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Teleconsultation in primary care: conceptual model and implementation in favela territories

Fernanda Adães Britto https://orcid.org/0000-0003-3393-8735 [1]; Monique Nunes Fiuza Dias https://orcid.org/0000-0002-7761-7768 [1]; Amanda de Araujo Batista-da-Silva https://orcid.org/0000-0001-8256-2178 [2]; Fabiana Lustosa Gaspar https://orcid.org/0009-0000-2505-0651 [1]; Lucas Galhardo de Araújo https://orcid.org/0009-0006-9819-959X [1]; Juliana Paranhos Moreno Batista https://orcid.org/0000-0002-2494-9689 [1]; Luna Escorel Arouca https://orcid.org/0009-0000-9971-8167 [3]; Carolina Maria Carneiro Dias https://orcid.org/0000-0001-6878-3468 [3]; Fernando Augusto Bozza https://orcid.org/0000-0003-4878-0256 [4,5]; Paula Bortolon https://orcid.org/0000-0003-0996-0959 [1]

Abstract *Primary Health Care is central to ensuring access to healthcare and is the preferred gateway to the Unified Health System. The municipality of Rio de Janeiro has made progress in coverage, but still faces challenges, especially in vulnerable areas. An innovative teleconsultation model was proposed in the Maré favelas compound, integrating public authorities (Ministry of Health and Rio de Janeiro Municipal Health Department), academia (Fiocruz), and community-based organizations (Redes da Maré). Therefore, this article presents the pilot implementation stages, emphasizing the territorial context, stakeholders involved, resources, and governance. It proposes a conceptual framework, combined with qualitative and quantitative methods, to describe the experience. A total of 1.017 teleconsultations were conducted (November 2024 to June 2025) with the following profiles: follow-up on recent appointments (58%), chronic conditions and life cycles (33%), acute conditions (5%), and prescription issuance (2%), even during territorial conflicts. However, barriers were encountered, such as difficulty using the tools, data insecurity, and accessibility. The model proved successful in its initial phase, providing support for a national teleconsultation policy for vulnerable territories.*

Key words *Primary Health Care, Social Vulnerability, Remote Consultation*

[1] Secretaria Municipal de Saúde do Rio de Janeiro. R. Afonso Cavalcanti 455, z3, Cidade Nova. 20211-110 Rio de Janeiro RJ Brasil. fernanda.adaes@gmail.com
[2] Departamento de Engenharia Industrial, Pontifícia Universidade Católica do Rio de Janeiro. Rio de Janeiro RJ Brasil.
[3] Associação Redes de Desenvolvimento da Maré. Rio de Janeiro RJ Brasil.
[4] Instituto D'Or de Pesquisa e Ensino. Rio de Janeiro RJ Brasil.
[5] Fundação Oswaldo Cruz. Rio de Janeiro RJ Brasil.

Introduction

The World Health Organization (WHO) defines digital health as a field focused on developing and applying digital technologies in health. It mainly aims to promote people-centered health systems. This approach is a key strategy for expanding access to health services and improving population living conditions. Technologies like artificial intelligence and telehealth offer substantial potential as they improve individual care by enabling more accurate diagnoses, care continuity, and better clinical guidance for health promotion and disease prevention. These technologies also strengthen large-scale interventions and public health actions[1].

Although it is a relatively recent field, digital health has been gaining prominence in health policies worldwide[2]. The United Kingdom[3] and Portugal[4], for example—countries with universal health systems—have escalated digital transformation policies, especially strengthening of interoperable electronic health records and the expansion of telehealth.

The Brazilian Ministry of Health has implemented foundational initiatives in this area. One example is the National Health Information and Informatics Policy (PNIIS)[5], enacted in 2015. This policy sets guidelines for organizing systems and advancing interoperability. These actions built the regulatory and technological basis for service digitalization. They also enabled the development of national solutions such as the National Health Data Network (RNDS) and *Conecte SUS*, established by Ordinance No. 1,434 of May 28, 2020.

The digital health agenda became more consolidated with the creation of the Information and Digital Health Secretariat (SEIDIGI). SEIDIGI coordinates digital transformation at the national level. For SUS public policies, GM/MS Ordinance No. 3,232 of May 1, 2024[6], established the SUS Digital Program. This program stands on three pillars: digital culture; technological solutions and digital health services; and interoperability, analysis, and dissemination of health data. It also defines guidelines to structure the digital transformation project in three stages: planning, implementation, and evaluation. This program provides financial incentives to states and municipalities for implementing and consolidating these actions.

