos presenciais.

Palavras-chaves: Telemedicina; Atenção primária à saúde; Barreiras ao acesso aos cuidados de saúde.

Resumen

Problema: En Brasil, hay evidencias de que algunos grupos desfavorecidos tienen menos probabilidades de sobrevivir y más probabilidades de morir prematuramente. Las desigualdades en salud están favorecidas por la mala distribución de profesionales de la salud, especialmente médicos, en el país. La telemedicina tiene el potencial de apoyar en la resolución de problemáticas relacionadas con la salud de la población. Este artículo describe la implementación de un servicio de teleconsultas para la Atención Primaria de Salud (APS) con servicios secundarios a través de la telemedicina. Incluye desafíos y barreras a la implementación no comúnmente descritos en la literatura. **Métodos:** Este es un informe de experiencia de la implementación del TeleNordeste en Rio Grande do Norte. El proyecto fue elaborado en colaboración con el Ministerio de Salud de Brasil, a través del Programa de Apoyo al Desarrollo Sostenible del Sistema Único de Salud (PROADI-SUS), y construido con la ayuda de profesionales y gestores locales basados en el modelo PASA, vinculando médicos teleconsultores a los Equipos de Salud Familiar en el territorio. **Resultados:** Para la implementación, se necesitaron algunas etapas como diagnóstico situacional, visitas de aproximación y contratos de colaboración entre los municipios y la Asociación Hospitalaria Moinhos de Vento (AHMV). Durante la implementación se identificaron barreras y desafíos relacionados con las tecnologías, humanas y sociales, de la red de salud, psicosociales y antropológicas, además de gubernamentales y económicas. **Conclusiones:** A pesar de todas las barreras y desafíos encontrados en el proceso de implementación, fue posible verificar que las teleconsultas tienen muchas ventajas y funcionan también como estrategia de educación continua. El modelo de teleconsultas implementado en Rio Grande do Norte ha demostrado reducir el tiempo de espera y resolver la mayoría de los casos atendidos, reduciendo los referimientos presenciales.

Palabras clave: Telemedicina; Atención primaria de salud; Barreras de acceso a los servicios de salud.

INTRODUCTION

Since its enactment in 1988, health has been established as a constitutional right in Brazil. The Brazilian Unified Health System (*Sistema Único de Saúde* – SUS) is structured around three fundamental principles: universalization, comprehensiveness, and equity.[1] The concept of equity, in this context, refers to the absence of systematic disparities in health outcomes or in the primary social determinants of health among groups occupying different positions within the social hierarchy.[2] There is robust evidence indicating that disadvantaged groups have a lower likelihood of survival and a higher risk of premature death compared to more advantaged populations.[3] Furthermore, these groups not only face higher mortality rates but also endure a disproportionate burden of disease, often experiencing illness in a more severe and oppressive manner, along with the earlier onset of chronic conditions and disabilities.[3]

Equity entails ensuring that the distribution and design of health resources, programs, and policies, many of which extend beyond the direct influence of the health sector, are aimed at equalizing outcomes among socially advantaged and disadvantaged groups.[2] According to the World Health Organization,

nearly half of the global population lacks adequate access to qualified health services.[4] This highlights the persistent challenge of health inequities faced by both central and peripheral nations.[4]

A key factor contributing to the worsening of social determinants and health inequities is the shortage of healthcare professionals, particularly doctors.[4] Over the past 50 years, the number of doctors in Brazil has grown nearly four times faster than the population.[5] As of January 2023, Brazil has 560,229 doctors, resulting in a national ratio of 2.60 doctors per 1,000 inhabitants. Despite this significant quantitative growth, disparities in the distribution of medical professionals across the country persist. According to a medical demographics report by Universidade de São Paulo (2023), there is a stark inequality in the availability of doctors between capital cities and inland areas. In capital cities, the average is 6.13 doctors per 1,000 inhabitants, compared to only 1.84 doctors per 1,000 inhabitants in inland cities. Regional disparities are also evident: while the national average is 2.60 doctors per 1,000 inhabitants, the North region has a rate of 1.45, which is 44% below the national average, and the Northeast region has a rate of 1.93.[5]

