English

Experience and benefits of telehealth implantation in Amazonia

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Abstract

Objective: *To present the initial results of implementing the Telehealth Center at the UFPA University Hospital Complex through the historical series of teleconsultations, teledermatology, and tele-electrocardiogram reports and the use of tele-education offers.* ***Methods:*** *This is a descriptive study of the initial results of the Telehealth Center using the historical series, from 2022 to April 2024, related to the number of teleconsultations, teledermatology, and tele-electrocardiogram reports prepared from a secondary database obtained from the Telemedicine and Telehealth System (STT) platform without user and patient identification.* ***Results:*** *The Telehealth Center has achieved a progressive increase in the use of teleconsulting, teledermatology, and tele-electrocardiogram offers, as well as web lectures, in territories in the Amazon, such as the great river archipelago of Marajó, the capital Belém and the Tocantins region in Pará. The role of teledermatology stands out, as it enabled 60.3% of cases to be resolved in primary care.* ***Conclusion:*** *The UFPA Telehealth Center began to be implemented in municipalities in the Amazon region of Pará and has achieved an increase in the use by primary care doctors of teleconsulting, tele-electrocardiogram, teledermatology and tele-education through web lectures, over time series studied.*

Keywords: *Digital Public Health, Telemedicine, Teledermatology, Remote Consultation, Amazon*

Resumen

Experiencia y beneficios de implementar Telesalud en la Amazonía

Objetivo: *Presentar los resultados iniciales de la implementación del Núcleo de Telesalud del Complejo Hospitalario Universitario de la UFPA a través de las series históricas de teleconsultorías, informes de teledermatología y tele-electrocardiograma, y de la utilización de las ofertas de teleeducación.* ***Métodos:*** *Se trata de un estudio descriptivo de los resultados iniciales del Núcleo de Telesalud utilizando las series históricas, en el período de 2022 hasta abril de 2024, relacionadas con el número de teleconsultorías, informes de teledermatología y tele-electrocardiograma elaborados a partir de bases de datos secundarias obtenidas de la plataforma del Sistema de Telemedicina y Telesalud (STT) sin identificación de usuarios y pacientes.* ***Resultados:*** *El Núcleo de Telesalud logró un aumento progresivo en la utilización de las ofertas de teleconsultorías, teledermatología y tele-electrocardiograma, además de las webconferencias, en territorios de la Amazonía, como el gran archipiélago fluvial de Marajó, la capital Belém y la región de Tocantins en Pará. Se destaca el papel de la teledermatología que permitió resolver el 60,3% de los casos en la atención primaria.* ***Conclusión:*** *El Núcleo de Telesalud de la UFPA inició la implementación en municipios de la Amazonía paraense y ha logrado un aumento en la utilización, por parte de los médicos de atención primaria, de las ofertas de teleconsultoría, tele-electrocardiograma, teledermatología y teleeducación a través de las webconferencias, a lo largo de la serie histórica estudiada.*

Palabras-clave*: Salud Pública Digital, Telemedicina, Teledermatología, Consulta Remota, Amazonia*

English

Resumo

Experiência e Benefícios da Implantação da Telessaúde na Amazônia

Objetivo: *Apresentar os resultados iniciais da implantação do Núcleo de Telessaúde do Complexo Hospitalar Universitário da UFPA por meio das séries históricas de teleconsultorias, laudos de teledermatologia e tele-eletrocardiograma e da utilização das ofertas de teleducação.* ***Métodos:*** *Trata-se de estudo descritivo dos resultados iniciais do Núcleo de Telessaúde utilizando as séries históricas, no período de 2022 até abril/2024, relacionadas ao número de teleconsultorias, laudos de teledermatologia e de tele-eletrocardiograma elaboradas a partir de banco de dados secundários obtidos da plataforma do Sistema de Telemedicina e Telessaúde (STT), sem identificação do usuário e pacientes.* ***Resultados:*** *O Núcleo de Telessaúde alcançou aumento progressivo na utilização das ofertas de teleconsultorias, teledermatologia e tele-eletrocardiograma, além das webpalestras, em territórios da Amazônia, como o grande arquipélago fluvial do Marajó, a capital Belém e a região do Tocantins, no Pará. Destaca-se o papel da teledermatologia, que propiciou resolubilidade de 60,3% dos casos na atenção primária.* ***Conclusão****: O Núcleo de Telessaúde da UFPA iniciou a implantação em municípios da Amazônia paraense e tem alcançado aumento na utilização, pelos médicos da atenção primária, das ofertas de teleconsultoria, tele-eletrocardiograma, teledermatologia e teleducação por meios das webpalestras, ao longo da série histórica estudada.*

Palavras-chave: *Saúde Digital, Telemedicina, Teledermatologia, Teleconsultoria, Amazônia*

INTRODUCTION

In 2011, the Brazilian Health Ministry published portal No. 2546, which established the National Telehealth Program Brazil Networks (*Programa Nacional Telessaúde Brasil Redes)*, with the objective of: "Supporting the consolidation of Health Care Networks organized for Basic Health Care within the scope of the Single Health System (SUS-*Sistema Único de Saúde*)[1]". In 2017, the program was ratified by portal No. 5, which relates to consolidating the regulations on the actions and services of the Unified Health System. In 2024, portal 3,691 will institute the SUS Digital – Telehealth strategy. The Telehelth Centers have their legal framework to support the SUS Care Networks and are also intended for the permanent education of health workers.

