Expanding access and training through Digital Health: a report on the successful experiences of the Acre Telehealth Center.

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Abstract

The Acre Telehealth Center was established in 2016, in a partnership between the State Health Secretariat and the Federal University of Acre, and has been gradually implementing Digital Health modalities. **Objective**: to report the successful experiences developed by the Acre Telehealth Center, highlighting the achievements obtained and the challenges faced in each of them. Experience **Report**: four successful experiences are reported – integration with the Federal University in teaching, research, and extension activities; actions in tele-education, with the production of web lectures, web series, and distance learning courses; mediation and monitoring of the PROADI-SUS Project in the development of Telemedicine in the municipalities; and the implementation of telediagnosis in the municipalities. **Conclusion:** Through these experiences, the Acre Telehealth Center has contributed to expanding access and quality of services, reducing waiting lists and costs in Out-of-Home Treatment, and promoting equity and democratization of healthcare.
Key-words: Digital Health; Telehealth; Primary Health Care; Human Resources Training in Health

Resumen

Ampliando el acceso y la formación por médio de la Salud Digital: relato de experiencias exitosas del Centro de Telesalud de Acre

El Centro de Telesalud de Acre fue fundado en 2016, en colaboración con la Secretaría de Salud del Estado y la Universidad Federal de Acre, y ha implementado gradualmente modalidades de Salud Digital. **Objetivo:** Reportar las experiencias exitosas desarrolladas por el Centro de Telesalud de Acre, destacando los logros obtenidos y los desafíos enfrentados en cada una de ellas. **Informe de Experiencia**: Hubo cuatro experiencias exitosas relatadas: integración con la Universidad Federal en actividades de docencia, investigación y extensión; acciones de teleeducación, con la producción de conferencias web, series web y cursos a distancia; mediación y seguimiento del Proyecto PROADI-SUS en el desarrollo de la Telemedicina en los municipios; y la implementación del telediagnóstico en los municipios. **Conclusión:** Con estas experiencias, el Centro de Telesalud de Acre ha contribuido a ampliar el acceso y la calidad de los servicios, a reducir las listas de espera y los costos de la atención fuera del hogar, y a la equidad y democratización de la atención médica.
Palabras clave: Salud Digital; Telesalud; Atención Primaria de Salud; Formación de Recursos Humanos en Salud

Resumo

Ampliando acesso e formação através da Saúde Digital: um relato das experiências exitosas do Núcleo Telessaúde Acre

O Núcleo Telessaúde Acre foi implantado em 2016, em uma parceria entre Secretaria de Estado da Saúde e Universidade Federal do Acre, e vem implementando gradativamente as modalidades de Saúde Digital. **Objetivo:** relatar as experiências exitosas desenvolvidas pelo Núcleo Telessaúde Acre, destacando as conquistas obtidas e os desafios enfrentados em cada uma delas. **Relato de Experiência:** são relatadas quatro experiências exitosas – integração com a Universidade Federal em ações de ensino, pesquisa e extensão; ações em tele-educação, com a produção de webpalestras, webséries e cursos EaD; mediação e monitoramento do Projeto PROADI-SUS no desenvolvimento de Telemedicina nos municípios; e a implantação do telediagnóstico nos municípios. **Conclusão:** com essas experiências o Núcleo Telessaúde Acre tem contribuído para ampliação do acesso e qualidade dos serviços, para a redução das filas e diminuição dos custos em Tratamento Fora de Domicílio, e na equidade e democratização da atenção à saúde.

Palavras-chave: Saúde Digital; Telessaúde; Atenção Primária à Saúde; Capacitação de Recursos Humanos em Saúde

INTRODUCTION

In the contemporary world, telehealth strategies are an important component of healthcare systems, especially in rural and remote areas. These locations face difficulties accessing specialists and more sophisticated diagnostic methods, which are more readily available in larger cities and near major medical centers. With the advent of the internet at the end of the 20th century and its development at the beginning of the 21st century, these strategies have been gradually incorporated into health services. Following the surge in technological devices, such as tablets and smartphones, and their widespread use during the COVID-19 pandemic, they have contributed to the diversification of services and the development of the field of knowledge and practices known as Digital Health.

In Brazil, the milestone was the development of the Telehealth Brazil Networks Program, the result of the coordination between State Centers in a national program guided by the Ministry of Health. The National Telehealth Brazil Networks Program (*Programa Nacional Telessaúde Brasil*) was established through Ordinance number 35 of 2007, and redefined and expanded through MS Ordinance number 2,546 of 2011[2,3]. The program enabled the expansion and collaboration among the centers in the various action mechanisms. The Legal Amazon is one of the regions with great potential for development and social benefit from digital health services. Good results have already been achieved in the State of Amazonas, where municipalities located in more remote areas have had access to specialized teleconsultations, reducing isolation and contributing to the continuing education of professionals working there.