The strategic actions in GM/MS Ordinance No. 3,691 of May 23, 2024[7] marked another advance in the national digital health policy. They established the SUS Digital Strategic Action—Telehealth as a main part of the SUS Digital Program. This action strengthened the digital transformation of the Brazilian Unified Health System (SUS). It aimed to expand access, problem-solving capacity, and integration across all care levels. This action seeks to consolidate health care networks. It places special focus on Primary Health Care (PHC) using telehealth resources like teleconsulting, telediagnosis, tele-education, and remote support for health teams. It also adds new care resources for PHC consultations in regions with limited access and greater vulnerability.

Within this context of digital innovation in Brazilian public health, PHC represents a strategic setting for implementation because it is the preferred gateway to the SUS. Organized around the Family Health Strategy (ESF), PHC operates with a family-and-community-centered focus through the registration of a defined clientele, delimited by a specified number of people and their families through territorial assignment, which favors longitudinal and comprehensive follow-up of users[8].

PHC is responsible for providing resolutive care and coordinating care for individuals and families within SUS across all life stages and throughout the health care network, ensuring access to prevention, health promotion, treatment, and rehabilitation actions, whether through individual or collective activities[9].

Rio de Janeiro began the Primary Health Care Reform (RCAPS) in 2009. This effort increased investment and expanded ESF coverage[10]. Coverage reached 70% in 2020 and 79.8% in 2024[11]. The reform included management changes, the adoption of health indicators, and a new management model. It also involved opening new units, improving infrastructure and supplies, expanding the service portfolio, and encouraging professional qualification[12].

Within this context of health digitalization, since November 2024, Rio de Janeiro has been developing an interinstitutional pilot project built through a partnership among SEIDIGI, the Municipal Health Secretariat of Rio de Janeiro (SMS-Rio), the Oswaldo Cruz Foundation (FIOCRUZ), and *Redes da Maré* (Maré's Networks)[13]. The project consists of implementing the SUS Digital Strategic Actions focusing on Telehealth in PHC, in a suburban territory marked by high social vulnerability and armed violence—the Maré's compound of favelas.

This collaborative initiative allows teleconsultation. It also develops indicators and methodologies for building inclusive public policies

in digital health. The approach is guided by evidence and territoriality. The goal is to build solutions that can be replicated in other violent and inequality-burdened urban areas. The project helps strengthen SUS health care networks by ensuring continuous, safe, and high-quality care for residents of suburban areas.

This study aims to organize the stages of establishing teleconsultation in Primary Health Care units in the Maré's compound of favelas. It highlights the governance system developed in this setting and the preliminary results achieved. The findings are expected to guide other local efforts to consolidate this care model in Brazilian PHC, especially in highly vulnerable areas.

Methods

This article presents a descriptive case study. It covers the implementation process of a teleconsultation model in Primary Health Care. The service is offered only to residents registered in the catchment areas of the relevant health units in the Maré's compound of favelas, an urban territory with high social vulnerability.

The experience focuses on the initial eight-month implementation period from November 2024 to June 2025. It includes four of the six family clinics serving the territory's 15 Maré favelas. Data sources were institutional and regulatory documents and care databases from the health units. These are derived from the Electronic Patient Records (EPR), which health units use for clinical documentation and follow-up.

The territory selected for this study was the Maré's compound of favelas, located in Rio de Janeiro. It comprises 15 communities and has more than 124,000 residents[14]. Maré is the largest favela cluster in the municipality. In population, Maré is larger than 96% of Brazilian municipalities. It is also the ninth-most populous neighborhood in Rio de Janeiro. The region has two Municipal Health Centers (CMS), four Family Clinics (CF), and one Emergency Care Unit (UPA).

We selected this territory because of its history of public health initiatives and shared governance between the state and local organizations[15,16]. It has extensive knowledge of territorial dynamics and local data production[17,18]. There is a long history of partnerships and strong local capacity for mobilization and adaptation of the teleconsultation model.

