Avança Saúde SP

Digital transformation of health in the City of São Paulo

DIGITAL HEALTH CASE STUDIES

EDITION 12

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CONTENTS

ABBREVIATIONS AND ACRONYMS

CGM	Comptroller General of the Municipality of São Paulo
CNES	National Registry of Healthcare Facilities
DATASUS	IT Department of the Unified Health System
HIMSS	Healthcare Information and Management Systems Society
LOA	Annual Budget Law
PAMG	Glycemic Self-Monitoring Program
PGM	Municipal Attorney General
RUE	The Urgent and Emergency Care Network
SEADE	State Data Analysis System
SIA	Ambulatory Information System
SICAP	Integrated Partnership Control and Evaluation System
SIH	Hospital Information System
SINASC	Live Birth Information System
SIURBs	Municipal Secretary of Urban Infrastructure and Works
SMS	Municipal Health Department
SUS	Unified Health System

EXECUTIVE SUMMARY

MAIN THEME

An analysis of the digital transformation of care networks in the public health system of the largest and most populous city in the Americas, the result of a partnership between the Municipal Health Department of São Paulo and the Inter-American Development Bank (IDB). The case study will investigate how digital tools can redesign health care networks, highlighting the impact results — in terms of care, diagnosis, administrative and clinical practices — for professionals in the sector, health services management and citizens. Topics include: 1) the integration of proprietary health systems in the city of São Paulo; 2) the launch of **E-Saúde SP**, a platform for integrating clinical data and telemedicine with the patient's clinical history; 3) the implementation of televisits through online or at health center kiosks; 4) automated risk certification in emergency rooms; 5) the ongoing process of automating contracts with third parties (social organizations) in the health sector; 6) investments to automate health center management systems — planning, monitoring and control of medicines and hospital supplies; 7) and the expansion and reorganization of in-person access to health care networks, with investments in infrastructure.

CROSS-CUTTING THEMES

How digital tools can redesign social protection and health services when used appropriately, safely and efficiently. Highlighting the direct and indirect benefits of digital transformation in both care and diagnosis, as well as municipal administration, especially the impact on the São Paulo population and health system, as well as the national public health system. Evaluating the impact of knowledge generated by the training offered by the Municipal Health Department to prepare for the digital transformation and public health quality accreditation as a model for other regions of the country. Researching what is needed to scale the results achieved in São Paulo to other cities in the country and the Latin America and Caribbean (LAC) region. Comparing the impact data achieved in SP and global data for digital transformation projects supported by the Inter-American Development Bank (IDB) in other cities in LAC.

KEYWORDS

digital medical record; health management; interoperability; E-SAUDESP; CONECTE SUS; Digital Health; SUS.

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1. BACKGROUND

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Digital technologies as enablers of global transformation are part of 10 of the 17 Sustainable Development Goals of the United Nations (UN) 2030 Agenda.

Since 2018, the concept of digital health has been part of the regulations and priorities of the **World Health Organization (WHO)**, which works to foster the scalability, accessibility and sustainability of tools capable of supporting primary care in the prevention of diseases and promotion of well-being. In 2021, 49 countries and territories supported digital transformation of the health sector in the Americas.

Despite substantial progress in health information systems, countries in Latin America and the Caribbean still face the challenge of ensuring access to reliable data in the format necessary for decision-making and public policy development. Improvements still need to be made to the production of intelligence from monitoring and follow-up, with data analysis and evidence to inform public policy and health decisions. Advances in information technology and the use of big data can bring unprecedented benefits to health management. The Plan of Action for Strengthening Information Systems for Health produced by the Pan American Health Organization (PAHO) and the regional office for the Americas of the World Health Organization (WHO) points out ways forward, tools and strategic lines for implementation of the 2030 Agenda for Sustainable Development, with emphasis on aligning goals with other public policy management initiatives that guarantee access to open and electronic data management. Digital solutions can help address chronic problems in the daily routines of hospitals, clinics, offices and laboratories, combining health services with new technologies for data automation and care, such as management software, electronic medical records, digital prescriptions or telemedicine. The use of digital tools in medical and hospital care helps reduce operational and administrative costs, optimizes the use of professionals' time and reduces wait times for patients, expands access to data, facilitates both epidemiological analysis of the population and resource management, contributes to improved productivity, and stimulates patient autonomy and self-care.

In a region such as Latin America, where 30% of preventable deaths are due to lack of access to health care and the remaining 70% due to poor quality of services (IDB, 2022), the digital transformation of the sector can improve professional adherence to care protocols, boost quality and expand information about patients' health history, and reduce emergencies and adverse events. When appropriate, accessible and scalable, digital transformation in health can help mitigate the sector's spending growth curve and simultaneously increase the quality and efficiency of care, even for the most socially vulnerable populations.

However, challenges abound: healthcare generates a large mass of confidential and decentralized data, distributed in multiple digital systems that, most of the time, do not communicate with each other. A lot of information is still in the form of spreadsheets or paper files, catalogued without a unified criterion or standard. There are deep-rooted habits and dynamics, among professionals and patients, that resist digital transformation and hesitate to trust electronic medical records or teleservices.Added to this is a structural deficiency in connectivity among socially vulnerable populations that can compromise equal access to health technologies. According to a United Nations survey based on data from the International Telecommunication Union (ITU), an investment of US$428 billion would be needed to connect 3 billion people to the Internet and achieve broadband access for all by 2030.

The COVID-19 pandemic accelerated demand for the digital transformation of public health by exposing weaknesses in the sector and the urgent need to address them. On the other hand, the health emergency also increased the population's

adherence to care systems, that were previously viewed with distrust, such as telehealth, and expanded the use of digital tools, such as applications. Social distancing recommendations associated with regulatory changes that increased access to telehealth, and a greater willingness among the population to test new consultation formats led the country to register 7.5 million remote consultations between 2020 and 2021 by approximately 52.200 doctors. The data are from the Brazilian Association of Medical and Digital Health Companies, published in the article "A transformação digital nos sistemas de saúde" (SUN; SANDES, ARAÚJO; 2022, p. 3). Along with increased use, the learning environment have expanded, as well as the ways professionals and patients relate to the provision of services in the sector. In this context, it may be possible to accelerate the adoption and implementation of digital health solutions with greater support and engagement from public and private initiatives, health professionals and citizens.

