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APS DIGITAL

A solution to ensure access to primary care in Brazil

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APS DIGITAL

Executive Summary

Expanding Primary Healthcare (APS) coverage in Brazil faces the challenge of a shortage of medical professionals in regions of greater vulnerability.

With COVID-19, telemedicine made significant progress in the country, which created the opportunity to address this challenge through teleservice solutions for primary care.

HCFMUSP, in partnership with the Better Health Program Brazil (BHP-B), developed a Digital APS model where tele-physicians cooperate with local teams from Primary Healthcare Units (UBS) and provide teleservice to the population.

The model has two pilots and encouraging results, with resolution rates greater than 80%.

In both cases, implementation time took less than six months.

The experience of these pilots provided important lessons regarding the best utilization and integration of resources available for their implementation, which are shared herein.

Application of the proposed model at scale is feasibly possible, which requires minimum infrastructure and organizational-governance requirements and has the potential to yield rapid results.

The APS Digital solution is being expanded through partnerships with ADAPS and SAPS to implement the model in dozens of remote municipalities in different regions of Brazil in 2023.

APS Digital

A solution to ensure access to primary care in Brazil

Brazil is a global study case on the impact of Primary Health Care (APS) in delivering on the right to healthcare, but over the last ten years its evolution continues being lower than expected. Capturing and retaining doctors for vacant medical care spaces is a structural barrier that continues to challenge managers committed to providing access to good quality public health in the country, and one of the main obstacles in expanding healthcare coverage.

However, telemedicine opens an unprecedented window of opportunity to address this challenge. With the advancement of digital healthcare solutions - largely an inadvertent consequence of the Covid-19 pandemic -, telemedicine's promises are turning into results, which may mean a real chance of expanding access to primary healthcare. But for this to happen, we need to take this opportunity to where it is needed the most.

The Digital Primary Health Care (APS Digital) model discussed in this paper is a solution that transforms this opportunity into a proposal. To better disseminate its use and implementation, this brief WP introduces its development context, the concepts behind its design, shows the concrete results of pilots, exposes its potential impact, and provides details of factors for expanding this service on a national level. Lastly, we invite all interested parties to contact HCFMUSP for further information.

The Brazilian excellence model

Primary Health Care (APS) is the fundamental pillar that sustains a healthcare system. APS is community-oriented, covers health promotion and protection, disease prevention, diagnosis, treatment, rehabilitation, minimizes damages and maintains health[1]. It represents users' first level of access to the system and organizes care, allowing adequate forwarding to more complex services, when necessary. Investing in PHC also has the important potential of reducing healthcare spend by preventing the progression of diseases and harm: it is estimated that 80% of an individual's[2] health needs could be resolved in primary care.

In most municipalities across Brazil, APS utilizes the Family Healthcare Strategy (ESF) as the model for providing care, where a multi-professional team takes over the healthcare responsibilities of families living in a given territory through integrated care practices directed at the population. Teams comprise at least one general practitioner or specialist in Family and Community Healthcare, one generalist nurse or specialist in Family Healthcare, one nursing assistant or technician and community healthcare agents[3].

The Brazilian ESF model is an international reference of success in Primary Health Care, having undergone an impressive coverage-expansion process in its early days: in 1998, ESF covered 5.6% of the population; ten years later, in 2008, this figure reached 48.7%[4]. Achievements such as the 39% drop in maternal mortality and the 36.3% reduction in infant mortality between 1996 and 2004, are largely attributed to the implementation and expansion success of ESF. According to the federal government, in 2020, the program covered 63.5% of Brazilians[5].

An important part of ESF's success is the presence of a physician and a highly qualified team: studies show that the presence of these professionals on PHC teams promotes a reduction in mortality and hospitalization rates, particularly in the treatment of chronic diseases like diabetes[6]. Thus, ESF became the focus of the federal government's investments in the 2000s[7], as opposed to the APS expansion model solely focused on community healthcare agents.

Challenges of the Brazilian model

Despite all the advancements, there is a huge challenge ahead. 25% of the population still has no access to any type of healthcare[8] and 36.5% of Brazilians are not served by the ESF[9]. Between 2008 and 2019, the monthly growth rate of ESF coverage was close to zero[10] percent - in states like Roraima, Amazonas, Maranhão and Acre no significant change in coverage was observed[11].

One of the biggest obstacles to expanding primary care of good quality in the country is the lack of medical professionals willing to work in regions distant from major urban centers. The national average of 2.27 doctors/1,000 inhabitants is 43%[12] lower in the North region (1.3/1,000) and 25% lower in the Northeast (1.69/1,000)[13], while in the Southeast the ratio of physicians is 39% higher than the national average (3.15/1,000). Differences become even bigger when we compare the proportion of physicians in capital cities and the interior of states across all regions: northeastern capital cities have eight times more doctors than the other municipalities in the region's states[14], and the same indicator reaches 5.5x in the North, with states like Amazonas reaching 12.3x.