This study developed two analytical dimensions. First, it examined the collaborative and interinstitutional governance system. This process included three stages: documentary analysis of national guidelines and regulations related to the SUS Digital Strategy, with emphasis on GM/MS Ordinance No. 3,691/2024[7]; mapping of the main institutional stakeholders (Ministry of Health/SEIDIGI, Fiocruz, Municipal Health Secretariat, and *Redes da Maré*); and participatory development of a conceptual and operational governance model, shown in the results flowcharts. The second dimension analyzed the profile of teleconsultations in the selected PHC units. This involved examining the total number, participating family clinics, executive professionals, average teleconsultations per clinic and per professional, and user or consultation profiles.

This process led to a model adapted to the territory's conditions. It was based on institutional alignment, clear roles, and operational feasibility. The collective approach gave the model legitimacy, helping integrate management levels and implement teleconsultation as a care strategy in highly vulnerable contexts. As this was an institutional experience report and used no individual data, the study was not submitted for ethical review (CEP-CONEP system).

Results

Governance Architecture and Strategic Axes

Teleconsultation in the Maré territory was built on an interinstitutional governance architecture with four key pillars (Figure 1). This model places the Maré's compound of favelas at the center. It connects the territory to institutions with distinct roles and competencies.

The model presents a shared governance structure in which the Ministry of Health assumes responsibilities related to policy promotion, definition of national guidelines, provision of financial resources, and technical monitoring of project execution; the research institution (Fiocruz) provides technical-scientific support, methodological advising, production of training materials, and monitoring and evaluation of implementation; the community-based organization (Redes da Maré) acts in territorial coordination, providing logistical support, community listening, and mediation between users and teams; and the Municipal Health Secretariat, as the SUS manager in Rio de Janeiro, is responsible for operationalizing the service, from the

allocation and training of human resources to service integration, technological availability, and supervision of actions, besides ensuring comprehensive care for the patients served.

This interinstitutional configuration reflects an integrated approach that seeks to combine technical competencies, financial resources, territorial knowledge, and local management, promoting articulation across the federal, municipal, academic, and community levels. The proposed design aims to ensure both the project's technical and operational sustainability and its adequacy to the specificities and needs of the Maré population.

Chart 1 details the operational components of this governance architecture, showing the specific distribution of responsibilities among the institutions involved. The structure reveals eight main components that underpin implementation of the strategy: Federal Coordination (Ministry of Health), responsible for national guidelines, financing, and technological support; Municipal Coordination (Rio de Janeiro Municipal Health Secretariat), focused on operationalizing the service itself; Technical-Scientific Support (Fiocruz), encompassing methodological support, monitoring, data analysis, and academic production; and Community Coordination (Redes da Maré), centered on territorial articulation and community communication. In addition, the structure includes cross-cutting components such as Interinstitutional Agreement and Governance, involving all institutions in periodic meetings and definition of operational flows; Technological Instrumentation, shared by the Ministry of Health, SMS/RJ, and Fiocruz; Training and Technical Support, coordinated by SMS and Fiocruz; and Mobilization and Communication, conducted by *Redes da Maré* for territorial dissemination of the strategy.

This distribution of components consolidates a collaborative governance model that articulates complementary institutional competencies—technical-scientific expertise, public management capacity, federal resources, and territorial knowledge—to ensure both the technical quality and the local adequacy of the teleconsultation strategy.

Implementation of teleconsultation in the Maré clinics occurred gradually and stagewise. The operationalization of this governance architecture followed a sequential six-stage structured plan (Figure 2). The process began with Institutional Alignment, involving meetings between management and the local team to define the local supporter responsible for territorial coordination of the actions. This stage