In Acre, the Telehealth Center was established in 2016 and has since been providing services with the support of the Ministry of Health and other older centers. Three agreements have already been signed for the maintenance and operation of the Center: the first in 2008, the second in 2017, and the third most recently in 2025. These agreements enabled hiring a specific team for the center and developing actions in the municipalities. The partnership with the Federal University of Acre (UFAC) was an action that facilitated the implementation and execution of activities. It provided two rooms and a Telehealth Laboratory for projects involving teaching, research, and outreach.

This article aims to report on the successful experiences developed by the Acre Telehealth Center, highlighting the achievements obtained and the challenges faced in each of them. We expected that it would contribute to the exchange of experiences and information, as well as to its improvement. The integration with the University is the first experience highlighted, as it is something original that has yielded good results for the institutions involved. The other experiences chosen were in the areas of tele-education (development of web lectures and distance learning courses), telediagnosis (implementation process in municipalities), and teleconsultation (medication of the PROADI-SUS project with the municipalities of Acre).

Experience Report
The Telehealth Center within the University: integration through teaching, research, and outreach projects

The Acre Telehealth Center was established through a partnership with UFAC (Federal University of Acre) and has operated on the university's premises since its beginning, staffed by three professors from the medical program. This arrangement has facilitated essential collaboration for teaching, research, and outreach activities. The partnership is supported by UFAC's administration, which provides two rooms for the team's work and a laboratory space.

From the outset, the center's activities included internships for medical students. In the pre-pandemic era, interns collaborated in teleconsultation activities. For each request, the internship activity was to create a "mini-review" on the main topic using two updated references. In their responses, the teleconsultants attached the mini-reviews, contributing to the continuing education of the requesting professional. More than 50 mini-reviews were completed, constituting

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technical output from the interns and the Telehealth Center.

During the pandemic, all the center's activities were focused on combating Covid-19, with the organization of two initiatives: the "Coronavirus Hotline," designed to answer questions and provide guidance to the population; and "Telemonitoring," designed for the remote monitoring of people who tested positive for the virus, enabling timely in-person care. At the beginning of the pandemic, all teaching activities were suspended, including those of the medical internship program. Due to the need for a workforce to combat the pandemic, the Acre Telehealth Center recruited a team of 200 interns to work via mobile communication devices, with hours spent validating their internship. The Coronavirus Hotline received 8171 calls, and the Telemonitoring program monitored a total of 5593 people. From these experiences a teaching project and two extension projects emerged, institutionalized at the University, with certification for the interns and the production of two experience report articles[4,5].

In the post-pandemic period, with the diversification of activities, the role of interns involves assisting in the monitoring and implementation of actions with municipalities, participating in the execution of telediagnosis and tele-education actions, and developing innovative projects, such as podcasts and extension and research projects focusing on Digital Health modalities.

Teaching activities are developed through internships in telehealth modalities. There are rotations for the Internship and Residency in Family and Community Medicine in teleconsultation and telediagnosis. In this way, they experience specialized consultations via telemedicine, gaining knowledge of the services, workflows, and their usefulness in expanding access and continuing education.

In this research, there were three projects: one in the area of telediagnosis and two in the area of telemedicine, involving undergraduate students in the development of scientific initiation sub-projects and undergraduate thesis projects. The first project focuses on electrocardiographic alterations in municipalities in the interior of Acre. This project has produced undergraduate theses related to seven municipalities and one undergraduate research project (PIBIC). The telemedicine projects aim to analyze the sociodemographic characteristics of users served in Psychiatry and Cardiology. These two projects are contributing to the analysis of users, diagnoses, and medical follow-up carried out within this strategy. These projects have already produced four undergraduate theses, and three more are underway on Cardiology, contributing to

adjustments in the flows and management of the program at the municipal level.

Regarding outreach, the Center has already produced two previously mentioned projects in response to the COVID-19 pandemic. Currently, a project is being initiated in conjunction with the Oncology, Dermatology, and Plastic Surgery Leagues, aiming at the early diagnosis of skin cancer cases through teledermatology. To support these actions, the Telehealth Laboratory was recently inaugurated, featuring consulting rooms for telediagnosis and telemedicine, as well as a soundproof room for producing tele-education activities.