In 2018, the World Health Organization adopted a resolution advocating digital transformation, inviting countries to develop technologies that best promote universal health coverage and sustainable development. In 2021, the Pan American Health Organization published the Roadmap for the Digital Transformation of the Health Sector in the Region of the Americas, a document produced from resolutions adopted by the United Nations General Assembly, the World Health Assembly and the Board of Directors of the Pan American Health Organization (PAHO), in addition to related global and regional strategies and recommendations of United Nations (UN) panels on digital transformation. The Institution works in dialogue and synergy with other international organizations for the development of a health strategy capable of expanding the organization and systematization of digital databases for the sector. The same recommendation was reinforced in the Sustainable Health Agenda for the Americas 2018-2030, which recognized the importance of strengthening digital information systems for decision-making in the area and other sensitive issues for transformation of the sector, such as the E-Health and digital health resolutions approved by the World Health Organization (WHO) in 2018.

PAHO lists eight guiding principles for the digital transformation of health in the Americas:

1. Universal connectivity for the entire sector by 2030.
2. The co-creation of digital public health products designed to ensure fairer and more equal access to health for the population.
3. More inclusive digital health systems that are accessible to the most vulnerable populations.
4. The implementation of open-source and interoperable digital systems.
5. Human rights guarantees throughout the health service chain.
6. Participation in discussions and developments in artificial intelligence and any other technology that may make a difference to the sector.
7. Ensuring the trust and security of health data.
8. The design of public health structures that dialogue and establish points of contact with digital systems.

These principles reinforce the irreversible path of digital transformation of the sector and the fundamental contribution of digital technologies to equal access to health services and assistance.

Since 2018, the IDB and PAHO have been working together under the IS4H framework to harmonize tools and approaches. Together, they have co-created more than 40 tools and jointly supported 20 countries in the region. The IDB's approach to digital transformation of the health sector is aligned with PAHO's 8 Principles for Digital Transformation of Public Health and Roadmap for Digital Transformation of the Health Sector in the Americas to ensure that national digital agendas are safe, equitable, inclusive and cost-effective.[1]

[1] https://blogs.iadb.org/salud/en/health-services-cooperation/

The two institutions also work in partnership for the implementation of a **Pan-American Highway for Digital Health (PH4H)**, an initiative that aims for interoperable data of population's electronic medical records at a transnational level. Under PH4H, for example, a Jamaican traveler passing through San Salvador could access their medical history if they need to resort to emergency care in the country. Another benefit of a health system accessible to research beyond national borders is access to digital vaccination certificates to facilitate public health management, especially in times of emergency and global crisis such as the coronavirus pandemic.

1.1. Together, we are building a future where health has no boundaries

Since 2018, the Inter-American Development Bank (IDB) has been producing knowledge about the challenges, benefits and opportunities for digital transformation in healthcare, and discussing methods for implementing digital solutions and appropriate tools for use in this process.

In 2019, the IDB adopted the **Principles for Digital Development**, guidelines endorsing technological modernization applied to health and social protection, designed to help developers and public agencies use integrated digital best practices for the medical field. As part of these principles, it supports promoting projects that have digital scalability, offering products and services that can be continuously adjusted and gain new functionalities; security and privacy clauses to protect user data and ensure secure access to information; open codes and the highest international standards of interoperability to stimulate the exchange of data whenever necessary, preferably following a single and integrated standard.

Far beyond the acquisition of an application, the Bank believes and contends that a successful digital transformation comprises a portfolio of projects and investments in six main dimensions that work in a holistic and integrated way for the effective transformation of health services. These six dimensions are: **governance and management, people and culture, informed health policy and practices, digital infrastructure, infostructure, and digital applications and services** in the sector (IDB, 2022, p. 18). **The six dimensions** listed and prioritized by the IDB support balanced investment in digital health. The IDB has also developed a toolbox and diagnostics of the challenges to be faced by the public sector that identifies fragile points and maps opportunities and possible paths to be followed for digital transformation in health.

» **For more information, see "The Golden Opportunity of Digital Health for Latin America and the Caribbean"**

Digital transformation in health is possible only if it involves technology and people, governance and care, data science and the sharing of information. As the IDB argues, the goal of digital transformation is to ensure the right information reaches the right people at the right time (IDB, 2022, p. 15), allowing data-based decisions to be made based on demands that make a difference to the population and professionals in the sector. To be efficient, services such as telehealth or digitalized medical records need to generate value for the user and the professionals involved in providing the service.

A digital system for the administration or control of inputs and medicines only improves the efficiency of the sector if it changes workflows or causes a redesign of health care and management processes. Therefore, more important than acquiring a state-of-the-art system or implementing high-cost technological solutions is listening to the demands of the population and professionals in the sector, identifying weaknesses, and engaging the team in the use of technology, offering training and qualification throughout the implementation period. Prioritizing the solution rather than the problem, paying little attention to the process, may not bring the expected effectiveness.

1.2. Digital transformation in Brazil

In a network the size of Brazil, one of the greatest challenges in public health management is the sharing of citizens' data among the different units that make up the Unified Health System (SUS).

Since 2017, the Brazilian government has implemented the digital transformation of other sectors of the country's public services and is prioritizing the use of **Information and Communication Technologies (ICT) in the health area**. The objective is to improve quality and expand access to health care by training teams, streamlining care and improving the flow of information for clinical, surveillance, regulatory and health promotion decisions, as well as management.

The Federal Government is working through **CONNECTE SUS** to implement its **Digital Health Strategy for Brazil 2020-2028**, promoting digitalization and the exchange of information within the Health Care Network. The **Ministry of Health** has emphasized the importance, best approaches and urgency of "making available and using comprehensive, accurate and secure information that speeds up and improves the quality of health care and processes in the three spheres of government and in the private sector, benefiting patients, citizens, professionals, managers and health organizations" (BRASIL, 2017, p. 9).

It proposes data interoperability through the **National Health Data Network (RNDS)**, a cloud platform that gives access to patients' clinical history, including care, hospitalizations, exams, medicines and vaccines, in the public, private and supplementary health networks, thereby supporting continuity of care and improving health care for the Brazilian population (MS, 2020, p. 11). The program follows **international standards**, enabling data sharing with other countries and contributing to the generation of inputs that anticipate alerts in areas such as epidemiological surveillance and control of recurrent and emerging diseases. The construction of a **National Health Data Network (RNDS)** is the first step towards the creation of a **Pan-American Digital Health Highway (PH4H)** with interoperable digital medical records at the transnational level.

The creation of the **National Health Data Network (RDNS)** in 2020 established the basis for the launch of a standardized and interoperable data platform for the exchange of information between a range of actors dedicated to health care in the country. The proposal is that, by 2028, RNDS will be established as a digital platform for innovation, information and health services for the whole of Brazil, benefiting users, citizens, patients, communities, managers, professionals and health organizations. (BRASIL, 2020, p. 19).