From this perspective, the Telehealth Center of the University Hospital Complex of the Federal University of Pará - UFPA (*Núcleo de Telessaúde do Complexo Hospitalar Universitário da Universidade Federal do Pará*) was established in 2020 with resources from the decentralized execution term 172/2020, with the following objectives: to implement the Telehealth Center; to offer teleconsultations to health teams; to support the Service Regulation Centers of the State of Pará and the municipality of Belém; to offer telediagnosis in teledermatology, tele-electrocardiogram, and teleradiology, expanding the population's access to health services and aiming to qualify care; also, among the objectives of the Center, to provide teleeducation through web lectures and self-instructional distance courses for the continuing education of health workers[2].

The Center's priority for action is the locations with the lowest primary care population coverage in the State of Pará, located in the Eastern Amazon: the capital, Belém, which in 2020 had 22.65%, and the health regions of Tocantins, with 9 municipalities, with 52.8%, and Marajó, with 16 municipalities, and 54.4%, an archipelago that, in 2015 alone, with the *Programa Mais Médicos para o Brasil* (PMMB), reached 42.8% coverage[3].

It is important to highlight that the Amazon region represents a large part of the population without health care coverage due to the lack of doctors, the dispersion of the population in large areas, distant from two urban centers, such as the riverside communities, quilombolas and indigenous and also because of the large rivers that increase the distances, making it difficult to access health care, at the same time that the cost of transportation for medical assistance increases.

In this reality, the Center's role is to shorten distances and improve equity in access to health care, by offering teleconsultation to primary care physicians, avoiding unnecessary patient travel to specialized care; teledermatology, whose remote reports can increase the resolution of primary care and prioritize serious cases for the Regulatory System; tele-electrocardiogram, providing reports that can avoid referral to a specialist; and teleeducation and its role in contributing to continuing education, through distance courses and web lectures.

One difficulty in making Telehealth services available would be the need to develop a platform and the time it would take, which would delay the start of services and compromise the Center's results. Thus, to make the UFPA Telehealth Center viable, a partnership was established with the Federal University of Santa Catarina, which made the Telemedicine and Telehealth System (STT-*Sistema de Telemedicina e Telessaúde*) platform available with a regional branch for Pará. Thus, the Center's activities effectively began in May 2022.

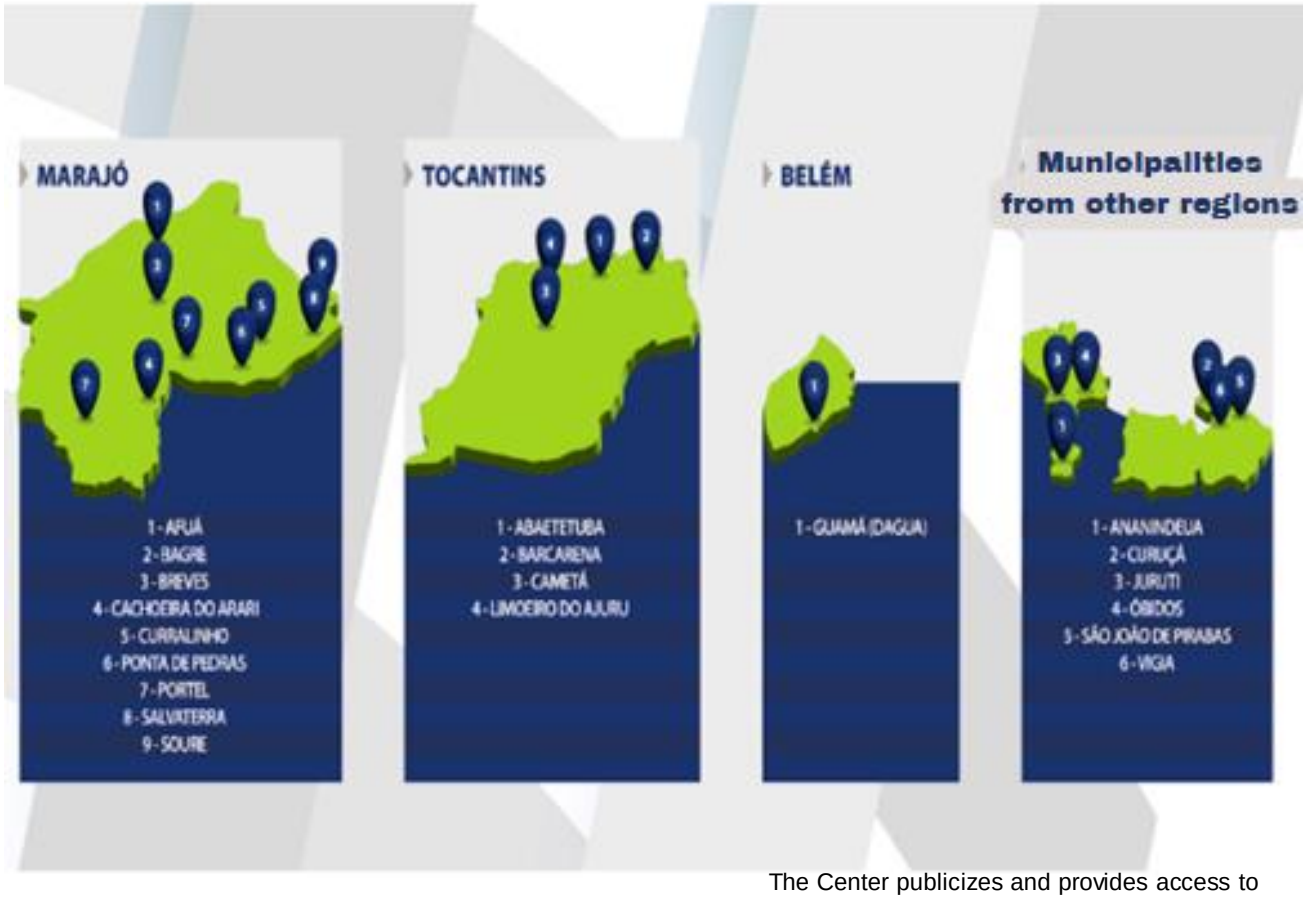
The objective of this work was to present the initial results of the implementation of the Telehealth Center of the UFPA University Hospital Complex through historical series of teleconsultations, teledermatology and tele-electrocardiogram reports and the use of teleeducation offers.