Telehealth presents a scalable and effective strategy to address the shortage of healthcare professionals, particularly in hard-to-reach areas.[6] In contexts where barriers to healthcare access exist, telemedicine has emerged as a tool to reduce inequities, improve the efficiency, effectiveness, and quality of services, and enhance user satisfaction.[7-9] In December 2022, Brazil enacted Law No. 14.510, which authorized and regulated telehealth in the country, encompassing remote care across all regulated health professions.[10] This law also established standards for information and communication technologies, including the secure transmission of health data and information. In response to significant gaps in care and the uneven distribution of resources in the Northeast region, as well as the regulation of telemedicine, the TeleNordeste project was launched. The telemedicine model employed in this initiative is teleconsultation, which involves the exchange of information and opinions between doctors for diagnostic evaluation or therapeutic and clinical management.[11]

Reflecting on the barriers to implementing digital health strategies is essential for understanding the limitations of a given region. This awareness, in turn, fosters the development of more effective solutions and supports the integration of other digital tools that can enhance patient health in these areas, mitigating the challenges previously encountered.[12] Therefore, the objective of this study was to report the experience of implementing a teleconsultation service for Primary Health Care (PHC) in conjunction with secondary services through telemedicine, highlighting, among other aspects, challenges and barriers to implementation that are not commonly discussed in the literature.

METHODS

This experience report was prepared in accordance with the Standards for Quality Improvement Reporting Excellence (SQUIRE) guidelines,[13] and describes the implementation of the project "Specialized Medical Care in the Northeast Region of Brazil through Telemedicine (*Assistência médica especializada na região Nordeste do Brasil por meio de Telemedicina*) – TeleNordeste" in the Seridó region of Rio Grande do Norte, carried out by the administrative team. The project was developed in collaboration with the Brazilian Ministry of Health through the Support Program for the Sustainable Development of the Unified Health System (*Programa de Apoio ao Desenvolvimento Sustentável do Sistema Único de Saúde* – PROADI-SUS). It was designed with the assistance of local professionals and managers, following the model proposed by Mendes.[14] This model emphasizes the integration of teleconsultants with Family Health Teams, thereby influencing health management in territorial regions. Priority is given to areas that

implement Health Care Planning (*Planificação da Atenção à Saúde* – PAS) and/or PlanificaSUS, as well as those utilizing the Chronic Health Conditions Care Model (*Modelo de Atenção às Condições Crônicas de Saúde* – MACC).[14]

This project aims to expand the availability of specialized care through teleconsultations. This modality involves the exchange of information and opinions between physicians, facilitated by technology, with or without the patient's presence, for diagnostic, therapeutic, clinical, or surgical assistance in Primary Health Care.[10] The analysis of the experience was conducted retrospectively through a collective process involving multiple rounds of discussion about the actions carried out during the implementation phase of the TeleNordeste project. These actions included situational diagnosis, outreach visits, and the signing of collaboration contracts. Hypotheses and lessons learned from the intervention were developed based on the personal and professional experiences of the team, considering their prior knowledge and expertise as researchers, physicians, and nurses. These formulations were informed by the literature, situational analysis, and insights gained during the outreach visits. The Research Ethics Committee of Hospital Moinhos de Vento approved the project (CAAE 63070522.8.0000.5330).

RESULTS

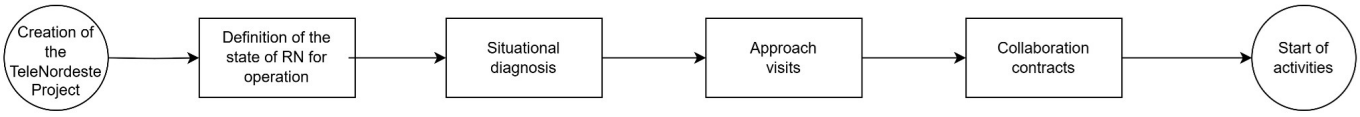
The TeleNordeste project was implemented in the Seridó region of the state of Rio Grande do Norte (Chart 1)[15].