The reasons that explain the lack of professionals in these areas are many and difficult to resolve. According to a survey with 795 healthcare professionals conducted by the Better Health Program Brazil (BHP-B), a UK program in cooperation with Brazil, factors like (i) socio-cultural life of a location, (ii) geographic access and (iii) existence of a good quality infrastructure to raise children were widely valued as criteria for choosing a workplace, hence, inner state regions and rural areas tend to be less competitive[15].

In addition, due to multiple structural reasons, primary care work tends to be perceived by physicians as a transitory phase for recent graduates who have not yet undergone a residency program - i.e., the family healthcare career is not considered a long-term option by medical professionals.

The leap in teleconsultation and remote medicine

Telemedicine has the potential to solve part of these issues in a qualitative and effective manner, as it allows doctors from other locations to attend patients remotely and to digitally participate in the functioning of medical equipment. Its utilization disseminated rapidly in Brazil - more than 7.5 million teleconsultations took place between 2020 and 2021[16], generating improvements in technologies and results. It is estimated that 75 thousand lives were saved through teleconsultations during the period, and their resolution level in Emergency Care was 91%[17].

New possibilities for implementing telemedicine solutions in Brazil were made possible through the legal recognition of telemedicine in the country. After the end of the sanitary emergency period due to Covid-19 in April 2022, telemedicine regulations were published by the CFM in May 2022 (Regulation #2,314/2022), followed by legal recognition by the Ministry of Health in June 2022 (GM/MS Directive # 1,348), which gave greater autonomy to the provision of remote care to patients by healthcare professionals.

In other geographies, the use of telemedicine in primary health care allowed expanding coverage and improving healthcare satisfaction indicators. The UK government, through its National Health Service (NHS), implemented NHS Online GP (General Practitioner), an online consultation service for primary care that intends to migrate at least 25% of all first-level healthcare consults to the online format[18]. In Rwanda, the implementation of a digital health-service app for the general population and especially those in remote areas has led to more than 3 million teleconsultations since 2016[19].

Aware of this potential yet to be explored in Brazil and the challenges in fulfilling the right to healthcare that we face as a continental-size and unequal country, HCFMUSP with BHP-B's support developed the APS Digital project.

A solution designed for Brazil's primary care challenges: APS Digital

The APS Digital model proposes to use teleconsulting services in Primary Healthcare Units (UBSs) as a way of expanding the availability of clinical consultations by primary care professionals. Patients, with the support of UBS professionals (for example, nurses) and IT technicians, use a computer located in the UBS unit to conduct a remote teleconsultation with a doctor.

Patients also count on the UBS infrastructure, staff and processes to receive pre- and post-consultation care. The proposed model was designed to overcome the main barriers that currently prevent expanding primary care access to the population. Thus, APS Digital sets out to address: (i) Impossibility of attracting and retaining physicians in places lacking healthcare professionals, (ii) Difficulty accessing telemedicine services and (iii) Patient demand higher than healthcare service capacity.

Patient Journey

The patient goes to the UBS with or without an appointment

UBS professionals receive and screen patients

The patient is attended by the doctor remotely through a video call on the UBS computer with support from the local nurse or nursing technician

The patient receives treatment on site (such as vaccination, medical prescription, medication) and the orientations necessary (treatment and next steps)

Obstacle 1

Impossibility of attracting and retaining physicians in areas lacking medical professionals

As discussed, the imbalance between the distribution of primary care physicians in Brazil creates medical assistance gaps, as these are caused by factors that are difficult to solve (e.g., attractiveness of inner-state municipalities). Through teleconsultations, it is possible to connect doctors and patients, even remotely, without the need to allocate a professional in regions that, historically, have had difficulties attracting and retaining them.

By providing medical care to the population in vulnerable regions, rural or remote areas, particularly in those where a doctor is not present or its difficult retaining professionals, it is expected that there will be an increase in the availability of medical care in areas lacking assistance.

Obstacle 2

Difficulty accessing telemedicine services

One of the obstacles to the population's access to wide scale telemedicine is the need for equipment (computer, smartphone or tablet), access to stable internet and digital literacy necessary to access and use telemedicine services. Digitally excluded and unschooled patients - a vulnerable group that represents 26% of Brazilians and very much coincides with regions with lower primary care coverage[1] - would not benefit from a service model that in its design did not contemplate this challenge.

To address the digital integration barrier present in the Brazilian context, the APS Digital model opted to conduct teleconsultations using the UBS infrastructure. By centralizing access to this service at said units, it satisfies in a simpler and less-costly manner the logistics challenge of ensuring adequate quality equipment and internet access for physicians and patients. There is also an effort to improve the quality of service provided remotely, as the UBS will have the support of the local healthcare team, which will provide support in the pre- and post-consultation processes, as well as other procedures eventually deemed necessary.