METHOD

This is a descriptive study of the initial results of the Telehealth Center, using historical series related to the number of teleconsultations, teledermatology, and tele-electrocardiogram reports prepared from secondary databases obtained from the Telemedicine and Telehealth System (STT) platform without identification of the user and patients.

Initially, the Center used several strategies to publicize its offers to municipal managers, including telephone contact with the Secretary of Health, presentations to the Regional Intermanagement Committees (CIR), the Bipartite Intermanagement Committee (CIB), the Teaching-Service Integration Committees (CIES) and the State Health Council. If the Secretary of Health showed interest, a meeting was held to present the project and begin the agreement.

Figure 01: Municipalities agreed with the UFPA Telehealth Center by region from December/2021 to April/2024.



The agreement with interested municipalities is carried out in 4 stages:

1) approval of the Secretary by official letter with information about the needs of the municipality;
2) formalization of the presentation of the Center through an official letter to the Secretary of Health;
3) preparation of the Action Plan jointly by the Secretariat and Center, regarding the activities necessary for the implementation of each service and schedule; and
4) training of the teams for the use of the STT.

Following up on the agreement and implementation of the offers, monitoring was done to identify the use of the offers and difficulties of any nature, in addition to the need to review and adapt the action plan.

Within the scope of the project, the center has 26 amazonian municipalities to serve as a priority, 9 in the Tocantins region, 16 in the Marajó region, and the municipality of Belém, the capital. From December 2021 to April 2024, 20 municipalities joined Telehealth, 9 in Marajó, 4 in Tocantins, Belém, and 6 other municipalities that, although not in the target regions, requested to join, as shown in Figure 01. dissemination strategy was aimed at the *Mais Médicos para o Brasil Project*. Thus, the Center registered and remotely trained the Project's doctors through academic supervision carried out by the Federal University of Pará to publicize the offers and encourage their use. In this context, 6 tutors were trained, who trained 62 supervisors and 632 doctors working in Pará, not necessarily in the municipalities where there was an agreement with the management.

The Center publicizes and provides access to its offerings on the Center's website (telessaude.ufpa.br). Contact with users and health managers for publicity is also made through e-mails, direct mail, monthly newsletter, and *Telessaúde em Ação*, a product that reports on the progress of partnerships and services provided by the Center in Pará municipalities. However, the main focus of communication has been on social networks: Facebook, Instagram, X (formerly Twitter), and YouTube. The highlight is Instagram, where there are 520 followers, a reach of 1,031 accounts, in addition to having already achieved more than 11 thousand impressions.

Teleconsultation is characterized by a registered consultation between the primary care physician and the Telehealth Center specialist via the STT platform, asynchronously, with a response within 72 hours, to clarify clinical and work process doubts.

After the primary care physician requests a teleconsultation on the STT, a regulator from the Center forwards the patient to the specialty via the platform, according to the clinical case. Initially, only Family and Community Medicine was offered. However, based on the need detected by the requested teleconsultations, the specialties of infectious diseases, endocrinology, cardiology, neurology, vascular surgery, hepatology, and Chagas disease were included. The number of teleconsultations per specialty was obtained from the teleconsultations answered by specialty.