By 2028, states and municipalities need to accelerate the adoption of electronic medical records and hospital management systems capable of interoperating at least minimum patient care data that contribute to and feed the platform developed by the federal government. Digital transformation begins with data management but goes beyond the computerization of health systems. It must enable the development of actions capable of engaging patients to adopt healthy habits and manage their health with tools such as apps and televisits, with care data available at the touch of a button.

Combining efforts and investments to modernize digital systems and implement new technologies, along with structural projects to reform and expand the municipal public network, with primary care as the guiding axis: This was the scope of the close partnership between the São Paulo Municipal Health Department and the

Inter-American Development Bank (IDB), culminating for the signing of a cooperative agreement and the launch of the **Avança Saúde SP** program. The municipality's ongoing transformation is being overseen by the Federal Government, anticipating requirements in the **Digital Health Strategy 2020-2028** for care management in the country.

Avança Saúde SP aims to expand coverage and improve the health care offered to the São Paulo population through investments in **technology, management and infrastructure**. The agreement was signed in 2019, with an IDB investment of US$100 million and US$100 million from the city of São Paulo. The **program** was structured in dialogue with the digital health strategy defined and supported by the IDB. The theoretical references listed above serve as context and a starting point for data collection and the mapping of results by the São Paulo Health Department and the Inter-American Development Bank.

2. SÃO PAULO: SEVERAL CITIES IN ONE

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The country's most important financial center, the city of São Paulo is responsible for 12% of gross domestic product (GDP). If it were a country, it would be the 36th largest economy in the world.

The city has a high human development index (HDI), ranking 28th among the 5,561 municipalities in the country, according to IBGE data. However, Brazil's largest metropolis and sixth most populous city in the world is characterized by serious socioeconomic disparities that affect the quality of life, health and well-being of its population.

With more than **12 million inhabitants**, rapid, uneven growth, and insufficient urban mobility, the city needs a public health system capable of quickly and efficiently serving a population facing gaps in care and service. The city's sociodemographic complexity amplifies the challenge of implementing a primary care model capable of meeting the multiple needs and demands of serving and caring for the population based on the principles of universality, integrality and equality advocated by the Brazilian Unified Health System (SUS).

São Paulo's rapid and uneven growth has failed to eliminate the structural poverty that spread through different regions of the municipality and are reflected in illness rates and types. A study conducted by the Municipal Department of Social Assistance and Development (SMADS, 2021) found that 31,000 people live on the streets in the metropolis, a 30% increase when compared to 2019. A significant part of this population lives in

Aerial view of São Paulo, SP, Brazil. Source: Pixabay.

Brasilândia hospital in northern São Paulo. Source: SP municipal government.

the central area of the municipality, a region that concentrates many migrants and immigrants in situations of social vulnerability and with interrupted or weakened family ties, with their own demands and needs in the context of health care.

Another point to highlight regarding the city's population is the uneven aging pattern among São Paulo residents in different regions of the municipality. A study carried out by the Municipal Department of Urban Development (SEADE) shows that the aging rate of the São Paulo population is above the national average. In 2019, the elderly accounted for 15% of the city's population. By 2030, that percentage is expected to increase to 20%. In 2050, it will be as high as 30%, according to the SEADE Foundation.

An aging population is one of the factors responsible for the growing number of non-communicable chronic diseases, the main cause of death in the municipality today (CEINFO, 2023, p. 22). The municipal health department has the dual challenge of addressing the increased number of elderly people in the city and reducing the inequalities within this population group. According to a survey by the Department of Health (CEINFO, 2023), ischemic heart disease and cardiovascular disease occupy the first two positions in the classification of morbidities in the municipality.

The numbers are also reflected in the city's hospitalization rates: **circulatory diseases accounted for 24,695 hospitalizations in the municipal health network in 2022, behind only pregnancy, childbirth and puerperium, with 49,487 hospitalizations in the same period** (CEINFO, 2023, p. 18). The social disparity crosses the main health markers of the municipality — the mortality rate from diseases of the circulatory system is as high as 27.28 in Anhanguera, a vulnerable area in the northwest region of São Paulo, compared to 9.34 in Campo Belo, for example. Also of concern are the rates of infectious diseases and maternal and child mortality, a symptom of the social bottlenecks that developing countries still face. Along with chronic diseases such as hypertension and diabetes, improving the quality of prenatal care and decreasing the transmission rate of congenital syphilis are some of the disparities that require attention in the municipality.

The **sociodemographic complexity** of the city generates a mismatch between supply and demand for health services in different regions of the urban conglomerate, aggravated by the increase in the number of SUS users at the national level. Research by the Brazilian Institute of Geography and Statistics carried out in 2019 shows that seven out of 10 Brazilians exclusively use the Unified Health System. In other words, 71.5% of the population lacks a private health plan and depends exclusively on the public network for consultations or care. According to data from the National Registry of Healthcare Facilities (CNES), São Paulo ranks as the second state with the most SUS-dependent municipalities in the country. To further aggravate this situation, the municipality functions as a regional and national hub for highly complex services, attracting citizens from different parts of the state and the country and further burdening the city's health network.

With the IDB's financial support, the São Paulo Municipal Health Department developed an action plan to minimize structural bottlenecks and sociodemographic contrasts in the care offered by the municipality's Primary Care network. Despite the size of the municipality's physical network, deficits remained in care units in the poorest regions of the city. The units lacked basic infrastructure, such as an energy or Internet network for adopting technological advances; hospital beds in neighborhoods with greater social vulnerability, where the population depends exclusively on SUS services; health professionals to serve such a large network, with peripheral areas that are difficult to access and low adherence by care teams; and data management systems capable of organizing supply and medication inventories in real time to improve distribution, assist the population and avoid waste in the form of emergency purchases or expired products.

What was also absent was a data system with unified patient care records, integrating information from primary, specialized and hospital care, as well as exams and results. Instead, São Paulo residents continued to rely on scattered paper records of visits, vaccines and assorted exams, unavailable in other health units besides the one where the initial care was provided. More than 20 electronic medical record systems distributed throughout

the municipal network functioned in a disaggregated manner, without articulation between the city's multiple health units. In addition to compromising the quality of service, the lack of data integration means financial losses for departments in the form of extra requests for exams or consultations, unpredictable supply orders and inaccurate tallies of beds available in the municipality. Ultimately, the absence of an integrated information system compromises the provision of care to the population by preventing the Secretariat from using the data for centralized and orderly management of health decisions in the municipality.

2.1. An overview of the process of mapping public health challenges in the municipality

Organized into six regional offices — South, Southeast, North, Center, East and West — the city's Health Department faces a challenge common to all regions: a diverse population with concentrated poverty, especially in peripheral regions, and high demand for primary care services that are not offered homogeneously throughout the territory, compromising efficiency in patient care.