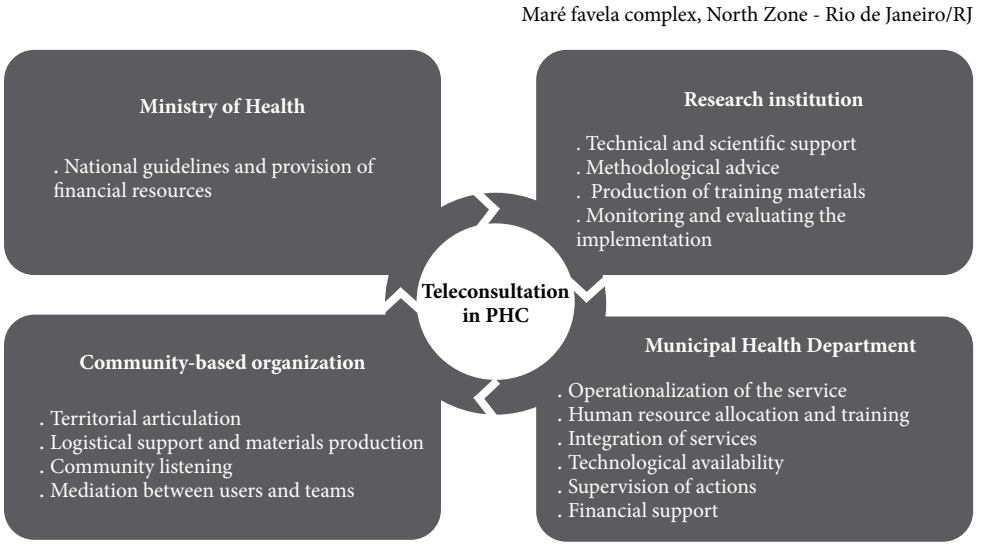

Figure 1. Interinstitutional Governance System for the Implementation of Teleconsultation in Maré.

Source: Authors.

included presentation of the project to the unit's professionals and selection of the reference professional, who then acted as the focal point for teleconsultation actions in the unit, in coordination with the local manager.

The second stage, Technical Training, included training teams in the Electronic Patient Record (EPR) module customized for video-based teleconsultation, as well as training Community Health Workers (ACS) in the use of the platform. This training was delivered by the Digital Health team—composed of the nurse leading project implementation in the territory and five coordinators residing in the territory—to support the units throughout the process. The training included real-time simulations of the process for scheduling and conducting teleconsultations via Google Meet, in addition to reviewing records to align them with the national CADWEB SUS database[19].

Chart 1. Components of the Interinstitutional Governance of the Teleconsultation Strategy in Maré.

Component	Responsible Institution	Main responsibilities	Strategic axes	Team involved
Federal coordination	Ministry of Health	National guidelines Policy financing Technological support	Digital Health Policy Funding and Infrastructure	National coordination
Municipal coordination	Rio de Janeiro Municipal Health Secretariat (SMS-Rio)	Strategy operationalization Team supervision Training and monitoring Technical support and infrastructure	Technological availability and infrastructure Human resources and training Financing Service supervision	Managers PHC professionals
Technical and scientific support	Fiocruz	Technical and methodological support Monitoring and evaluation of implementation Data analysis Academic production	Technology and Information Assessment and knowledge production	Researchers Data Analyst Developer
Community coordination	Maré's networks	Territorial coordination Community listening and communication Support in the units and in the territory	Territorial Mobilization Community Support	Field coordination Territorial coordinators
Interinstitutional agreement	All the institutions	Interinstitutional coordination/ Periodic meetings Definition of operational flows and milestones Coordination of rapid responses	Interinstitutional alignment	Institutional representatives
Technological instrumentation	Rio de Janeiro Municipal Health Secretariat	Platform implementation Protocol development Digital support	Technology and information	SMS-Rio IT Managers and Technicians
Technical training and Support	Rio de Janeiro Municipal Health Secretariat,	Professional training Ongoing support Production of educational and operational materials	Human resources and training	Technical leadership of the implementation
Mobilization and communication	Maré's networks	Planning and executing campaigns Producing materials Organizing events Disseminating information within the territory	Researchers	Communication team and territorial coordinators

Source: Authors.