Teledermatology consists of issuing reports based on the clinical record and a protocol of photos of dermatological lesions. The Center's dermatology service reports on the exams using protocols from the

Ministry of Health and the Brazilian Society of Dermatology and performs risk classification.

Teledermatology was offered to all the municipalities that participated in the agreement. However, in the capital, Belém, an action plan was agreed upon, which included a teledermatology pilot in a health district with 13 health units (*1 ESF ribeirinha*). This pilot aims to organize the line of dermatology care, whose pent-up demand has been up to 3 years in the Regulatory System queue. After reviewing the list of patients waiting for dermatology, the active search was fruitless for several reasons. However, some new patients were located and included in teledermatology.

For the tele-electrocardiogram report, the municipality must provide a digital electrocardiograph, computer, and internet to send the images and a qualified technician to perform the exam.

To prepare the historical series, the total number of teleconsultations, teledermatology reports, and tele-electrocardiograms per month were extracted. Each result of the modalities offered is recorded and stored in the STT based on the doctor's request and extracted into a spreadsheet to prepare the historical series in the R software (R Project for Statistical Computing).

The resolvability of teledermatology was assessed based on the risk classification defined by the dermatologist who prepared the reports and suggested treatment in primary care or referral to specialized care.

The implementation of the tele-education service went through several stages: a survey of the educational needs of professionals, using a questionnaire; identification of the topics indicated in the questionnaire; coordination with the speaker; preparation and dissemination of the activity on social media; and offering the selected topics through web lectures on a web conferencing platform, synchronously and monthly, given by professionals in the field. The web lectures are broadcast by *ConferênciaWeb* of RNP (National Education and Research Network-*Rede Nacional de Ensino e Pesquisa*). The number of participants was obtained from the access logged in to the STT.

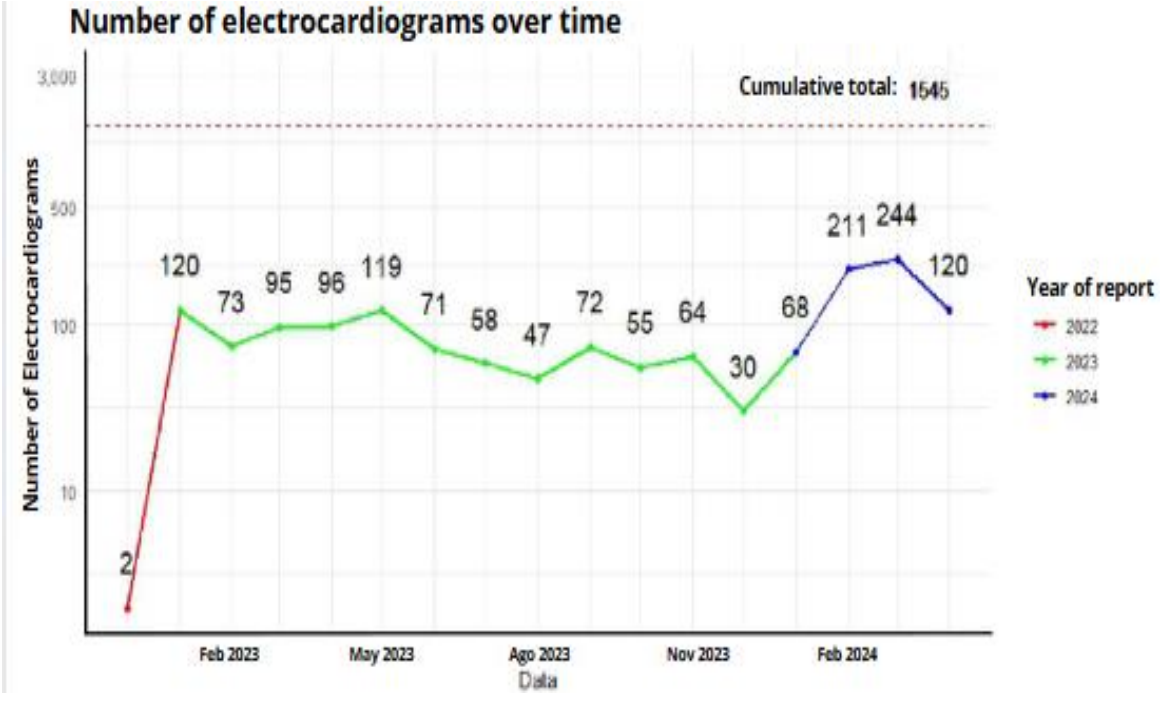
RESULTS

The Center's offerings of tele-electrocardiogram, teledermatology, teleconsulting, and tele-education have shown increasing use in the period studied.

A total of 1565 electrocardiogram (ECG) reports were performed between December/2022 and April/2024, most of them (1545) in 4 municipalities of Marajó (Graph 1).

Teledermatology services began to be offered in 2022 but with low municipal uptake of the service, totaling only 5 requests throughout the year. On the other hand, in 2023, with greater incentives and dissemination of services to municipal managers and in-person and remote training of doctors from the Mais Médicos para o Brasil Project, there was greater uptake and use, totaling 24 municipalities and 192 requests during the year, with an average of 16 requests per month.