These initiatives offer benefits for both core production and medical training. Experience in the field of Digital Health is becoming increasingly important for future healthcare professionals, as it is progressively being integrated into the healthcare system and will soon represent a significant portion of healthcare activities. With the development and improvement of post-pandemic strategies, teleconsultations and other services are already possible, supported by a well-established ethical framework.[6] It is fundamental that students have the opportunity from the start of their training to develop the necessary skills for the responsible, ethical, and committed use of these technologies to address the needs of the population.

Challenges include teacher training in digital health tools, as they are relatively recent and innovative practices, and teachers do not always have the necessary experience. Deepening research projects, with integration into postgraduate studies, is also a possible and promising path. It will be possible to develop research that can answer more complex questions. Finally, an important challenge is the formal incorporation of Digital Health activities into the undergraduate curricula of health professions.

Web lectures, web series, and distance learning courses: distance education as a tool for training and service qualification.

Tele-education is one of the services offered by the Telehealth Brazil Networks Program (*Programa Telessaúde Brasil Redes)*, according to Ordinance number 2546 of October 27, 2011, and aims to develop actions based on regional needs and aligned with the priorities of the national health policy. In Acre, this activity began in May 2017, using the virtual room of the National Research Network (RNP-*Rede Nacional de Pesquisa)*, hosted at UFAC, for the transmission of web lectures. In 2018, the service was interrupted due to the termination of the agreement, and resumed in 2019.
In this new phase, a YouTube channel was created where the webinars began to be broadcast live,

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significantly expanding the reach of the initiatives. Currently, the channel has over 9,000 subscribers and more than 530 videos posted. The most innovative and noteworthy presentations have been the web series related to mental health, resulting from partnerships with UFAC (Federal University of Acre) and the Acre Hospital Foundation, entitled "Debate Series on Mental Health and Suicide Prevention," *(Ciclo de Debates sobre Saúde Mental e Prevenção do Suicídio*) which includes more than 50 video lessons, and "Free Expression," (*Livrexpressão)* which evokes artistic expressions related to quality of life, with more than 20 live sessions held.

The Center currently has a dedicated team responsible for organizing activities, enabling it to expand its scope and take on new challenges. The structuring and implementation of self-instructional courses has emerged, which enhances training opportunities for healthcare workers. These courses use active and flexible methodologies adapted to the different realities of the different regions.

The first major project of this new phase was the development of the course "Comprehensive Care for People with Autism Spectrum Disorder (ASD) in Primary Care," (*Cuidado Integral da Pessoa com Transtorno do Espectro Autista (TEA) na Atenção Primária),* which is in its final stages of development. This course, designed to meet the needs of primary healthcare professionals, has been built collaboratively, with contributions from members of the Center and external specialists with experience in the subject.

Mediation and monitoring in telemedicine: the role of the Acre Telehealth Center within the Proadi-SUS Program of the Albert Einstein Israelite Hospital.

The PROADI-SUS Program of the Albert Einstein Israelite Hospital (HIAE) was implemented in Acre in 2021 in seven municipalities. The project consists of teleconsultation services, which presuppose the presence of the patient and doctor in the municipal offices, and the specialist via video call, enabling direct consultation with the patient, mediated by the local doctor. Currently, 18 municipalities have the program implemented, offering 12 specialties.

The Acre Telehealth Center plays a crucial role in implementing and consolidating telehealth services in various municipalities. This involves ensuring that program participation requirements are met and assisting management in selecting the appropriate primary care unit. The Center is also responsible for defining the necessary computer equipment and organizing the local medical scheduling. To strengthen the service, the Center's team travels to different municipalities to train doctors, help schedule appointments, identify potential obstacles, and suggest strategies to reduce appointment cancellations. The Center has also developed protocols and workflows for specialties, while collaborating with regulatory bodies to organize and rationalize the use of these specialties, expanding access and ensuring patient priority.

Since 2021, there has been an increase in the number of consultations carried out (Figure 1) with the inclusion of new municipalities and new specialties. By the end of April 2025, 25,638 consultations had been carried out, with the most frequently used specialties being Pediatric Neurology, Psychiatry, and Neurology (Figure 2).