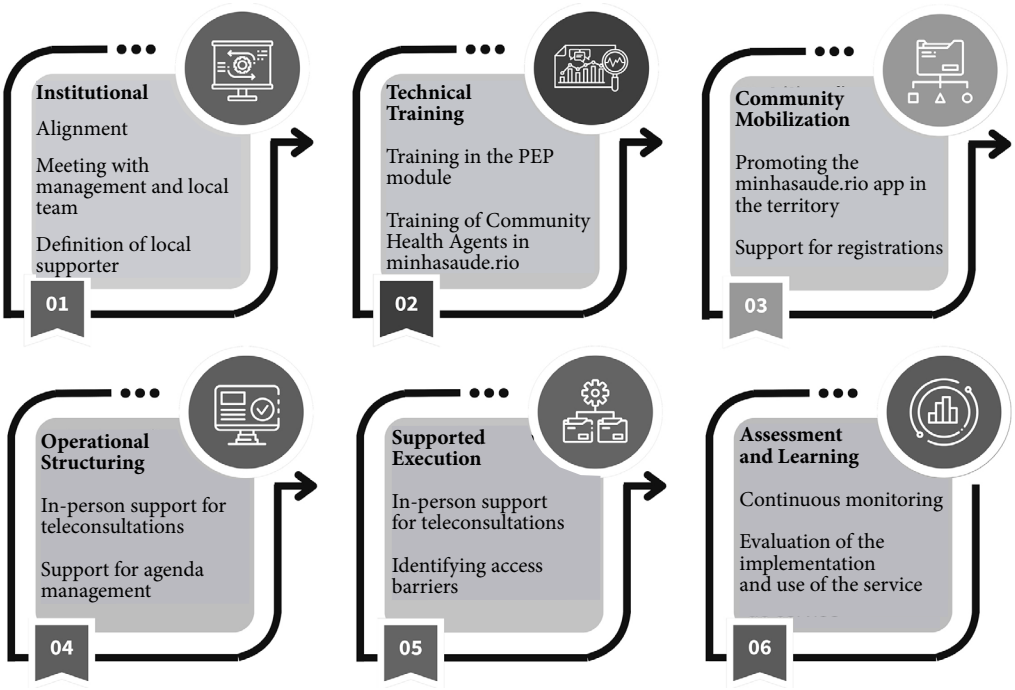

Figure 2. Implementation stages of telehealth in Maré.

Source: Authors.

The third stage focused on Community Mobilization and Communication, initially through dialogue with local organizations, residents' associations, and key stakeholders for strategic dissemination of the new service. Later, through the team of young articulators, the project promoted the *minhasaude.rio* app[20] in the territory, assisting health unit users with registration, answering questions, and serving as a point of reference for residents. This stage involved waiting-room activities, continuing education, and coordination with territorial leaders to raise users' awareness of this new mode of access to health services. This stage was grounded in the local institution's legitimacy and recognition among residents and in its capacity for mobilization and communication, built through its long trajectory of work in the territory.

In the fourth stage, operational structuring organized in-person support for teleconsultations and schedule management, including the provision of technological equipment (webcams and headsets) for professionals and the configuration of institutional email accounts for host access to video calls.

In the fifth stage, supported execution consolidated in-person support for teleconsultations and the systematic identification of access barriers. It included schedule management to identify eligible demands according to the municipal protocol, joint action by ACS and coordinators to identify technical problems, and the Digital Health team direct support to minimize operational barriers.

Finally, in the sixth stage, evaluation and learning established continuous monitoring and assessment of the implementation and use of the service, including surveillance activities by project leadership in coordination with area management. This stage also involved the development of a dashboard for systematic monitoring of indicators related to the use and performance of the teleconsultation strategy.

The process followed a timeline of approximately two months per unit, allowing the development of professional expertise and the territo-

rial dissemination of the tool. By June 2025, four units in the territory had implemented the tool, although they were at different stages of consolidation and improvement. The fifth clinic was in its first week of testing, and the sixth unit was in the preparation stage for implementation.

This plan reflects a progressive approach that integrates institutional preparation, technical training, community mobilization, and continuous monitoring, ensuring that the teleconsultation strategy is adapted to the territorial context of Maré.

Figure 3 provides a graphic synthesis of how a PHC teleconsultation is conducted, presenting the stepwise process from linking the patient to their reference family health team, through the request for and scheduling of the teleconsultation, up to the final appointment through the *minhasaude.rio* app.

Initial Profile of Teleconsultation Implementation

During the initial project implementation period, 1,017 teleconsultations were held and involved four family clinics and 72 health professionals (38 doctors and 34 nurses). The monthly median was 74 (95%CI: 42-156) teleconsultations, with 51 teleconsultations per clinic (95%CI: 32-70). Each professional performed, on average, 64 consultations (95%CI: 37-91), with a mean duration of 23 minutes per consultation.

Analysis of the teleconsultation profile showed that follow-up consultations related to recent appointments accounted for the largest proportion of visits (589 teleconsultations; 58%), followed by monitoring of chronic conditions and life cycles (333 teleconsultations; 33%), evidencing prioritization of the tool for care continuity. Simple acute conditions (56 teleconsultations; 5%), issuance and renewal of continuous-use prescriptions (19 teleconsultations; 2%), and other reasons (12 teleconsultations; 2%) accounted for smaller proportions (Table 1).