Chart 1. Main characteristics of the region where the TeleNordeste project operates.

The project operates in the Seridó region of Rio Grande do Norte, located in the Northeast of Brazil.
It covers an area of 9,374.063 km² and had an estimated population of 310,067 inhabitants[15].
The region comprises 25 municipalities, 123 UBS*, and 126 ESFs*.
The project has the installed capacity to serve the entire region in the specialties of cardiology, neurology, psychiatry, and endocrinology.

*UBS: Basic Health Unit (*Unidade Básica de Saúde*); ESF: Family Health Team (*Equipe de Saúde da Família*).

During the implementation phase of the TeleNordeste project, the following actions were carried out (Figure 1):



RN: Rio Grande do Norte.
Figure 1. Flowchart of the phases of implementation of the TeleNordeste project.

1. Situational Diagnosis: Online and in-person meetings were conducted with state and local managers to carry out an initial assessment of the region's infrastructure and main health demands. Based on the discussions in these meetings, the project team developed a structured interview guide for the situational diagnosis, focusing on understanding technological needs, such as the availability of equipment, devices, and internet access, as well as the primary clinical conditions. The results of the situational diagnosis revealed that the main health inequities were in the areas of cardiology, endocrinology, neurology, and psychiatry. These specialties were selected because they were prioritized in the regulation of the participating municipalities. Although there was no specific regulatory system, municipal managers monitored PHC referrals through monthly reports.

The identified shortage of professionals in these specialties restricts the region's service capacity, leading to waiting lists for care, with wait times that are nearly impossible to measure due to the lack of management and operational oversight of the referral patient flow.

2. Outreach Visits: The project team conducted reconnaissance and outreach visits with municipal managers and Family Health Teams (FHT) to clarify key aspects of the project and encourage participation in the TeleNordeste project activities. The visit schedule was organized in alignment with the availability of state health managers and the inter-management committee meetings at each location, aiming to engage as many professionals as possible in the project. These visits were also followed by visits to the Basic Health Units (*unidades básicas de saúde* – UBSs) to meet with healthcare teams and raise awareness about the services offered.
3. Collaboration Contracts: Collaboration contracts were established to formalize partnerships between institutions and facilitate the loan of equipment necessary for conducting teleconsultations. These agreements aimed to ensure collaboration and commitment between the municipalities and the referral hospital, as well as to support the proper execution of project activities by defining the duties and rights of each institution. Equipment was provided only after the contracts were signed, and teams were subsequently trained to use the telemedicine platform. UBSs that already possessed the technological infrastructure for teleconsultations did not receive additional equipment but underwent training following the signing of the collaboration contract.

As part of the implementation of the TeleNordeste project, a telemedicine platform was specifically developed to support the initiative, incorporating features tailored for teleconsultations. This platform facilitates simultaneous connections between professionals based on appointments scheduled on behalf of patients. During teleconsultations, both the UBS professional in Rio Grande do Norte and the specialist physician connect via videoconference to collaboratively develop a care plan for the patient registered on the platform. Upon completion of the consultation, both professionals can access the recorded information, thereby fostering shared care and continuity of treatment.

During the initial execution of the project, several barriers to implementation were encountered, some commonly reported in the literature and others specific to the regional context. These barriers were categorized as technological, human and social, health network-related, psychosocial and anthropological, as well as governmental and economic (Chart 2). The barriers were identified based on the experience of the implementation team and documented in meeting minutes, where obstacles to initiating actions and ensuring the proper progress of activities were noted. For each barrier encountered, follow-up meetings were scheduled with state and municipal managers to address the issues and ensure the project's effective operation.

Technological barriers included low adoption of new technologies by primary care physicians, difficulties in accessing the internet, and connection issues caused by obsolete equipment. During the implementation of the TeleNordeste project, one of the primary obstacles to the use of telemedicine was identified as the underutilization of technological capacity, compounded by limited internet access and the complex eligibility requirements for technology improvement programs. Furthermore, it was observed that health units lacking internet connectivity were often located in municipalities where managers were unaware of the Ministry of Health's Digital Health Strategy and the *Rede Conectada* Project, which aimed to provide connectivity to 16,202 health units.[14] Despite being important initiatives, the limited applicability of such computerization strategies highlights their inability to address the vast size and unique characteristics of the Brazilian territory effectively.