IBGE data indicate that, in absolute terms, the Central, West and Southeast regions are home to most of São Paulo's high-income population, while 71.8% of residents in the East, 66.6% in the South and 59.2% in the North earn the equivalent of two minimum wages or less. In the Central and Western regions of the city, only 32.8% of the population lives with this amount and 6.8% receive more than 20 minimum wages per month (IBGE 2010).

Recently integrated into the West region, the central area of the city of São Paulo had its own office due to its large population of homeless people and squatters living in inadequate sanitary conditions, immigrants and refugees, in addition to a large itinerant population of workers who also use the health units in the region and create a diverse demand for services. Eight basic health units (UBS) serve the region, which has the highest waiting time for medical consultations in the municipality's SIGA-regulated specialized care system: 83 days. The data is from the Regional Health and Technical Health Supervision Office of the municipality of São Paulo (CEINFO, 2023, p. 13).

The eastern region of the city competes with the south in concentration of low-income population, and together they make up the most challenging areas for the city's health management. For different reasons, both suffer from low coverage of health services. Rural and sparsely inhabited, some health units in the southern region are accessible only by ferry almost 70 km from the center of the municipality, with several environmentally protected areas that make it difficult to identify sites for the opening of new units. A resident of Parelheiros, at the southern end of the capital, has access to outpatient clinics, but it takes about 2 hours on public transportation to travel to the city center for examinations or consultations with specialists.

If the southern region suffers from care gaps that were amplified by the difficult access, the east suffers from high population concentration and insufficient health services for the growing population.

Different scenarios, and a single challenge: solving key issues in health care for the population, such as the overload of low-complexity patients in urgent care and emergency centers, difficulty scheduling exams, and the lack of specialized care accessible to the community.

These were the obstacles that set the agenda for implementation of the **Avança Saúde SP** program. An urgent need was identified for restructuring primary health care strategy by reducing the overload of outpatient clinics and emergencies and wait times for exams, consultations and surgeries. These demands guided the work plan for the US$200 million (about R$1 billion) program, partially financed with IDB resources.

With more than a thousand health teams available in the municipality, including Basic Health Units (USB), Ambulatory Medical Care (AMA[2]), Home and Outpatient Care, Ambulatory Centers and Municipal Hospitals, Emergency and Emergency Services, among others, the municipality of São Paulo provided 27,951,294 consultations at health facilities in the SUS Network in 2022, according to the Regional Health and Technical Health Supervision Office. Of this total, almost 17 million were primary care consultations, with the rest representing urgent and non-emergency care. Despite the network's scope, data from the São Paulo Health Department (CEINFO, 2023, p. 13) show that the average waiting period for primary care consultation in the municipality is still 24 days. For specialized care it is 70 days and may exceed 80 days in some regions of the city.

As the patient gateway to SUS, Primary Health Care (PHC) is responsible for initial contact with the community, offering comprehensive and accessible care that should meet 80% to 90% of patients' health needs throughout their lives. A survey by the Pan American Health Organization shows that primary care is the most efficient and effective way to act on health problems that affect the population and an important mechanism for reducing total health spending on longer and more costly procedures, such as hospitalizations and surgeries.

Strengthening primary health care is one of the focal points of any public policy committed to offering quality care, with careful screening of the population's needs and responsible referral for the care of more complex specialties and procedures. In this sense, in addition to investments in the reform, expansion or modernization of health units and services, it is important to create criteria for referring patients to specialists or for exams; and standardize professional conduct to facilitate regulation and create conditions for better monitoring of medical decisions, with the aid of integrated health data systems capable of sharing access to information collected in health units or remote care services, including laboratories, to facilitate data management and better decision making on priorities, demands and necessary adjustments in the public network.

In São Paulo, support for the modernization, reorganization and integration of local health care networks and the improvement of the efficiency and quality of the health system outlined by the Avança Saúde SP program led to the decision to invest in the construction of eight new Emergency Care Units and the renovation of five others. For Basic Health Units, the investment was even greater: **the renovation of 11 units and the construction of 88 new USBs was scheduled**. Plans for restructuring the health network included the renovation of an Integrated Continuous Care unit (ICC)[3] and the health post of the hospital serving municipal public servants (HSPM), in addition to the construction of Brasilândia Hospital and equipment for the Parelheiros Hospital.

More than 104,000 professionals, of which 18,000 are doctors, provide health care to the municipal population. They include staff hired directly by the Secretariat and the Social Health Organizations (OSS). The data are from SMS-SP, and are available online.

[2] Ambulatory Medical Assistance (AMA) offers walk-in low- and medium-complexity care to the population of São Paulo. The units were created to offer immediate medical assistance services, direct follow-up and complementary consultations at units in the public network.

[3] The Integrated Continuous Care (ICC) unit is a new model capable of adding quality care that avoids hospitalization for low-risk patients who need health care before discharge but do not need to be in a hospital environment, as part of efforts to optimize bed allocation in hospital units.

2.2. The need for an integrated view of health data to inform a public policy based on epidemiological science

In addition to the demand for structural investments to reform and expand health services in the municipality as a way of improving primary care, the network cannot keep up with the growing demand for online and integrated data capable of better driving health decision-making with agility, accuracy and efficiency. Dozens of systems serve the multiple areas of public health management in the municipality, with no consistent integrations between epidemiological, administrative-financial or regulatory databases. The absence of system interoperability compromises decision-making at the clinical, managerial and strategic levels, and making it difficult to manage the resources available to the sector.

Data integration horizontalizes access to general health indicators and verticalizes the capacity for analysis, management and decision-making aimed at improving the well-being and care offered to São Paulo residents. The data flow must go beyond the limits of the databases generated and updated by the municipality and contribute to the production and quality indicators required by the federal government for a consistent and global analysis of the country's health system. The National Health Data Network (RNDS) is the national health interoperability platform created to promote the exchange of information between public and private bodies, contributing to the sector's digital transformation. Any regional changes should contemplate and envision interoperability with federal bases, establishing as a goal the unification of data under the single RNDS umbrella and paving the way for the construction of a **Pan-American Digital Health Highway (PH4H)**.

With more than ten electronic health systems operated by different units in the city, in addition to multiple databases operated by clinical analysis and imaging laboratories and the different management and control systems under the responsibility of the city, health professionals and patients had no access to unified clinical, prescription or hospitalization data. Health units and regional coordinators exchanged billing and payment information for health cost management in the municipality but did not detail or monitor patient history. The computed data were interoperable with the Outpatient Information System (SIA) and Hospital Information System (SAH) and covered only the financial aspect of the services offered, ignoring patients' epidemiological history.