The option to provide care at the UBS unit also supports the qualification of the local health care team and maintenance of the ESF structure. For UBSs with no physician physically present, the remote physician assumes the role of leader, discussing patient cases and heading the planning of team actions. In addition, in the format adopted, the local healthcare teams are trained in the service flows and basic concepts of telemedicine (e.g., training on the General Data Protection Law - LGPD), patient rights, and connected healthcare concepts. The solution values the healthcare team's participation, especially in the ESF model, with the participation of the nursing team and community healthcare agents (ACSs), avoiding fragmentation and heterogeneity of care models in primary care.

[1] Centro Regional para o Desenvolvimento de Estudos sobre a Sociedade da Informação (CETIC). Tic 2019. Dados disponíveis em: https://cetic.br/media/analises/tic_domicilios_2019_coletiva_imprensa.pdf

Obstacle 3

Patient demand higher than medical care capacity

Some regions, despite retaining some medical professionals, face higher demand than serving capacity, leading to long waiting lines for patients with simpler demands. The causes are several, such as licenses or team transitions, or even logistics challenges in distributing professionals in the service networks.

Teleconsultations can complement service in regions where doctors are already active, with the potential of reducing lines and repressed demand. Through temporary physician-allocation models to overcome staff shortage or temporary leaves, APS Digital has the potential to not only resolve quickly and flexibly intercurrent absences of medical professionals, but also add capacity in locations that require additional attention.

Impact case

Santarém

Paissandu is a remote community of 748 inhabitants in the municipality of Santarém, Pará state, and 6 hours away by ferry from the city. It was the first place to receive the APS Digital solution, with the objective of validating its effectiveness in a region with no primary healthcare coverage.

The community has no doctor physically present, only a team composed of a nurse and nurse technician and ACS that attends at the local UBS unit, which makes it difficult to access healthcare services. The inhabitants that require medical attention need to travel to neighboring communities, which many times is impossible due to rain and road conditions.

Results achieved with APS Digital in Paissandu demonstrate the effectiveness of the solution in this context. Teleconsultations were offered for seven months with an initial medical allocation of 20 hours/week. Results achieved with the solution include:

1. Large portion of the population serv

About 33% of Paissandu's population was served via teleconsultations, widely disseminated through communication actions and active search of patients by the local healthcare team

2. High resolution rate

Approximately 93% of cases were of remote primary care, mostly composed of simple demands that were suppressed in the community

3. Early identification of serious cases

The ~7% of cases that could not be resolved through teleconsultations were analyzed and submitted to specialized care or urgency and emergency service, avoiding possible future complications in the health state of patients

4. Population very satisfied with the service

Of the patients who responded the satisfactio survey, ~89% rated the teleconsultation positively

Impact case

Jaguariúna

The second APS Digital pilot was done in Jaguariúna, São Paulo state, with the objective of demonstrating the solution's effectiveness in an urban context as a way of complementing in-person medical care.

In spite of having doctors at all UBSs in the municipality, primary care coverage is insufficient to serve the entire population of Jaguariúna. The number of physicians in primary care is only capable of serving 64% of the population[1]. According to UBS XII de September - the UBS unit that received the APS Digital solution - the waiting line to schedule an appointment is 2-3 months.

The APS Digital solution reported positive results when implemented at the UBS. Two months of teleconsultations were offered, with a medical allocation of 10 hours/week. The main gains observed with the solution include:

1. High resolution rate

Approximately 79% of consults stayed in the remote primary care, reflecting the model's resolution success in more complex scenarios

2. Reorganization of the in-person doctor's schedule to focus on more-serious cases

A major part of teleconsultations were cases of continued care (new prescriptions, monitoring of chronic diseases), which allowed patients with more-serious cases to be prioritized in terms of being served

3. Short waiting time for teleservice

Roughly 95% of those who responded the satisfaction survey complimented the short interval between scheduling and the teleconsultation appointment itself

4. Population very satisfied with the service

Of the patients who responded the satisfaction survey, ~83% evaluated the remote service positively

[1] E-Gestor AB (SCNES e IBGE), Dezembro de 2020

Step-by-step implementation

We divided the implementation of APS Digital into 3 stages. First, to implement the solution, it is necessary to make adjustments to the infrastructure and systems in the UBS units, hire personnel, train healthcare teams and adapt unit processes. Next, divulging the service to the population is a key part to ensure success of the model's implementation. Lastly, the continuous monitoring of performance indicators and incorporation of improvements to the functioning of the solution ensure the constant improvement and functionality of APS Digital.

Experiences from the Santarém and Jaguariúna pilots taught ways to facilitate the implementation of this innovative solution. Below we share potential ways to enable and accelerate the development of these stages.

1. Implementation of the solution

1. Adapting of UBS infrastructure and systems[20]

There are federal programs that can be useful to adapting the infrastructure of UBS units so that they achieve the minimum applicability requirements of the APS Digital model. The Informatiza APS program can support the IT structure of UBS units[21], the GESAC connection (Electronic Government - Citizen care service program) can help with satellite-based Internet connection in remote and rural regions[22] and the e-SUS APS is an electronic medical record offered by the Ministry of Health that can easily be implemented in UBSs[23].