The demographic profile of users served showed a predominance of females (745 users; 73%) over males (236 users; 23%), with 36 undeclared cases. Age distribution was concentrated in the 18-39-year (444 users; 44%) and 40-59-year (350 users; 34%) groups, followed by the 60-79-year (109 users; 11%), 0-17-year (67 users; 7%), and 80 years or older (11 users; 1%) groups. The mean number of visits per family clinic was 106 consultations (95%CI: 73-139) (Table 1).

Discussion

The present study highlights the strategic role of the shared governance model in implementing teleconsultation in vulnerable territories, based on the experience of the Maré's compound of favelas. The initiative was made possible through coordination among the State, civil society, and academia, creating an institutional arrangement capable of responding to local specificities. This collaborative governance, which had already been mobilized in the territory during the pandemic[20], adapted actions to local conditions and reinforced the legitimacy and sustainability of the proposal[21].

The institutional design that guided the teleconsultation implementation process in the Maré territory was developed as an outcome of this integrated effort. It begins with a meeting presenting the project to professionals from all categories within the unit and then progresses through in-service training focused on the tools used, territorial mobilization and communication, support for teleconsultation delivery, schedule management, and continuous performance monitoring.

Recent studies emphasize the importance of network-based work throughout the implementation of teleconsultation nationwide, keeping PHC at its core given its role in coordinating care in the territory[22]. They also confirm that the ideal scenario for implementing teleconsultation in favela territories must be process-based, gradual, and evolutionary, organized into stages that lead to successful implementation and, therefore, incorporation of a new way of providing care that adds value to the services offered to the population[22,23].

Thus, teleconsultation implementation in Maré involved a gradual transition, with increasing adherence by teams working in the different PHC units. Under these conditions, teleconsultation has proven essential for ensuring care continuity when in-person services are suspended, such as on days of armed conflict or police operations – a recurrent reality in favela and peripheral territories[21-24]. In 2024, Redes da Maré recorded 42 police operations resulting in 20 deaths, 30 days of suspended health services—interrupting an average of 360 consultations per day—and 37 days without classes, affecting approximately 8,099 students per day[18]. During the first half of 2025, with application of the "Safer Access" method—developed and adapted by the International Committee of the Red Cross (ICRC)[25] to prevent and mitigate