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Figure 1. Evolution of the number of Teleconsultations in the State of Acre - 2021 to 2025 - PROADI SUS Hospital Albert Einstein/SESACRE
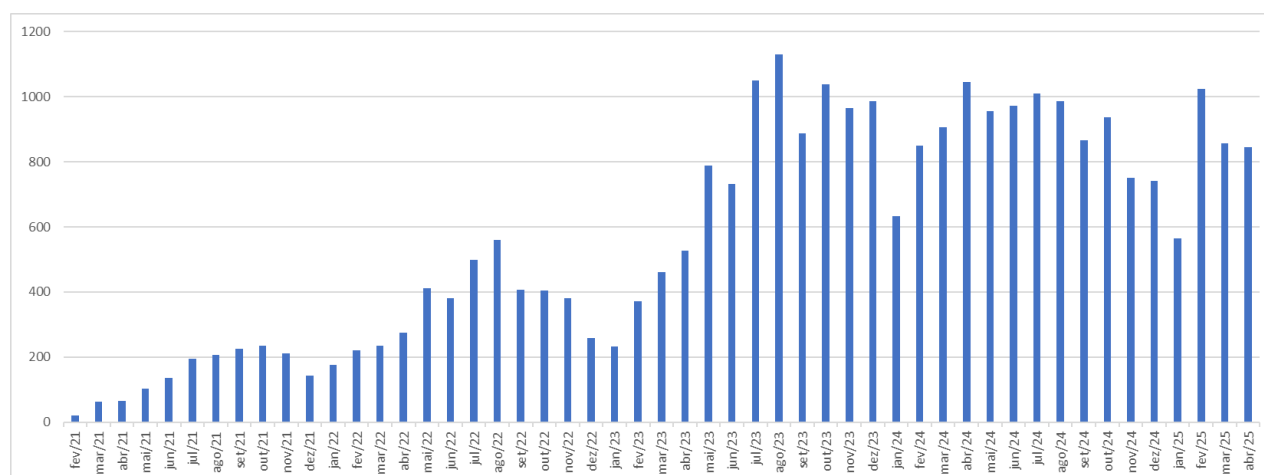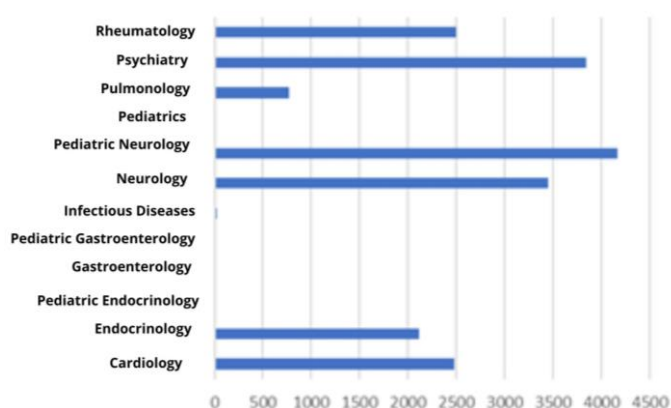

The PROADI-SUS program at HIAE has significantly contributed to the Acre State Health System, particularly in municipalities in the interior, by expanding access to specialists and reducing waiting lists in the state regulatory system. Its use has become routine in services, increasing the autonomy of municipalities, since specialist doctors only work in the capital, Rio Branco, and in regional centers. In addition to these achievements, the program's contribution to reducing the costs of Out-of-State Treatment (TFD-*Tratamento Fora de Domicílio*) is noteworthy. The data generated by the program have great evaluative potential, leading to the creation of new health indicators and new evaluation methods.

Figure 2 - Number of Teleconsultations by Specialty - 2021 to 2024 - State of Acre

Initially, the doctors resisted participating in teleconsultations, claiming that it was not part of their responsibilities in Primary Care. This resistance was gradually overcome through the work of the doctor/professor in training the doctors and in scheduling appointments.

Other challenges on the agenda were high appointment cancellation rates in some municipalities due to factors related to the users' area of residence, who are often residents of rural or riverside areas; inconsistencies in the State Regulation System (SISREG), sometimes resulting in duplicate queues for telemedicine and TFD; and non-acceptance of special reports and prescriptions made through telemedicine.

Expanding access to medical examinations in the State of Acre: implementing telediagnosis initiatives in municipalities.

The Ministry of Health defined Telediagnosis as a service "that uses information and communication technologies to provide diagnostic support services across geographical and temporal distances"[3]. Different diagnostic tests in the health field can use information and communication technologies, depending on the transmission of medical or radiological signals and images. The main advantage of its use lies in improving access to diagnostic methods, especially in remote locations, reducing travel costs, and increasing the effectiveness of Primary Care.

The implementation of telediagnosis modalities in the Brazilian Unified Health System (SUS) was possible by the National Telediagnosis Offer, which was a cooperation between State Telehealth Centers to perform examinations with remote report issuance for states with a smaller specialized workforce. The first modality

implemented was tele-ECG, followed by tele-dermatology, tele-spirometry, tele-retinography, and tele-stomatology.