2. Personnel contracting or allocation[24]

In this stage, it is paramount that team size be defined according to operational needs. It is advisable to assess whether there already is a staff available at the UBS that can be allocated to the project, especially the healthcare team in the municipality's unit and IT team, since they are already familiar with the local routine and challenges.

The allocation of remote physicians must consider the necessary adjustments in terms of work space with the equipment and systems necessary for teleconsultations. This said, it is important to observe the legal parameters regarding the practice of telemedicine[25]. In addition, practices for controlling working hours and production of the telemedicine team should be defined and agreed upon in advance.

3. Training of healthcare teams and remote physicians

Training should be provided so that all teams are ready to execute tele-service processes, which can be done both synchronously (e.g., training conducted for implementing the solution, tele-service

simulations) and asynchronously (e.g., online course, library of documents and processes).

4. Adapting of UBS internal processes

As soon as the solution's concepts are conveyed in training and clinical protocols, the teams involved can start adapting the internal UBS processes, using the equipment and infrastructure available to start teleconsultations. It is important to emphasize the lead role of teams, both for their best performance and for their best adaptation to the local context.

The processes include:

- Application of the appointment flow of teleconsultations
- Utilization of teleconsultation service flows for the receiving and triage of patients in order to select those eligible for teleconsultations
- Utilization of the electronic medical record for registering medical care provided to the population
- Population attended through teleconsultations
- Application of means for measuring results (like satisfaction survey) and management rites

2. Communicating with the population

Given the innovative nature of APS Digital, effective communication with its end-recipients is essential for the dissemination and adoption of the solution, especially in communities that previously didn't have medical care and where patients did not seek care at the UBS. In particular, it is recommended that the population be informed of the possibility of the teleconsultation and the respective working hours.

Based on learnings from the pilots executed, we found that (i) the active search of patients by ASCs, (ii) the physical and digital disclosure (e.g. via WhatsApp) of service hours and (iii) the organizing of health promotion events were actions with potential for mobilizing and disseminating information more effectively to the population

3. Monitoring and continuous improvement[26]

The monitoring of teleconsultations is fundamental to base decisions, make improvements and expand the solution to new locations. For such, it is necessary to establish communication channels with patients, nursing staff and tele-physicians, as well as monitor the main teleconsultation metrics.

The metrics must be evaluated comparatively against numbers found in in-person healthcare, with similar communities, or the progress of numbers at a given UBS over time. It is important that management routines make constant use of metrics to adapt their procedures in order to improve their results.

Next steps

Factors for expanding the APS Digital model

As the APS Digital solution gains scale and is applied nationwide and in different health scenarios, new adaptations will be necessary. We listed three factors that should be considered for the APS Digital solution to achieve a wide-scale level and potential solutions to the challenges it can bring about.

Unified training and protocols: ensuring standardized teleconsultation services becomes a challenge as the APS Digital model encompasses a larger number of nursing and telemedicine teams. Training all teams on new teleconsultation processes is an operational and logistical challenge, particularly when you consider potential changes in personnel and the loss of knowledge that they cause. To overcome this challenge, it is recommended to unify training and protocols and make them available asynchronously, fostering their access by local teams.

Centralized IT/admin support: IT/administrative service costs can be significant when we consider dispersion of the APS Digital model. Centralizing these services could yield scale gains, with few employees responsible for providing support to a large number of UBS units. Sophistication of the model could involve owners of centralized management of information and IT tools[27] that enable structured and constant monitoring and incorporation of results.

Allocation and control over medical team hours: a team composed of many tele-physicians requires greater management capabilities and allocation of professionals, control over hours, and means for auditing services provided. As the team gains maturity in management methods, new ways of working can be considered, such as the creation of a tele-physician center, with dynamic allocation in municipalities according to demand.

Expansion of the solution

After the successful implementation of pilots (Santarém-PA and Jaguariúna-SP), the Hospital das Clínicas Digital Healthcare team from the University of São Paulo's School of Medicine (HCFMUSP) is actively working to expand access to healthcare via digital health in primary care, seeking partnerships to implement, expand and improve the APS digital solution model.

There is currently a partnership with the Agency for the Development of Primary Health Care (ADAPS), which aims to expand the digital healthcare model to 20 remote municipalities in different regions of Brazil in 2023.

HCFMUSP also entered into an agreement with the Ministry of Health's Department of Primary Health Care (SAPS) to expand the solution's scope to 20 different locations in the Amazon region in 2023. The program will be implemented in waves and the initiative is expected to reach thousands of people throughout its implementation, measuring the satisfaction and impact on the population during this period.

Implementation invitation

Brazil is an unequal country, but that does not mean we have to accept the reality presented to us. In a context where nearly one-quarter of the population remains without access to a doctor where they live, our role as transformation agents is to create conditions for the right to healthcare to be more than an expectation, to be a fact. Here is a way to do it.