Chart 2. Barriers to implementing the TeleNordeste project.

Technology	Human and Social	Health Network	Psychosocial and Anthropological	Governmental and Economic
Low adherence from Primary Health Care (PHC) doctors to new technologies.	Difficulty in forming a team of specialists.	Creation of friction points in the health network due to the increased demand after teleconsultations.	Cultural barriers.	Need for coordination with local management.
Internet access difficulties.	Insufficient number of doctors for the patient population in the territory	Fragmentation of health networks.	Different epidemiological profile.	Electoral silence – impossibility of sending equipment.
Connection issues due to obsolete equipment.	Increased workload for PHC doctors.	Difficulties in scheduling protected time slots for doctors.	Belief in the ineffectiveness of online medical assistance.	Inflation and rising costs.
	High turnover rate among UBS doctors.	Difficulty obtaining tests in the network.		Distance and travel for situational assessment.
		Difficulty obtaining medications in the network.		Difficulty in gaining adherence from local managers.

PHC: Primary Health Care; UBS: Basic Health Unit (*Unidade Básica de Saúde*).

In the human and social aspects, several challenges were identified, including difficulties in assembling a team of specialists, an insufficient doctor-to-patient ratio in the region, increased workloads for PHC doctors, and high turnover rates among doctors in UBSs. These factors highlight a significant barrier, as there is not always a doctor available at the UBSs to participate in the project. This issue arises from the high demands placed on healthcare professionals and their limited working hours, which often prevent them from engaging in teleconsultations.

Barriers related to health networks included the creation of friction points within the healthcare system; fragmentation of healthcare networks; challenges in protecting designated time slots in the PHC physicians' schedules; and difficulties in accessing exams and medications within the network. In this context, the primary challenge faced by the TeleNordeste project was integrating its processes into the daily operations of the Basic Health Units. The implementation of a new care model required significant adaptation and adjustments within the existing healthcare network.

Psychosocial and anthropological barriers included cultural resistance, differing epidemiological profiles, and skepticism regarding the effectiveness of online medical care. Additionally, resistance was observed among UBS doctors to exposing their knowledge to specialist physicians. This resistance may be linked to the hierarchical teaching model prevalent in biomedical institutions, which reinforces a structured hierarchy among healthcare professionals. Furthermore, cultural perceptions and societal expectations that position medical professionals as absolute authorities in knowledge may contribute to a reluctance to openly discuss cases or acknowledge uncertainties and challenges, as this could be perceived as undermining their credibility among peers.

Governmental and economic barriers included the need for coordination with local administrations, restrictions on sending equipment due to electoral silence, inflation and rising costs, long travel distances for

situational assessments, and challenges faced by local managers in adhering to the project. The economic instability during the pandemic led to Brazil ending 2022 with an inflation rate of 5.8%, which began to decline in the months following the first half of 2023.[16] This period of inflation and financial imbalance highlighted the need for budgetary adjustments to account for expenses and costs that exceeded the initial estimates. Additionally, difficulties in adherence to and understanding of the project by managers were observed. These challenges stemmed from personal or political/partisan conflicts of interest, as well as resistance to incorporating new workflows and adopting the process changes required for the successful implementation of TeleNordeste.

DISCUSSION

Despite the barriers and challenges encountered during implementation, the teleconsultation format offers numerous advantages. It also serves as a strategy for continuous education and as an intervention to change professional behavior. In TeleNordeste, the potential for improving the quality of care and implementing guideline recommendations in clinical practice became evident. With the presence of the patient's primary care physician, the specialist physician can develop a care plan and recommendations better aligned with the patient's reality and local culture. The teleconsultation model implemented in Rio Grande do Norte has shown a reduction in wait times and resolved most cases, thereby decreasing the need for in-person referrals. Chen et al. cite in their studies that the telemedicine-supported care model reduces patient referrals for in-person consultations by 40%.[17]