A patient from the remote eastern zone who crossed the city in search of specialized care in another part of the city would be admitted to a basic health unit (UBS) as a new patient, restarting care from scratch without access to previous clinical data. The lack of integrated data compromised the quality of care and the assertiveness of diagnoses, in addition to burdening the network with ineffective consultations or unnecessary examination requests. There was no unified data repository capable of covering the entire city network, which would facilitate patient monitoring and the efficient use of the city's health resources and equipment.

Seeking efficiency in data management is an urgency that directly impacts cost reduction, quality and assertiveness of health care offered to the population. Digital transformation makes it possible to compile and analyze information; improve data quality by standardizing fields, nomenclatures and indexes to be measured; and monitor and evaluate the performance, bottlenecks and needs of health units and teams, offering a 360° view of public health coverage in the municipality — fundamental tools for decision making in the sector. The monitoring of clinical data takes health management beyond the financial and operational aspect already practiced by the secretariat to incorporate a strategic analysis of the epidemiological aspects of the population, in synergy with the federal government's guidelines for digital health transformation in the country.

3. INTRODUCING AVANÇA SAÚDE SP

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Avança Saúde SP is a program for the restructuring and requalification of health care networks in the city of São Paulo.

Combining integrated investments in infrastructure, technology and management systems, the program proposes to improve the health care and access offered to the São Paulo population through structural improvement, following medical practices based on data science and administrative efficiency. Focusing on the reorganization of Primary Care and the performance of the care network, the program's objective is to expand the offering, improve access conditions and elevate the quality of municipal services offered by the Unified Health System (SUS) in the city of São Paulo, in accordance with the city's main service demands.

The Program anticipated the implementation of some of the main tools recommended by the Federal Government in the Digital Health Strategy 2020-2028 and was responsible for the largest combined engineering, technology and management intervention ever carried out in the municipality of São Paulo.

Avança Saúde SP was structured in four parts:

1. Improved efficiency and quality of the Health Department, with the acquisition of management, planning and monitoring systems for administrative areas and risk classification and regulation systems for urgent care and emergency services.
2. Stronger information management and the encouragement of innovation and the use of new health technologies, with investments in an integrated electronic records system and the implementation of new care technologies.
3. Project management and validation, with support for administering, implementing, auditing and evaluating the initiative.
4. And support for the modernization, reorganization and integration of local-regional health care networks through the construction, renovation and acquisition of basic health units (UBS), emergency care units (UPA), the new Brasilândia Hospital and Integrated Care Centers (CCI).

Employees and service providers received training throughout the program, with continuous investments in workshops and sessions that reiterated the importance and value of humanizing health care for the population.

The program aligns directly with the **Six Key Dimensions for Digital Transformation** advocated by the IDB, creating conditions for investments in technology and digital systems, people and culture, governance and structure, to be used to change the rules of interaction, organization, management and decision-making in public health, in alignment with the sector's national needs and guidelines.

TABLE 1:
Six dimensions for digital transformation: An applied perspective on Avança Saúde — SP

Dimension	What was done	What was learned
Informed Health Policy and Practice	Implemented Strategic Center for health data management.	Management and sharing of health data to make strategic health decisions with potential for scale and impact on the municipality.
Digital Health Apps & Services	Launch of the **E-Saúde SP** application.	Makes clinical and hospital records available in one place and encourages self-care and patient autonomy. It is the **application with the highest number of downloads in the municipality**, with **15.6 million logins** and **3.1 million registered users** as of July 2023.
Infostructure	Creation of a **minimum data repository**, acting as an aggregator of information from primary care, hospital care, examination results and the regulatory process.	The tool puts the city of São Paulo ahead of other states and municipalities in patient data management, with access to a powerful database with more than **26 million SUS cards registered** as of September 2023.
Infrastructure	Creation of a telecare system.	Remote care in different modalities — digital consultations, home care or app — facilitating the flow of emergency and primary care in the municipality and providing assistance in multiple formats for people with transportation or connectivity issues.
Governance and management	The largest investment in management systems by the city of São Paulo in recent years, focused on the acquisition and implementation of the Integrated System of administrative contracts, the Procurement/Contract and Centralized Supply Management System and the Integrated Evaluation and Partnership Control System (SICAP).	Improved service contracting flows, cost control and transparency in the management process, leading to greater efficiency in health care for the population.
People and Culture	Implementation of procurement /contract systems and centralized administration of more than six thousand different items with the potential to serve about 11 million people.	The system changed the entire workflow of purchasing departments for medicines and supplies, with end-to-end monitoring of the request by a designated manager who assumes responsibility for purchase and distribution for the entire municipal health network.

3.1. History and governance

The activities of **Avança Saúde SP** began with a vast mapping by the Municipal Health Department of the main bottlenecks for the reorganization of primary care, with a focus on indicators, measures and objectives that would inform implementation of the health investment program. The signing of a loan agreement with the Inter-American Development Bank on **June 19, 2019,** put in place a plan for the acquisition and renovations of health units capable of minimizing care gaps in different areas of the municipality, especially in the eastern and southern zones, and reorganizing the city's care and digital data management systems. With investments on the order of US$200 million — of which US$100 million is financed by the IDB and the rest by the municipality — the program has a five-year implementation plan scheduled to end in mid-2024.

To implement Avança Saúde SP, the municipal Health Department created a **project coordination unit (UCP)** with the mission of planning, executing and monitoring the program, in addition to evaluating its legacy for the municipality. UCP has administrative autonomy to hold bids and manage financial and budgetary operations. The Unit's team includes a general coordinator; a technical and planning unit; a finance and accounting team; a procurement office; an information and communication technology team, and a works department. The leaders of each unit were consulted for the preparation of this Case Study.

In addition to the UCP, an **Institutional Coordination Committee** was created for the project with representatives from the Municipal Health Department (SMS), the Municipal Government Department (SGM), the Municipal Finance Department (SF), the Municipal Management Department (SG), the Department of Urban Infrastructure and Works (SIURB), and the Information and Communication Technology Company of the Municipality of São Paulo (PRODAM). The committee is responsible for coordination between the UCP, the Secretariats and participating offices and aims to monitor and evaluate actions and commitments related to the project's execution. The list of priorities for the implementation of **Avança Saúde SP** was determined through public consultations and evaluations with the coordinators of the municipal health regions which, in the administrative structure, are responsible for providing the necessary subsidies for integrated management of the municipal secretariat.