Brazil's Primary Health Care model questioned parameters and proved to be highly effective in the early 2000s, but its advancement over the last decade came up against its inability to overcome medical assistance gaps in vulnerable regions. Today we have the opportunity to take a new step towards increasing access to healthcare by delivering on digital health promises in primary care and once again lead transformations to improve and expand public healthcare.

This white paper presented a solution tested in different contexts and with scalable potential to enable shorter waiting lines and satisfy repressed demand, as well as access to medical care in remote regions. We invite everyone interested in implementing this or similar solutions to contact the Hospital das Clínicas' Digital Healthcare team of University of São Paulo's Medical School (HCFMUSP) and build on these results.

Index of appendices

Appendix 01.

Minimum requirements

The teleconsultation operation depends on reliable equipment and a stable internet connection for effective communication between doctor and patient. This requires UBS units to satisfy some minimum IT requirements, described below:

3 computers, with the following functions:

- 1 teleconsultation computer capable of capturing integrated audio and video or via accessories (webcam and microphone), as well as speakers for sound, in good condition for making video calls
- 1 computer to register patient registration process (e.g. teleconsultation scheduling, patient data in the electronic medical chart)
- 1 computer to record data from the screening process (e.g., weight, pressure, height and other data and information provided by the patient during triage)

Printer to print documents sent electronically, such as medical prescriptions, treatments, examination requests, etc.

Internet access with enough speed and stability for audio and video calls

Contingency connection in case of equipment and/or main connection failure (e.g. 3G, mobile, landline)

Systems are essential to enable communication between the UBS, physician and patient, as well as for registering information in systems that present data interoperability between those involved and other UBSs and levels of healthcare. The solution is indifferent to the systems used and implementation of systems that meet the following requirements is required:

- Video call tool that can be used for medical consultations and provides security over the information transmitted (e.g., Google Meets, Microsoft Teams, Zoom)
- An electronic medical record that the UBS and physician can access remotely, that allows for the interoperability of data between other UBSs and other levels of healthcare (e.g. PEC e-SUS APS, provided by the Federal Government free of charge for use in UBS units)
- A tool for making digital prescriptions that allows sharing with UBSs and patients and satisfies the requirements established by regulatory services of municipalities and local drugstores (e.g., Memed, with prescriptions adapted with UBS & physician stamps)

Infrastructure: UBS must have physical infrastructure for the receiving and triage of patients, as well as for teleconsultations and post-consultation support. For such, it must have:

- Medical equipment for pre- and post-consultation
- Medical supplies (e.g., drugs, vaccines)
- Room to conduct teleconsultations, with table and chairs to accommodate at least a patient and a companion, and that offers privacy to the patient during the consultation

In order for the doctor to conduct consultations, he/she must have a minimum infrastructure to attend patients, which must include:

- A workstation to conduct teleconsultations, with a desk and chair and, preferably, a dedicated room, offering privacy during the consultation
- Computer for teleconsultations with the ability to capture integrated audio and video or use accessories (webcam and microphone), in good condition to make video calls
- Access to the video call, electronic records and digital prescription systems

Appendix 02.

Roles and responsibilities

Four teams are fundamental for the solution's execution: (a) remote primary-care doctors, (b) local healthcare staff, (c) IT support team and (d) management team of the solution. The attributions of those responsible go beyond the teleconsultation operation and include management, support and communication activities. Provided below is a summary of the main functions:

A. Remote primary-care doctor

The tele-physician should preferably be a Family and Community Doctor, with prior experience in primary care and the ability to coordinate the UBS medical care remotely. The work of the tele-physician must be executed from a work station equipped with a computer, accessories and a stable internet connection to hold video-calls, and have access to the systems necessary for teleconsultations (videoconference tools, electronic medical records, digital medical prescriptions).

The doctor does not necessarily have to be located in the same municipality as the UBS, but it is essential in order to attend the local population that he or she be familiarized with socioeconomic and epidemiologic conditions, as well as the availability of medication at the UBS and in the municipality.

Responsibilities of a tele-physician include:

- Medical care of patients received by UBS through teleconsultation and provide the necessary treatment as a result of call (e.g. forward to specialized care, write prescription)
- Register data from the patient call in the electronic medical chart
- Leadership and qualification of local UBS professionals in the event of absence of the in-person physician, as provided for in the National Primary Care Plan (PNAB). For remote care, this involves creating and maintaining management rites with local healthcare professionals to manage medical care at the UBS

B. Local healthcare team

The healthcare team should be composed of at least one nurse and one nurse technician, preferably from the same community and with prior work experience at the UBS - which facilitates the onboarding process of the tele-physician, contributing socio-demographic and epidemiological information about the region, as well as patient health history.