Graph 1 – Historical series of the use of tele-electrocardiogram in the UFPA Telehealth Center, from December/2022 to April/2024, Marajó-Pará.



In 2024, up to April, other municipalities began to use teledermatology, reaching 33 municipalities and 588 total requests, considering the entire period mentioned (Graph 2). Teledermatology is offered to all practicing physicians in Pará because the service reached municipalities beyond the one in which the offer was agreed with the management

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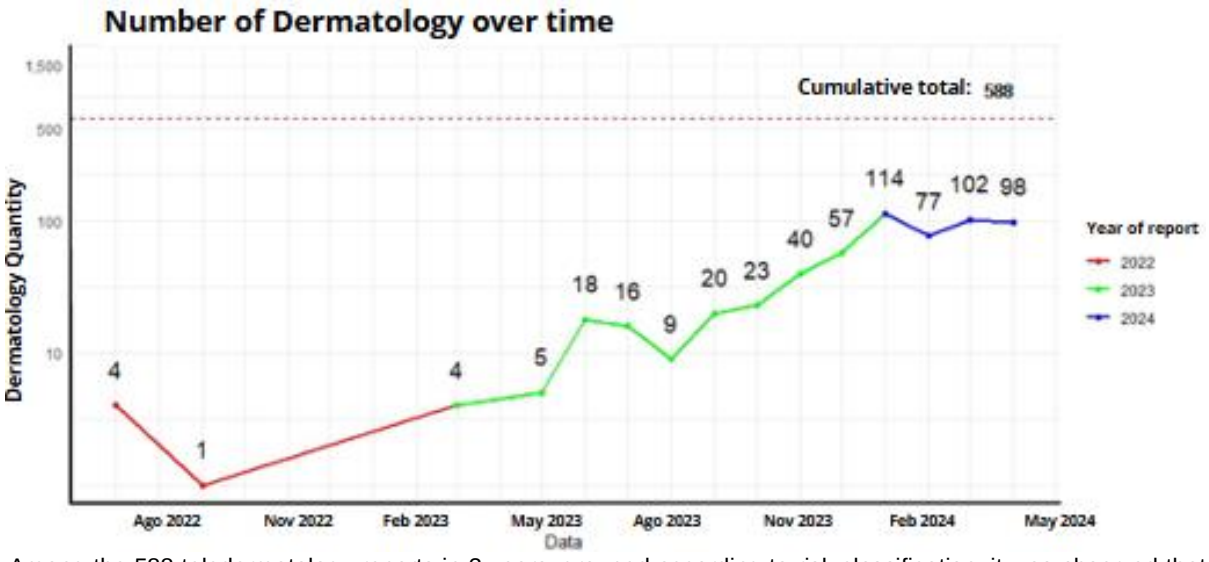
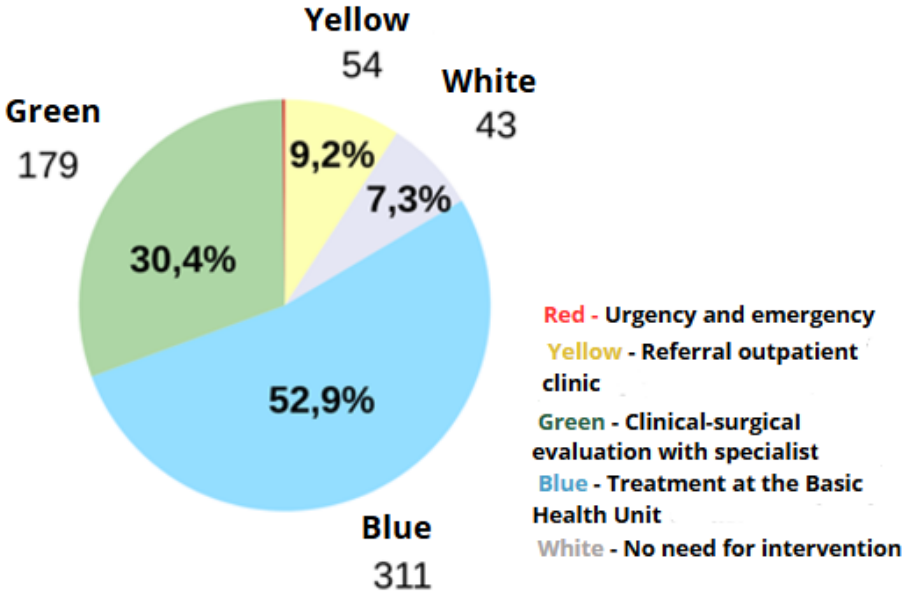
Graph 2 – Historical series of the use of teledermatology in the UFPA Telehealth Center, from August/2022 to April/2024, in Pará.