Several barriers encountered during the implementation of the TeleNordeste project have been previously described in the literature, including issues related to technological infrastructure, organizational culture, and challenges in conducting situational assessments.[18] However, other barriers identified by the authors and project implementers have not been documented in existing literature and are highly specific to the context of this project. A study evaluating the integration of telehealth in Primary Care highlighted essential factors for the effective use of digital information and communication technologies (DICT). These include ease of access and usability for professionals, as well as the "macropolitical" framework, which encompasses agreements, the organizational structure of the unit, local coordination, and ongoing education policies, factors associated with higher adherence to these technologies.[19] Additionally, Leddy et al.'s study, conducted in Uganda, identified various barriers to the implementation of digital technology in tuberculosis treatment. These included limited access to mobile devices, inadequate social support, and concerns regarding the stigma associated with the disease, which are barriers distinct from those encountered during the implementation of TeleNordeste.[20]

A systematic review of the literature identified 76 distinct barriers to the implementation of digital health services. The most frequently cited barrier was low literacy among users regarding the technologies offered, followed by a lack of devices necessary for implementation and financial constraints that hinder both the deployment and use of digital health services.[21] The same study also highlighted facilitators of implementation, which, although not the primary focus of this analysis, were observed in this project. These included the platform's ease of use, improved communication among professionals, and, most notably, the facilitation of shared care in patient management.[21]

Telehealth is recognized as a tool to promote universal access, comprehensiveness, and equity, which are foundational principles of the SUS. However, it does not yet appear adequately equipped to address access barriers across different regions. Identifying and describing these barriers is crucial for fostering

dialogue on the subject, disseminating acquired knowledge, and ensuring that future interventions do not encounter the same challenges. Telemedicine, as a valuable resource, often reveals latent weaknesses in care that might otherwise remain unnoticed. Understanding these specific barriers is essential for effectively planning telemedicine interventions. It is emphasized that alongside implementation, measures must be taken to mitigate access barriers, such as those identified in the TeleNordeste project and discussed in this study.

The limitations of this study include the potential lack of structure in the process of identifying barriers and challenges, which may have led to the omission of certain axes and variables. Nevertheless, the implementation was carried out in alignment with the context and constraints of the project scenario.

Despite the barriers and challenges encountered during the implementation of the TeleNordeste project, the telehealth model demonstrated significant advantages. By utilizing teleconsultations to facilitate collaboration between primary care physicians and specialists, the model not only improved care coordination but also served as a strategy for continuing education. In Rio Grande do Norte, teleconsultations were shown to reduce waiting times and resolve the majority of cases, thereby decreasing the need for in-person referrals despite the challenges faced.

CONFLICT OF INTERESTS

Nothing to declare.

AUTHORS' CONTRIBUTIONS

MEVC: Formal analysis, Conceptualization, Data curation, Writing – original draft, Writing – review & editing, Investigation, Methodology, Funding acquisition, Validation. GTA: Formal analysis, Conceptualization, Data curation, Writing – original draft, Writing – review & editing, Investigation, Funding acquisition, Validation. TSL: Formal analysis, Conceptualization, Writing – review & editing, Investigation, Methodology, Funding acquisition, Supervision, Validation. TCM: Project administration, Formal analysis, Conceptualization, Data curation, Writing – original draft, Writing – review & editing, Investigation, Methodology, Funding acquisition, Supervision. ADD: Formal analysis, Conceptualization, Writing – review & editing, Investigation, Funding acquisition. GRF: Formal analysis, Conceptualization, Data curation, Writing – original draft, Writing – review & editing, Investigation, Funding acquisition. GCF: Formal analysis, Conceptualization, Data curation, Writing – original draft, Writing – review & editing, Investigation, Funding acquisition. DHF: Formal analysis, Conceptualization, Writing – review & editing, Investigation, Funding acquisition. HMRMC: Project administration, Formal analysis, Conceptualization, Writing – review & editing, Investigation, Funding acquisition, Supervision. FCC: Project administration, Formal analysis, Conceptualization, Writing – review & editing, Investigation, Funding acquisition.

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