The local healthcare team should perform the same role as it would have with an in-person physician, as provided in the PNAB, performing pre- and post-consultation procedures, but with emphasis on the following activities to provide remote medical care:

- Patient's connection with the doctor to perform the consultation
- Nursing support for the tele-physician and patient during the teleconsultation when needed (e.g., provide the patient's medical history, screening data, simple analyses and other activities, except IT support)
- Actions to disclose the teleconsultation service among the population (e.g. physical and digital disclosure of service hours, organizing health promotion events)

C. IT support team

The IT team should be composed of IT technicians or professionals with a similar background. When implemented on a small scale, existing teams can be used (for example, IT support provided to UBS units of a given region by the City). It is not necessary for the IT technician to be present at the UBS, however it is expected that he/she can go there periodically when necessary (for example, to install and maintain equipment). Responsibilities include:

- Install and provide maintenance on the IT equipment of UBS units and physicians
- Install and train professionals on the use of teleconsultation software (which includes the electronic medical record, the videoconferencing tool and the electronic prescription system)
- Provide IT support to UBS units and tele-physicians when necessary

D. Management team of the solution

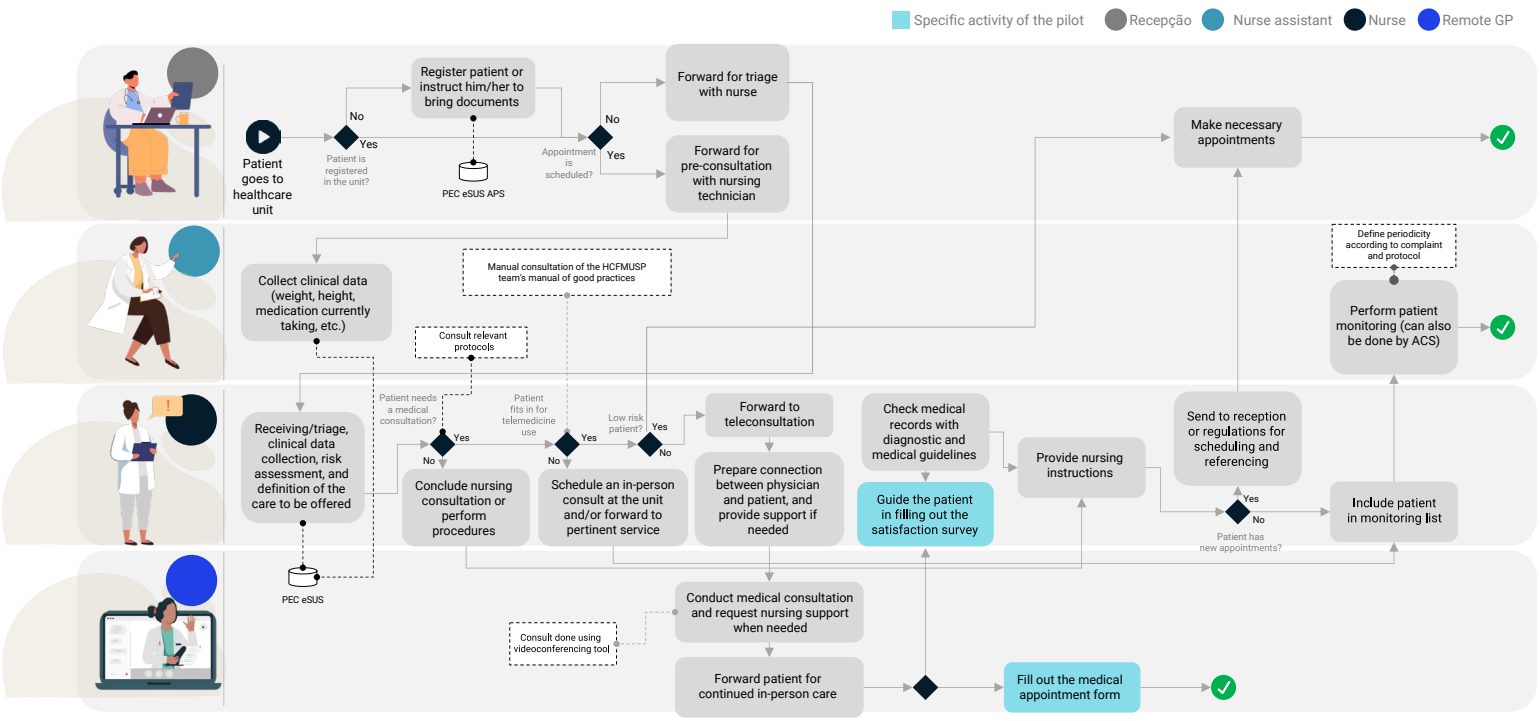
The management team is responsible for the long-term implementation and management of the solution. It is a central team of the implementing body, the composition of which depends on the size and complexity of the operation. Its functions can include:

- Analysis and monitoring of results, through data collection and management of metrics and indicators (using, for example, satisfaction surveys and electronic health record data)
- Continuous improvement of the solution through the analysis and interpretation of results and feedback from patients, UBS professionals and physicians (using, for example, management rites with professionals and interviews with patients, professionals and physicians)
- Articulation with stakeholders to operate and manage the solution (e.g. UBS units, Municipal Health Departments, partners)
- Management of the clinical staff (when implemented centrally) through leadership, support and monitoring of the production of the tele-physician team
- Qualification of professionals through the development, training and continuous improvement of clinical protocols and skills for primary care teleconsultations
- Management of administrative processes such as budget, implementation schedule, hiring, production, etc.