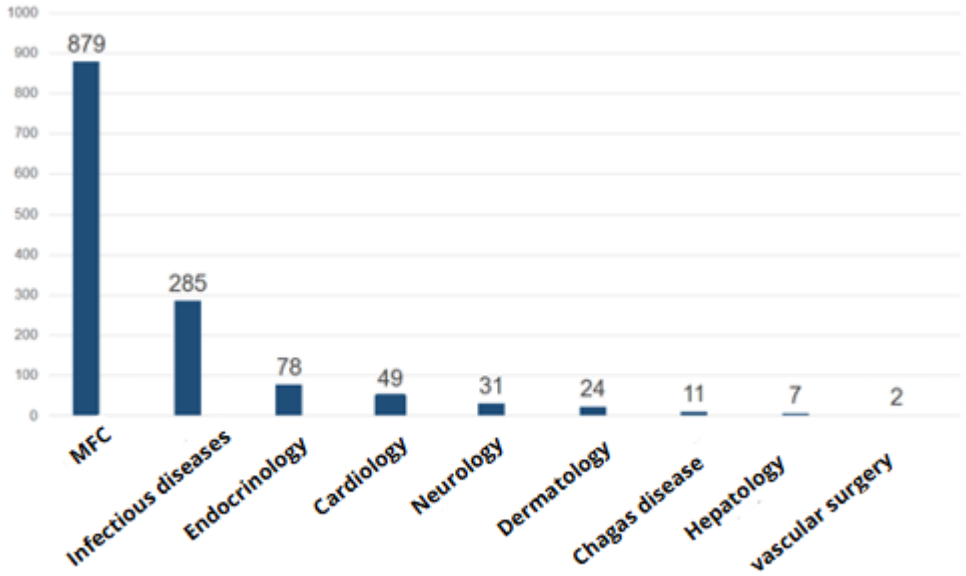
Among the 588 teledermatology reports in 3 years, grouped according to risk classification, it was observed that most of cases (60.3%) could be resolved in primary care, 311 with blue risk, characterized by eczematous, erythematous-scaly, infectious lesions, dermatoses due to chronic sun exposure, dermatoses of the skin appendages, and 43 with white classification, that is, without the need for intervention or monitoring (Graph 3). Of the total, 179 indicated in-person clinical-surgical evaluation (green risk) and 54 with a report of probable skin carcinoma or psoriasis, indicating priority referral to a reference outpatient clinic (yellow risk), and only one for urgency and emergency (red risk) (Graph 3). In Belém, where a pilot project was carried out to assess the resolvability of teledermatology in primary care, 247 reports have been carried out since October/2023, when the pilot began. Most of them had a blue or white risk classification, and around 144 showed resolvability in primary care of 58.3%.

Graph 3 – Teledermatology reports by risk classification, at the UFPA Telehealth Center, from August/2022 to April/2024.



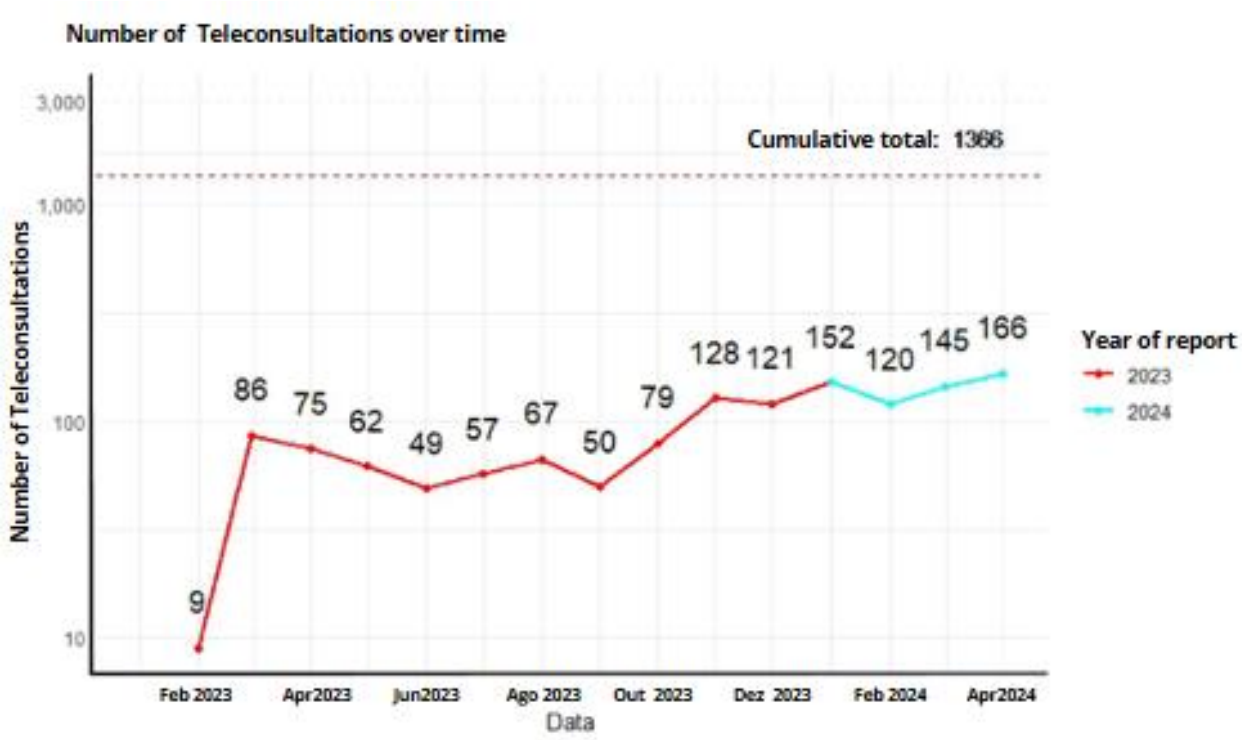
The total number of teleconsultations answered by specialty of Family and Community Medicine (MFC-Medicina de Família e Comunidade), infectious diseases, endocrinology, cardiology, neurology, vascular surgery, hepatology, and Chagas disease is shown in Graph 4, in which it can be seen that the majority corresponded to MFC, followed by infectious diseases and endocrinology.