The program's actions were guided by the premise that Primary Health Care is the main determinant of the care and well-being of the population. The UCP was responsible for defining the indicators that would guide the program. These were set for the medium term and involved combined efforts in the qualification of primary care and the municipality's urgent care and emergency network; for example, improving hospitalization and mortality rates for the main chronic non-communicable diseases, such as diabetes, coronary heart disease and hypertension, decreasing the transmission rate of congenital syphilis, and the average hospitalization rate for diabetes mellitus.

3.2. General concept of the program

Avança Saúde SP is the most robust and consistent program for the improvement of Basic Health and Emergency Care Units ever implemented by the municipality of São Paulo, with structural reforms and new construction carried out even during the critical period of the coronavirus pandemic, following careful requirements for sustainability and energy efficiency in all works. The initiative also represents the largest investment in technology and management systems by the city of São Paulo in recent years. On the administrative front, the **Integrated System of Administrative Contracts**, the **Procurement/Contract and Centralized Supply Management System** and the **Integrated Evaluation and Partnership Control System (SICAP) were involved in its implementation**, the latter responsible for managing the city's largest health budget. These systems help improve service contracting flows, cost control and transparency in the management process, leading to more efficient health care for the population.

In parallel, combined investments have been made in the **modernization of care systems** to improve and qualify primary care, the patient's gateway to the municipal health system. The results have included the creation of a **minimum data repository**, acting as an aggregator of information from primary care, hospital care, examination results and the regulatory process. This is a tool that puts the city of São Paulo ahead of other states and municipalities in patient data management, providing access to a powerful database with more than 26 million SUS cards registered as of September 2023. Another outcome is the launch of the **E-Saúde SP** application, which brings together in one place patient clinical and hospital records and encourages patient self-care and autonomy. The program also implemented **an integrated risk classification system**, with approved standards and an auditable protocol implemented during the COVID-19 pandemic to reduce wait times for screening and increase the efficiency and assertiveness of care, contributing directly to better organization of the flow of care in the primary area. Finally, it also resulted in **the structuring of a telecare system** offering remote services in different modalities — digital consultations, home care or app-based —facilitating the organization of the flow of emergency care and primary care, and directly connected to the database of the **E-Saúde SP** application.

Investment in overcoming structural bottlenecks in the city's health services has ranged from the improvement of the electrical system and Internet network cabling, both essential to the installation of digital services and the digital transformation of health units, to the construction of accessibility ramps, renovation of roofs and floors, and compliance with the surveillance requirements of the fire and health departments. In addition to new construction, Avança Saúde SP resources were invested in the acquisition of medium and high complexity equipment for the area, such as tomography and magnetic resonance devices. The financial support has helped expand the health care offering, improve access conditions and raise the quality of municipal services SUS offers in São Paulo.

Among the results expected with **Avança São Paulo** are the reduction of inequalities in access and quality of health services between the six regions of the municipality, the strengthening of public health management, with cost reduction and increased efficiency of services, and the integration and qualification of data to improve the city's care systems.

BOX 1 Program Recognitions

Since investment began in new digital tools, integrated systems and tele-service under **Avança Saúde SP**, the São Paulo SUS has gained unprecedented recognition and awards, in Brazil and abroad. In 2022, **E-Saúde SP was selected as one of the highlights of AIHealthyCities**, an event organized by the Novartis Foundation and Microsoft AI for Health. The app has been recognized as an important tool for reducing health inequality and encouraging patients to take the lead in managing their medical history.

In 2023, SUS was named the best public service in the city of São Paulo for the third consecutive year. Datafolha's survey revealed that 15% of the population chose the service as the best in the city. Among the factors that set SUS apart are advances in making digital tools and systems available to patients. These include the Glycemic Self-Monitoring Program, which offers remote monitoring to 128,000 patients with diabetes mellitus in the municipality, and the multiple services of the **E-Saúde SP** application.

These achievements coincided with a critical health emergency, the COVID-19 pandemic. Digital transformation in health facilitated remote care and minimized the risks of coronavirus contamination, allowing the general population, and chronic patients in particular, to enjoy safe medical care even at the height of the pandemic. Integrating data from the SUS patient's clinical history with the Vaccine Passport, **E-Saúde SP** allowed for monitoring of the immunization schedule, consultation of doses received, and a list of vaccination sites in the city. Access via app to @covid guaranteed service for patients with questions or concerns about the disease, leading to safety and agility in serving the population.

4. INVESTMENTS, PROFILES AND FUNCTIONALITIES OF CARE SYSTEMS

4. INVESTMENTS, PROFILES AND FUNCTIONALITIES OF CARE SYSTEMS

The program's investments in technology and digital health management make São Paulo one of the country's leading cities in the practice of medicine based on data science.

Action began with the development and implementation of a **clinical data repository, E-Saúde SP**, capable of connecting multiple systems and institutions — from the different electronic medical records used by the municipality's own and outsourced health units, to the numerous systems used by laboratories and imaging clinics, for example — following the interoperability recommendations of the Ministry of Health for the creation of a National Health Data Network, anticipating some of the requirements of the Digital Health Strategy for Brazil 2020-2028.

E-Saúde SP functions as an integrating platform for various systems and medical records of the São Paulo health network, making essential data from primary care, specialized care, hospital care, and laboratories available in a single place. Instead of imposing a new system to be completed and incorporated into the service routine, Avança Saúde SP preferred to invest in integrating legacy data obtained from the multiple technological bases already operating in the municipality. The solution values the work already carried out by city government units, social organizations, imaging and clinical analysis laboratories and other providers operating in the city, in addition to streamlining and facilitating the data integration process, anticipating by more than five years a portion of the Ministry of Health's requirements for 2028.

Every day, **E-Saúde SP** integrates selected data computed by the different systems into the unified base for the municipality, allowing monitoring of health indicators determined by the Federal Government. Health professionals perform the usual patient care using the electronic medical record available at the respective health unit, without having to fill in any extra fields or systems. At the end of the day, a minimum data set is extracted from each unit and integrated into the **clinical repository**. The same process applies to clinical, or imaging exams entered by the health professional in the local medical record, with the repository automatically integrating information about requests and results.

With this tool, the Secretariat guarantees unprecedented access to essential data on care and health services provided to the population. **E-Saúde SP** gathers primary care, hospital care, and test results into one place, as well as data about the control and management of care flows in the São Paulo municipal public health system — whether at its own establishments or those administered by social organizations and partner institutions. Currently, the system aggregates health information from more than **26 million clinical histories registered in E-Saúde SP**[4], representing the largest repository of essential clinical data at the state level in Latin America.

[4] The number refers to the number of SUS cards registered in the city's health systems as of September 2023.