Appendix 03.

Flow of medical care

The flow of medical care of APS Digital is composed of a set of predefined sequential activities executed by UBS professionals and the tele-physician, which includes the procedures of receiving, triage, teleconsultation and post-consultation of patients. Below is a process view of the medical care flow:



The pre-consultation process comprises the reception of the patient, triage and registration of information in the electronic medical record by the local UBS professionals, following the standard procedures set forth in the National Primary Care Plan (PNAB). In this stage, the patient's eligibility for consultation should be evaluated in accordance with the clinical protocols for primary care teleconsultations; if eligible, the patient can be forwarded to the teleconsultation or schedule the appointment, according to the agenda availability agreed between UBS and the tele-physician.

During the teleconsultation, the patient undergoes a clinical consultation with a remote doctor, which is done on a computer located in a UBS room that offers privacy to the patient to do the consultation.

Nursing team should help the patient to connect to video call and complement the medical care with simple analyses and patient history when needed. The IT support team can support the local UBS team with technical issues.

At the end of the consultation, the necessary arrangements are indicated by the medical professional, which may include dispensing medication, writing a prescription, submitting to specialized care or urgency and emergency, scheduling continued care, scheduling exams, among others, according to UBS standard procedures.

Appendix 04.

Evaluation criteria

The pilots were evaluated based on the results of the teleconsultations conducted, as well as assessment of the teleconsultation by patients and tele-physicians and in conversation spaces with the teams and patients involved. The data was collected through digital means and through Rapid Cycle Evaluation (RCE), the preliminary results were analyzed in real time and used to make improvements to the solution.

The data was collected through satisfaction surveys applied to patients after the teleconsultations and the evaluation of teleconsultations by the tele-physician. The satisfaction survey was developed based on studies to assess patient satisfaction, such as PCATool and GP Patient Survey, as well as an evaluation of systems used, such as System Usability Scale. The medical form was designed to measure key metrics of primary care and provide a means of comparison between in-person and remote care.

Satisfaction survey: applied on patients after the teleconsultation, with the objective of evaluating the consult according to the following dimensions:

- Waiting time
- Privacy
- Satisfaction with the service
- Satisfaction with IT orientations and support
- Quality of IT equipment and connection

Medical form: completed by the tele-physician during the teleconsultation, with the objective of assessing the effectiveness of teleconsultation. The information recorded includes:

- Comparison with in-person service
- Type of support needed from nursing team
- Factors preventing teleconsultations
- Room for doctor comments

The solution was also monitored through conversation spaces with the nursing team, physicians and patients, using management rites and interviews.

- **Management rites:** bi-weekly meetings with the UBS nursing team and tele-physicians to promote a space for presenting improvement suggestions and pain points about the solution
- **Interviews:** Structured interviews conducted with a sample of patients and the nursing team to assess the solution's performance and satisfaction

As the solution gains scale and serves a large part of the population, systemic and long-term impacts on healthcare should be observed:

- Percentage of hospitalizations due to conditions susceptible to primary care (ICSAB) in the municipality
- Mortality rate in the municipality
- Potential years of life lost (APVP) in the municipality
- Average cost per patient in municipality

Appendix 05.

Satisfaction survey Medical form

Section 1.
Information about the medical care location:

1. In which UBS were you attended?

2. What is the name of the physician who conducted the consultation?

Section 2.
Patient information:

3. Gender:

A. Male
B. Female
C. Other
D. Prefer not to answer

4. Age: (open field, numbers only)

5. Your color or race:

A. Yellow
B. White
C. Indigenous
D. Mixed race
E. Black
F. Prefer not to answer

6. Level of education:

A. Primary school incomplete
B. Primary school complete
C. High school incomplete
D. High school complete
E. Higher education incomplete
F. Higher education complete
G. Post-graduation incomplete
H. Post-graduation complete

Section 3.
Information about the consultation:

7. Regarding your medical consultation, you were attended by:

A. In-person physician
B. Tele-physician

8. Was the appointment scheduled in advance?

A. Yes
B. No

9. How do you evaluate the amount of time you had to wait to get a consultation?

A. Very bad
B. Bad
C. Average
D. Good
E. Great

10. How do you evaluate your privacy during the consultation?

A. Very bad
B. Bad
C. Average
D. Good
E. Great

11. How do you evaluate the quality of the medical care provided?

A. Very bad
B. Bad
C. Average
D. Good
E. Great

12. On a scale from 0 to 10, how satisfied are you with the medical care you received? (options 0 to 10)

13. On a scale from 0 to 10, how well did the consultation meet your expectations? (options 0 to 10)

14. On a scale from 0 to 10, how much would you recommend the type of medical care you received to your family and friends? (options 0 to 10)