Graph 4 – Number of teleconsultations by specialty carried out by the UFPA Telehealth Center, from February/2023 to April/2024, in Pará.



In the temporal analysis of use, it was possible to observe a growing increase in teleconsultations from February 2023, totaling 1366 teleconsultations until April 2024 (Graph 5).

Graph 5 – Historical series of the use of teleconsultation at the UFPA Telehealth Center, from February/2023 to April/2024, in Pará.



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The participation of professionals in the web lectures offered monthly by the Center achieved considerable growth in synchronous accesses, compared to the beginning of activities in May 2022. In 2022, there were 147 synchronous participants, in 2023 a total of 955 synchronous participants, and in the first four months of 2024, 357 synchronous participants were achieved.

DISCUSSION

There are many challenges to using Telehealth services in the Amazon, including physical barriers to in-person training, such as long distances and river access, since the large rivers, which are the main access routes to many of the municipalities furthest from the capital, do not have frequent transportation and highlight the long distances in the Amazon. Another major challenge is the unstable internet networks, especially within the basic health units distributed within territories, which have even more precarious connectivity. When it comes to digital health, devising strategies to overcome these obstacles is a fundamental component for better applicability.

Despite these difficulties and with the team's efforts, the UFPA Telehealth Center has overcome these barriers, which was demonstrated by the increased use of teleconsultations in the historical series studied. Teleconsultations have been requested spontaneously by physicians, providing continuing education to health professionals far from large centers, and reducing referrals to specialized care. The study shows that teleconsultations can support the regulatory system for specialized care in the health care network to increase the resolution of primary care by 15 to 20%[4] and qualify referral requests. However, this offer to support regulation has not yet been accepted by health managers in the territory, mainly due to difficulties in organizing the flow in the municipality or due to the lack of knowledge of the results of the Center's integration into the flow to specialized care.

A study of two Telehealth Centers[5,6] that offer teleconsultations for the multidisciplinary team showed that a minority were requested by doctors, evidencing the resistance of these professionals in carrying out this activity, which was also observed by Telehealth UFPA due to the low number of teleconsultations requested by doctors, as the Center offers this service exclusively for this primary care professional.

There is a greater expectation among managers for teleconsultation or teleinterconsultation between doctor and pacient rather than teleconsultation between doctors, due to the need for certain specialist professionals in hard-to-reach regions and due to local experiences with tele-interconsultation services linked to PROADI-SUS and COSEMS-PA. The tele-interconsultation doctor-pacient and teleconsultation of the UFPA Center are in the planning process for implementation.

The greater number of requests for the Family and Community Medicine specialty is due to the Center's decision to initially offer this specialty and only define the offer of other specialties based on the survey of teleconsultations.

A major challenge for digital health is Marajó, which is made up of several islands and extensive floodplain areas. It is the largest river archipelago on the planet, with 40,100 km2[7]. Although 12 of the 16 municipalities that comprise it are environmentally protected areas, with 5,904,400 ha, it still faces the challenge of fires and deforestation[8]. In the region, irregular internet connectivity is one of the main limiting factors for the implementation of Telehealth. To meet the care needs of the Marajó population, the Center established its 16 municipalities as a priority for offerings.

The cardiology care line is a priority in Marajó since most municipalities do not have cardiologists. Thus, the Center offers teleconsultation in cardiology and tele-electrocardiogram (tele-ECG). Among the municipalities in Marajó, 9 established agreements with the Center and intended to adhere to the tele-ECG, since the electrocardiogram report is a great difficulty in the archipelago. However, most did not have, nor were able to acquire, a digital electrocardiograph, limiting the adherence to this offer. Of these 9, only 4 managed to implement the service, and the result of its use can be seen in the historical series. As for the numerical increases in reports, they are due to the entry of a new municipality, and the reductions in the timeline are reflections of the stabilization of the monthly demand, the loss of the device for political reasons, or the difficulty in setting up a flow and hiring a qualified technician to perform the exam. Among the municipalities that adopted the tele-electrocardiogram, access to the report resulted in a reduction in the waiting list in the first month of operation.