In 2017, the tele-ECG service was launched, in which the examination was performed using a portable device that transmits the patient's tracing for analysis by specialists. The report is issued by specialists from the Federal University of Minas Gerais (UFMG) and transmitted within 2 hours. In 2025, Acre became the first state to have the service in 100% of its municipalities, with 53 centers spread across Hospital and Primary Care services, having already performed more than 150,000 examinations.

Tele-ECG has contributed to a health shift in the state, since before its implementation, this examination was only available at the tertiary hospital in the capital. It has been a valuable experience, bringing agility to clinical procedures in urgent cases and reducing public spending, generating estimated savings of around seven million reais.

Teledermatology was implemented in 2021. Currently, 14 municipalities are performing this examination. It is a telediagnosis model where professionals take photos with a cell phone equipped with a dermatoscope and send them for analysis. The report is prepared by specialists from the Santa Catarina Telehealth Center and must be returned within 72 hours. The examination report includes the diagnostic hypothesis and risk classification in colors, as follows: white (no treatment indicated), blue (treatment at the primary health care unit), green (referral to in-person dermatology service), yellow (referral to dermatology service with priority), and red (emergency cases). When the classification is blue, the specialist suggests clinical management to the attending physician.

The objective is to filter and qualify the waiting list for specialist consultations, improve patient access to diagnosis and management of dermatological problems, and contribute to the continuing education of primary health care professionals. In 2023 and 2024, 397 patients were seen, of which 134 (33.7%) were classified as white and blue, and could remain in treatment at the primary health care center. On the other hand, 50 (12.6%) were classified as yellow, requiring priority scheduling at the specialized outpatient clinic.

Table 1. Risk classification of patients treated by the Teledermatology service (STT – UFSC) in 2023 and 2024 in the state of Acre.

Classification	Total	%
White	30	7.6
Blue	104	26.2
Green	212	53.4
Yellow	50	12.6
Red	1	0.2
Total	397	100

Teleretinography was implemented in Acre in 2024. This examination is performed using a fixed or portable retinograph and allows observation and photography of the fundus of the eye, mapping the retina and highlighting the optic nerve, macula, and local vasculature. The examination is the early diagnosis of hypertensive or diabetic retinopathy, and other specific retinal pathologies. It also allows observation and suggestion of problems in other ocular structures, such as cataracts and glaucoma. It has performed 388 examinations, with 60 (15.5%) showing alterations such as those described above.

Telespirometry was implemented in the state in 2022 in partnership with the Minas Gerais Center. This examination allows measuring the patient's lung capacity and assists in the diagnosis of respiratory tract diseases such as asthma, chronic obstructive pulmonary disease, and pulmonary fibrosis. Currently, the examination is available in 5 municipalities in the state of Acre, and 728 examinations have already been performed by the end of 2024.

Tele-stomatology was implemented in Acre in 2024 by the Oral Health Coordination of SESACRE, with the training and registration of 87 dentists from Primary and Hospital Care. Through the platform of the Federal University of Paraíba, they send images and information on clinical cases then forwarded to specialist consultants, who issue a report within 72 hours and assist in the treatment. The objective is to detect oral cancers early and expedite treatment, as well as equip dentists with expertise in dealing with lesions of the oral cavity. In less than a year, 29 cases have already been reported in the state, mostly lesions of the lips and tongue, of which 8.3% are suspected of being malignant neoplasms.

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CONCLUSION

The reported experience highlights the contribution of Digital Health activities promoted by the Telehealth Center in the context of healthcare, through the implementation of telediagnosis modalities and the mediation of the teleconsultation program with municipalities in the interior of the country. Furthermore, it plays an important role in the continuing education of professionals working in Primary Care and in the training of future professionals, who then incorporate Digital Health tools into their daily practice.

Since these practices are relatively new within the Brazilian Unified Health System (SUS), only gaining prominence after the COVID-19 pandemic, there are still limitations to their implementation and use. Examples of these limitations include the resistance of some professionals to participating in interconsultations and the low initial uptake of telediagnosis exams. These challenges have been addressed through the constant work of the main team with municipal teams, which are gradually making these tools part of the daily routine of healthcare work.

Finally, the implementation of Telehealth in the state of Acre has provided several benefits in healthcare, such as greater speed in accessing specialists and examinations, improved care for patients with chronic diseases, and reduced waiting lists. These actions contribute to decreasing travel time and reducing the financial burden on assisted families. Therefore, the Telehealth Center has contributed to equity and democratization of access to healthcare, bringing services to more remote regions of the state.

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