Section 4.
Information about the remote medical care (only for remote medical care):

15. Did you ever have an appointment with a tele-physician before?

A. Yes

B. No

16. How do you evaluate the instructions and support required for the video call?

A. Very bad

B. Bad

C. Average

D. Good

E. Great

17. How do you evaluate the audio/video quality during the video call?

A. Very bad

B. Bad

C. Average

D. Good

E. Great

18. How do you evaluate the remote medical care provided compared to in-person medical care?

A. Very bad

B. Bad

C. Average

D. Good

E. Great

19. On a scale from 0 to 10, how much did remote care make it easier for you to see a doctor today? (options 0 to 10)

Section 5.
Comments:

20. Did you need help answering the survey?

A. Yes

B. No

21. Would you like to comment, complain, suggest and/or compliment the medical care received? (open field)

Appendix 06.

Medical form

Section 1.
Identification information:

1. Date of the teleconsultation: (DD/MM/YY)

2. Physician's name: (selection list)

3. UBS: (selection list)

Section 2.
Teleconsultation data:

4. Type of demand for this consultation

A. Spontaneous demanda
B. Scheduled consultation

5. Was the consultation conducted? (if no, stop here)

A. Yes
B. No

6. Teleconsultation duration:

A. 0 to 5 minutes
B. 5 to 10 minutes
C. 10 to 15 minutes
D. 15 to 20 minutes
E. More than 20 minutes

7. Type of consultation: (you can select more than one option)

A. Patient's first consultation at the UBS in-person or digital)
B. Patient's first consultation with you, doctor
C. Patient's return visit to the UBS (already attended by another professional at the unit)
D. Patient's return visit with you, doctor

8. Type of medical consultation:

A. Investigative (presents acute complaints to be analyzed, return with exam results to confirm diagnosis, reassess, etc.)
B. Information-orientated (regarding procedures, contraceptive methods and the like)
C. Continued/scheduled care (includes hypertension and diabetes program, group scheduling)

9. CID-10: (more than one can be inserted)

10. Line of medical care:

A. Adult-centered care
B. Elderly-centered care
C. Child/adolescent-centered care
D. Women's health-centered care
E. Pregnancy-centered care
F. Mental health

11. Conduct/outcome:

A. Case closed
B. Return visit scheduled to assess test results
C. Return visit scheduled to reassess
D. Return visit scheduled for continued/ scheduled care routine
E. Forwarded for an in-person primary care medical consultation
F. Forwarded for specialized care
G. Forwarded for urgent/emergency service
H. Forwarded for medical care group scheduling
I. NASF scheduling
J. Other

12. Was support required during the teleconsultation? (you can select more than one option)

A. Yes, support from the UBS healthcare team to complement the medical visit (information about the patient's history, simple analyses, accompany the patient during the consultation)

B. Yes, IT support

C. No

13. Do you agree that distance was NOT a limiting factor in providing adequate patient care?

A. Totally agree

B. Partially agree

C. Indifferent

D. Partially disagree

E. Totally disagree

Footnotes

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4. Rocha, Mrejen Coube, 2020. A Decree for Roads and the Road for Healthcare in Brazil. Available at: https://ieps.org.br/wp-content/uploads/2021/11/IEPS-NT13.pdf
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13. Ibidem
14. Ibidem
15. Better Health Program - Brazil, Ministério da Saude.
16. Digital Health Brazil, 2021. Entity reports that telemedicine saved more than 75 thousand lives between 2020 and 2021. Available at: https://saudedigitalbrasil.com.br/press/entidade-aponta-que-telemedicina-salvou-mais-de-75-mil-vidas-entre-2020-e-2021/
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19. Babyl, 2022. Available at: https://www.babyl.rw/
20. Minimum IT requirements are available in Appendix I - Minimum Requirements.
21. Programa Informatiza APS. Access available at: https://www.gov.br/saude/pt-br/composicao/saps/informatiza-aps/
22. Conexão GESAC. Access available at: https://www.gov.br/pt-br/servicos/obter-conexao-de-internet-programa-wi-fi-brasil
23. APS e-SUS system. Access available at: https://sisaps.saude.gov.br/esus/
24. Further details on the human resources necessary to implement, manage and operate the solution are described in Appendix II - Roles and responsibilities
25. Particularly those regulated by GM/MS Directive #1,348 of the Ministry of Health
26. The tools for monitoring the pilot are detailed in Appendix IV - Evaluation criteria, Appendix V - Satisfaction survey and Appendix VI - Medical form.
27. As example, a similar solution is performed by the UK government's National Health Service (NHS) in digital health management through the Chief Clinical Information Officers who centralize and lead information and IT projects on digital health. For more information, https://www.england.nhs.uk/blog/the-role-of-ccios-in-digital-transformation-of-the-nhs/


Memed - Receita Dig
DMDSTE-FULL.pdf
Memed - Receita Dig
gK7GDO-FULL.pdf
Lista de leitura
Você
LG