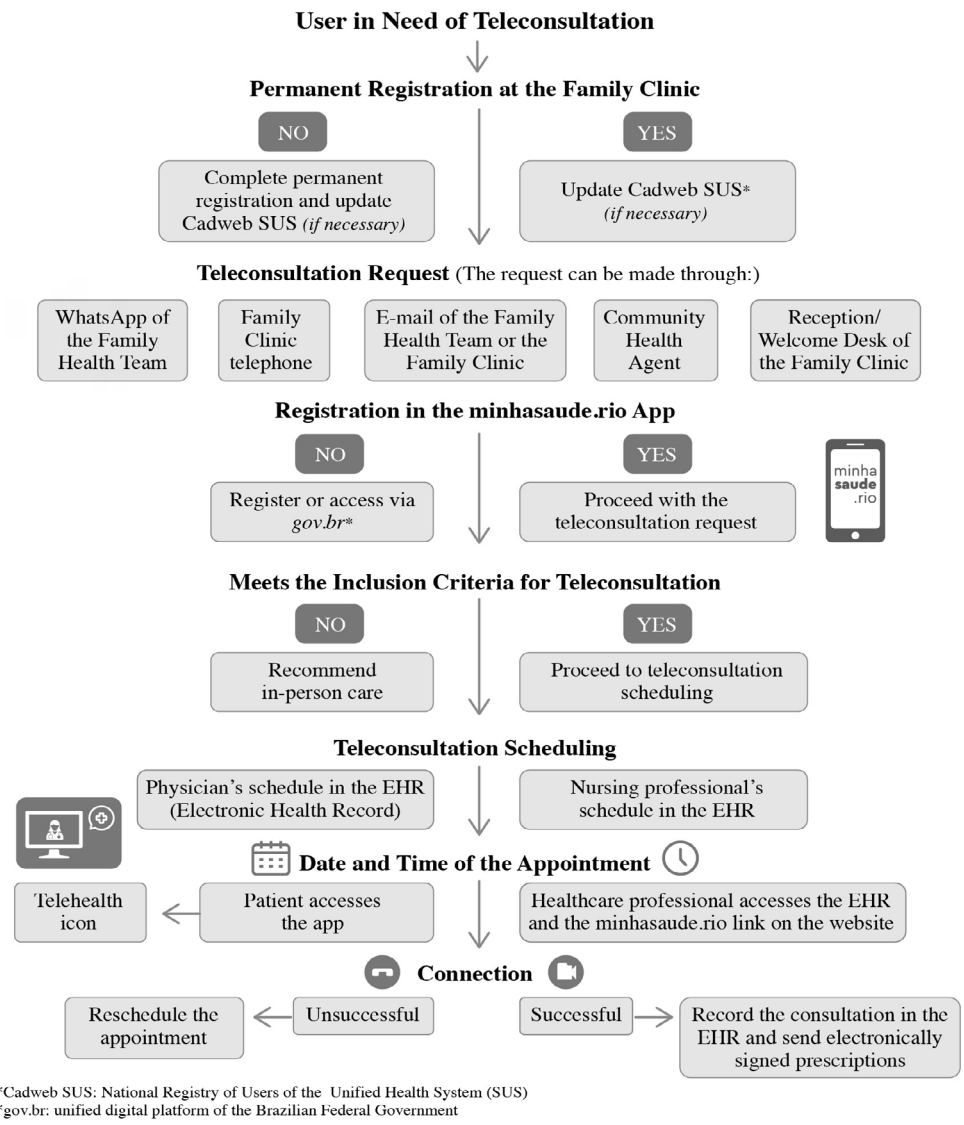

Figure 3. Flowchart for conducting a teleconsultation in Primary Care.

Note: Types of consultations included in the teleconsultation modality in Primary Health Care: Follow-up consultations related to recent appointments; Issuance and/or renewal of prescriptions for continuous use; Video call consultations, in situations of territorial instability, which may initially be scheduled as a Teleconsultation or correspond to a conversion of consultation modality from in-person to telehealth; Monitoring of chronic conditions and life cycles; Simple acute conditions (e.g., acute gastroenterocolitis, upper airway respiratory symptoms, and headache without warning signs).

Source: Authors.

the risks of security incidents in public facilities—the health units recorded, on the SUBPAV Platform (www.subpav.org), 20 red-level notifications, which implied closure of the units and safe evacuation of professionals and users in the face of critical-risk situations. In addition, 15 orange-level occurrences were recorded, resulting in the temporary suspension of internal and external activities because of elevated risk in the territory, as well as 11 yellow-level notifications,

which require the suspension of home visits in the flagged micro-areas and maintenance of internal work only because of moderate risk.

The use of teleconsultation in territorial instability has been effective in ensuring care continuity, as observed in Israel during the 2023 war[26] and in territories such as Syria, Gaza, and Yemen, even under severe access restrictions[27]. In addition, this modality has been used to support actions such as active case finding and home visits, helping to reduce care gaps and strengthen longitudinal follow-up[28].

Eight months after the implementation of teleconsultation in Maré, we can assess that the strategy strengthened the local care network and expanded access to the local reference PHC service, considering the volume of visits (1,017 teleconsultations) observed during the period. This performance is especially relevant in the PHC context because it contributes to continuous, comprehensive, and coordinated care and, consequently, to the potential it holds for strengthening PHC.

From a practical standpoint, teleconsultations in the Maré's compound of favelas promoted maintenance and expansion of access in this territory, considering the profile of teleconsultations generated since implementation, which is aligned with the scope of Official Letter No. SMS-OFI 2025/25576, dated June 30, 2025, concerning the Protocol for the Use of Teleconsultation Resources in Primary Health Care in the Maré's compound of favelas[29].

The combination of in-person and remote care has been effective in maintaining health care delivery in contexts marked by social, symbolic, and operational challenges, also reducing access inequalities in peripheral territories and among historically underserved populations[30].

A substantial number of follow-up teleconsultations (57%), monitoring of chronic conditions and life cycles (33%), simple acute conditions (56%), and issuance and renewal of prescriptions (2%)—including contraception, special control prescriptions, and pre-exposure prophylaxis (PrEP)—were observed. Recent studies confirm these findings by showing that teleconsultations make continuous population health care possible, support monitoring of health conditions, stratification of health demands, and health promotion and prevention guidance, while at the same time helping to bridge the gap between professionals and users—making them strategic in distant territories. Therefore, the tool has been considered satisfactory from both sides: for users, because it ensures access to the service from their own homes; and for professionals, because it has proven effective in helping reduce demand and waiting lists for care[31].