» **Rather than proposing a single medical record, E-Saúde SP represents the integration of almost all electronic medical records and digital systems used by health units, social organizations, laboratories and imaging clinics in the municipality.**

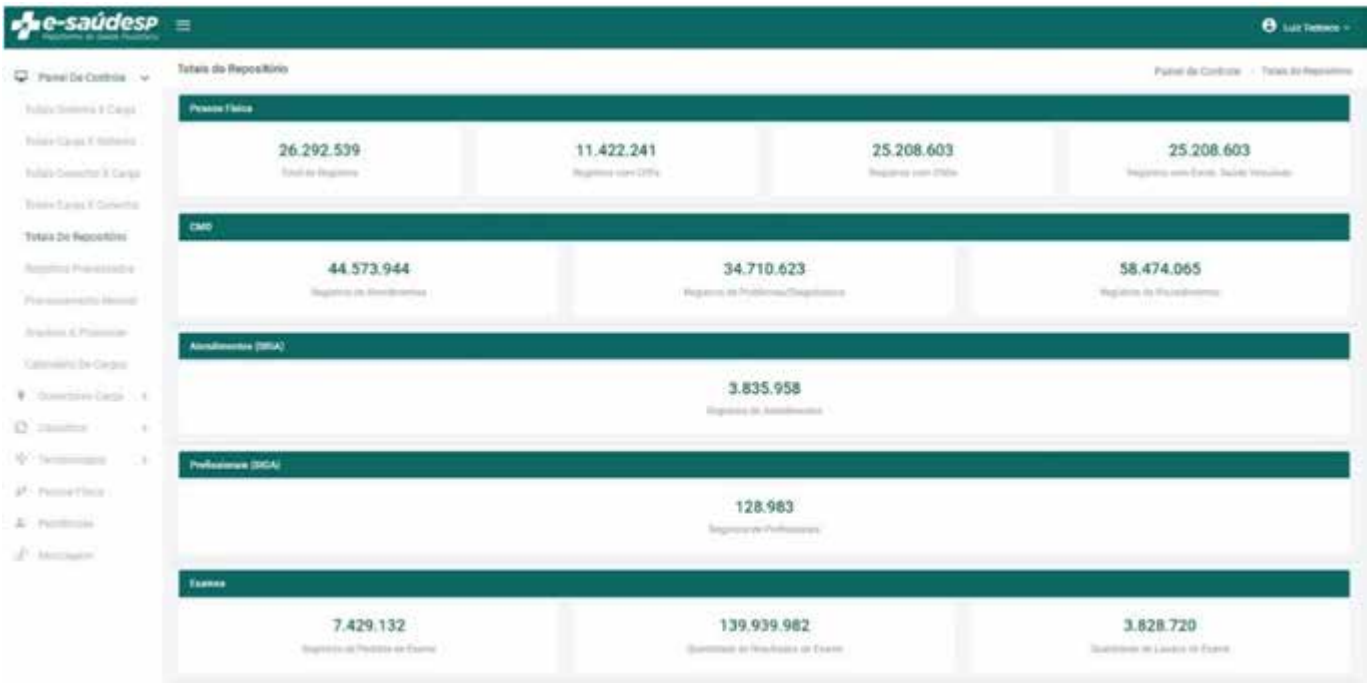
Before implementation of the clinical repository, the Secretariat lacked a unified system of data and processes that would allow an organized and structured view of citizen health. Administrative and financial information arrived at the SMS, but patient history data were missing. With **E-Saúde SP**, the information arrives already structured in a system with easy and visual methodology, organized by target population, e.g., diabetics, pregnant women, allowing the Secretariat to make strategic decisions based on data science.

The solution found by São Paulo integrates the municipality's data without imposing a single electronic medical record for all health units. The decision respects the investments made by partners and social organizations, imposes minimal changes to the handling of data by the health professional, and optimizes the use of information for municipal health management.

With access to essential data from all municipal electronic medical records and other fundamental systems for the administration of care, such as the Integrated Health Care Management System (SIGA), the repository will enable consistent analysis of health indicators required by the Federal Government (prenatal care; syphilis and HIV in pregnant women; cytology in women; childhood vaccinations; hypertension; diabetes).

In December 2023, more than 19,000 health professionals were already registered to use the E-Saúde SP platform — about 20% of the network. The goal is to bring the assistance modality to the entire municipal health network.

FIGURE 1:
Clinical data repository access numbers



4.1. E-Saúde-SP Application

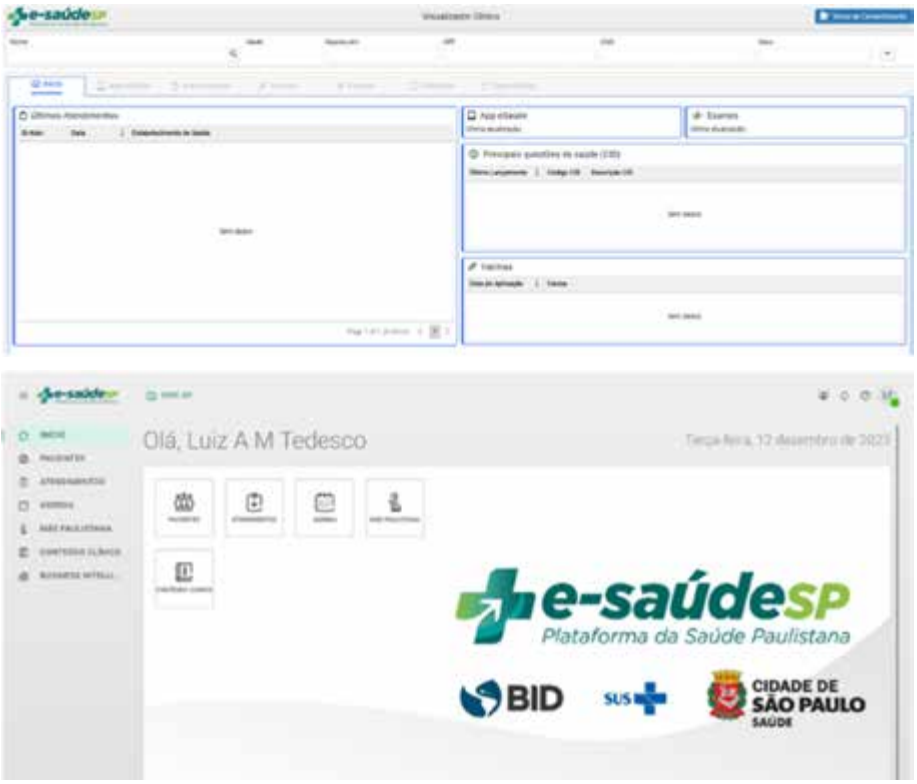
The data collected by the clinical repository make up the patient's health history and can be accessed by patients through the **E-Saúde SP** app. Available for download on multiple platforms (Google Play, Apple Store and the program website) and with a high rate of positive evaluation by the population, **E-Saúde SP** works as a **São Paulo health platform**, an accessible and free tool for patient management and self-care.