The Minas Telecardio project[9,10] showed variation in its long historical series, since, as new municipalities enter, the number of ECGs grows, as evidenced by the Marajó tele-ECG timeline.

Teledermatology in the Amazon region of Pará is increasingly being used and has enabled most cases to be resolved in primary care. However, access to the Regulatory System for specialized care by patients with yellow risk (recommended for priority referral to a referral clinic) and green risk (requirement for an in-person consultation to clarify a diagnosis or perform a procedure) is still a challenge. In Belém, as a result of the pilot project to assess resolution, a priority queue was established for cases classified as yellow risk, most of which are skin cancer. The full implementation of teledermatology still presents the challenge of lack of internet or network instability, a problem that is gradually being resolved, but internet access in the riverside and riverside units is still a challenge.

Teledermatology has been implemented in several regions of the world and shows a tendency for increased use in countries that have adopted this telediagnosis modality[11]. The teledermatology service of the Telehealth Center of the Federal University of Santa Catarina has existed since 2005 and shows a resolution rate in primary care of 40.2%, lower than the teledermatology of the Center of UFPA, a need for referral for in-person care of 40.0%, higher than the UFPA service, and a proportion of yellow cases (severe cases) of 19.8%, probably due to the high prevalence of skin cancer in the state[12].

Regarding the spontaneous use of teleconsultation and teledermatology by physicians, there is still a challenge to overcome: the acceptance by most professionals that specialized care has limited access due to the limited availability of specialists, and Telehealth can contribute to increasing the resolvability of care in primary care. In this way, its use would have a greater impact on meeting the population's care needs and reducing waiting lists for specialized care. Another

strategy would be the compulsory flow of teleconsultation and teledermatology to the Specialized Care Regulation System, but this depends on health managers.

The Center's next task is to implement teleradiology, an important resource that benefits the population, professionals, and municipal management. The Center began implementing teleradiology in three municipalities and found that the technological challenges are significant, ranging from the difficulty in acquiring equipment for Computed Radiology (CR) or Digital Radiology (DR), the lack of adequate computers to work as a Local PACS (Picture Archiving and Communication System) server, to the deficient internet network infrastructure, including the need to install new internet access points. However, with the partnership of municipal managers, the difficulties are gradually being overcome.

The UFPA Telehealth Center has played a fundamental role in the ongoing education of professionals working in primary health care, using innovative and collaborative initiatives. Tele-education was the first service implemented at the Center, in May 2022, and was motivated by the need to expand the scope of the qualification of these professionals through ongoing education, especially those who work in remote areas with difficult access and difficulties in traveling for training.

The future of tele-education at the UFPA Telehealth Center is promising and full of opportunities for expansion and improvement. Some of the main perspectives include: expanding coverage to extend the reach of tele-education activities to more municipalities and remote communities, ensuring that a greater number of health professionals can benefit from training initiatives; strengthening the collaboration network with other educational institutions, telehealth networks, and health departments, promoting the exchange of experiences, joint research and the development of innovative projects; offering the self-instructional courses, "Work Process in Primary Health Care" and "Surveillance of Congenital Syphilis and in Pregnancy", covering all primary care professionals in the State of Pará, in line with regional demands.

The consolidation of tele-education represents a significant advance in the democratization of access to health education and in the promotion of equity in professional training. With the continuous evolution of technologies and educational methodologies, the center is prepared to face future challenges and contribute decisively to the improvement of public health in Brazil, and especially in the Amazon region of Pará.

The mission of the Telehealth Center of the UFPA University Hospital Complex is to increase access to health care for the population of the Amazon that lives in remote areas with difficult transportation, such as Marajó and Tocantins, as well as areas with low primary care coverage to organize care networks, such as Belém. The task faces several obstacles, including irregular or non-existent internet signal, long river travel distances, the project being new to health managers, and the low participation of health professionals, especially doctors. However, the Center team is aware that these difficulties can be overcome, as digital health is one of the strategies of the Ministry of Health to expand access, which strengthens telehealth in the field of public health.

CONCLUSION

The UFPA Telehealth Center has begun implementation in municipalities in the Amazon region of Pará and has seen an increase in the use of teleconsultations, tele-electrocardiograms, teledermatology, and tele-education through web lectures by primary care physicians, throughout the historical series from 2022 to April/2024.

Teleconsultations are mainly in the specialties of Family and Community Medicine, infectious diseases, and endocrinology, with less use in cardiology, neurology, vascular surgery, hepatology and Chagas disease.

Teledermatology reports indicate that most lesions are low-risk and can be resolved in primary care and show that 9.2% of lesions with a probable diagnosis of cancer should be prioritized in the queue of the regulatory system for specialized care.

The tele-electrocardiogram, still implemented in a few municipalities, is already showing the benefit of increased access to this exam for populations in areas of difficult geographical access in Marajó.

Tele-education has increased the use of web lectures, becoming an important continuing education strategy for health professionals working in hard-to-reach areas.

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