Despite the advances described, use of this modality still requires a learning curve on the part of both users and professionals, as it depends on changes in practice and understanding of how to use the technology, and it still

Table 1. Characterization of Teleconsultations performed in PHC units in the Maré Favela Complex, Rio de Janeiro, 2024-2025.

Indicator	N (%)
Total teleconsultations	1,017
Total of monthly teleconsultations	
Nov/2024	42
Dec/2024	39
Jan/2025	69
Feb/2025	153
Mar/2025	76
Apr/2025	72
May/2025	274
Jun/2025	292
Participating Family Clinics	4
Professionals involved	72
Doctors	38 (53%)
Nurses	34 (47%)
Median of monthly teleconsultations	74 (IC95%: 42-156)
Mean of teleconsultations per Family Clinic*	51 (32-70)
Mean of teleconsultations per professional*	64 (37-91)
Main teleconsultation producers	
Follow-up consultations related to recent appointments	589 (58%)
Monitoring of chronic conditions and life cycle	333 (33%)
Simple acute conditions	56 (5%)
Issuance and renewal of continuous use prescriptions	19 (2%)
Other	12 (2%)
Age group (years)	
0-17	66 (7%)
18-39	443 (44%)
40-59	348 (34%)
60-79	109 (11%)
80+	11 (1%)
NA	35 (3%)
Biological sex	
Female	741 (73%)
Male	236 (23%)
NA	35 (4%)

* Monthly teleconsultations.

Source: Authors, based on data extracted from the SISREG Transparency Portal on July 29, 2025.

faces professional resistance to changes in the work process, concerns about data security, difficulty of use among older age groups, among other challenges. In addition, we can identify a predominance of teleconsultations directed to the young and economically active population (85%), which may reflect difficulties faced by older adults in the digital world at this early stage (only 12% of teleconsultations occurred among the population over 60).

Some authors are consistent with these findings in reporting the main barriers and difficulties identified throughout the process of implementing teleconsultation in PHC, including resistance to sharing personal information, lack of patient support, lack of access to the internet and technology, organizational difficulties, and technical quality issues[31].

The experience accumulated thus far indicates that, in territories of high social vulnerability, teleconsultation implementation requires strategies integrated with the territory, qualified listening to the teams, and solutions that can overcome the digital barriers described above. Care continuity has depended on responses adapted to unstable settings[32], which reinforces the alignment of the initiative with the SUS Digital guidelines. In addition to incorporating actions provided for in national regulations—such as inclusion of teleconsultation in the SUS reimbursement table and the structuring of remote care points in municipalities[33]—the proposal strengthens PHC, reduces technological asymmetries, and is anchored in collaborative governance. In this scenario, the marked regional inequalities in digital infrastructure in Brazil reinforce the urgency of structural investments in Digital Health[33], considering that effective teleconsultation may be limited by connectivity. Although the health units have infrastructure and internet access and, in most cases, users have Wi-Fi networks near or in their homes, factors related to insecurity in the territory and the influence of groups exercising local control can make connectivity unstable and signal quality poor. Even so, the initiative may provide concrete inputs for improving the national teleconsultation policy.

This preliminary analysis provides relevant information on the process of implementing the teleconsultation service in PHC within a complex, unequal, and conflict-affected territory that requires innovative actions capable of delivering comprehensive and continuous health care even under adverse conditions.

Final considerations

Based on the premise that teleconsultation has become a reality and a working tool throughout the Maré's compound of favelas, reaching 100% of this territory, this advance reveals possible pathways for expanding access and improving the quality of care in contexts marked by inequality and armed violence. The model adopted was based on territorial coordination and shared governance—responded to local specificities with solutions integrated into the daily routine of services and the reality of users, preserving care continuity even in the face of structural and contextual challenges.

Implementation of teleconsultation in the Maré territory is consistent with PHC's attributes and the SUS Digital guidelines, giving the proposal institutional relevance and positioning it as a reference for strengthening care networks in similar contexts. It is still in the consolidation stage, but it is a promising experience with potential for scalability and for making a concrete contribution to improving the national teleconsultation policy.

Collaborations

All authors participated in all stages of the article's preparation, from conceptualization to critical review and editing, as well as the final revision of the manuscript.

Data availability declaration

The databases used in the article, including the extraction codes, analyses, and results, are available in the repository: (https://web2.smsrio.org/minhasaudeRio/#/dados-transparencia, in "PBI do minhasaude.rio).

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