Launched at the time of the COVID-19 pandemic, the app was an important tool for queuing and vaccine availability at basic health units. **E-Saúde SP** also functioned as a virtual teletriage station for the coronavirus, clarifying symptoms and initial procedures for patient care and referral. It also displayed the patient's vaccination record, replacing the card acquired by children at birth, and can issue proof of vaccination. **Central Covid**, a tool created to serve people with symptoms, concerns or questions about the disease, registered more than **93,000 teleconsultations, 56,000 through the app** and the rest via active search on the municipal website. The digital tool was fundamental in reducing the flow of patients visiting health units in search of safe care and offered electronic prescriptions, contributing to contain the spread of the virus during the health emergency.

The pandemic seems to have strengthened the importance of a virtual gateway for accessible and safe care for the entire population, helping to reduce queues and crowds in physical units and paving the way for the digital transformation of health. **E-Saúde SP** became **the municipal application with the highest number of downloads**, with **15.6 million logins** and **3.1 million registered users** as of July 2023. The coincidence of the launch during the pandemic generated high adherence of the population to the technological solution, attracting even users who do not use the SUS network regularly, attracted by the information on vaccination. Since then, the service has grown and gained multiple assignments, gathering diverse health information in one place.

Among the added services offered by the **E-Saúde SP** application are the Glycemic Self-Monitoring Program, to control diabetes; **My Health**, a tool that lets patients enter data on medications, chronic diseases, allergies, blood pressure, and other indicators, and upload tests performed outside the public network. The **Vaccine Passport** replaced the traditional paper vaccination booklet and provided proof of doses taken by the patient, making life easier for citizens. The **Central Mãe Paulistana Digital** houses data on care and monitoring of pregnant women and mothers in São Paulo, results of laboratory tests, ultrasound, prenatal visits and follow-up through the first two years of the baby's life, with more than 108,000 remote visits/monitoring of pregnant women in two years. **Agenda Fácil** shows open appointments for primary care visits in the municipality, with general practitioners only. With these features, patients take with them their entire exam, visit and care history, with access to tools for self-care on a daily basis.

FIGURE 2:
E-Saúde SP app screens



Source: Available for download on Google Play and the Apple Store. Website: https://e-saudesp.prefeitura.sp.gov.br/

4.2. E-Saúde SP: Benefits for the patient

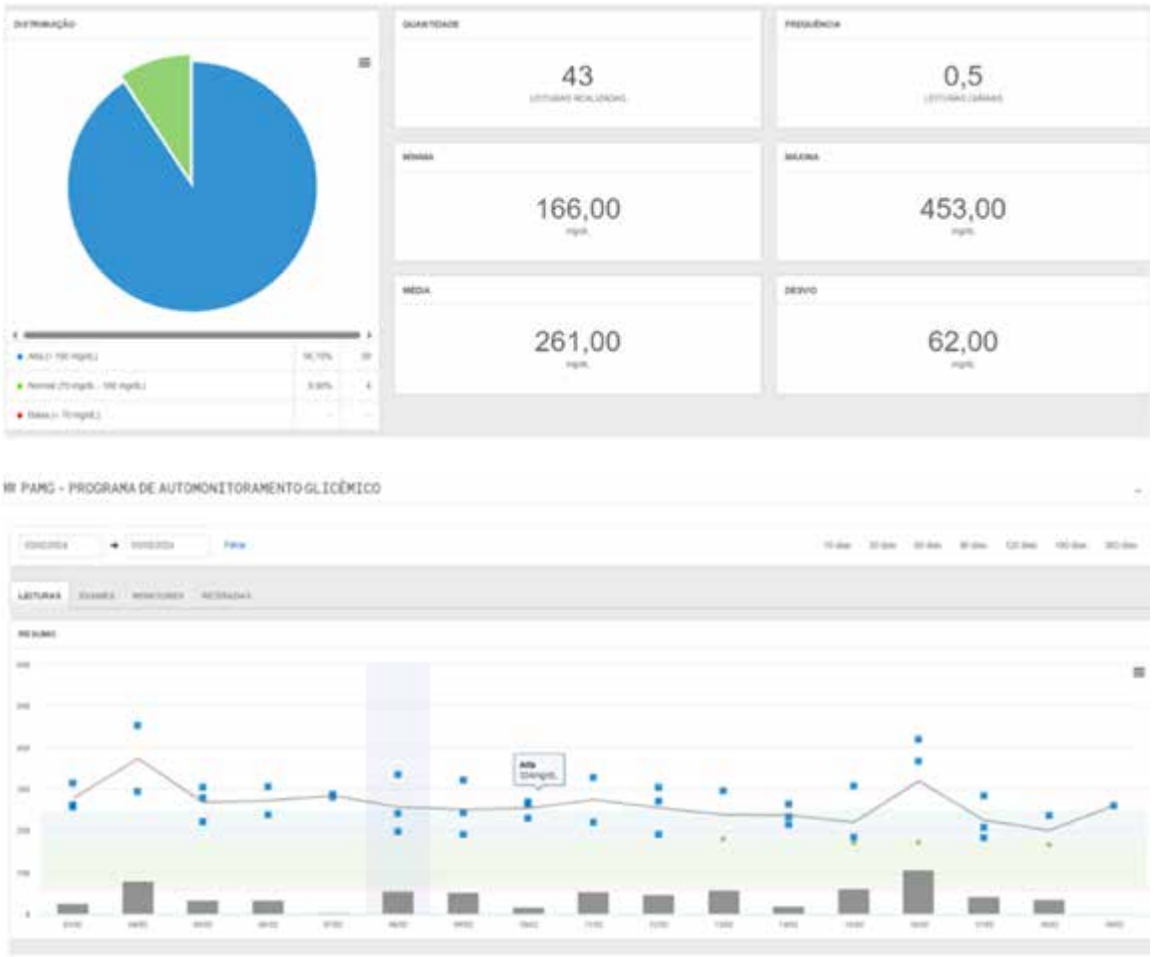
The E-Saúde SP platform brings doctors and patients together by making main information on the patient's clinical history available in one system.

Whether through the application or the electronic medical record used in emergency rooms or in primary care, doctors, nurses and patients share the responsibility of adding consistent and consolidated citizen health data to the platform, helping draw the epidemiological map of the municipality's population.

From making an appointment to checking test results, from the vaccine card to risk classification in urgent care and emergency centers, **E-Saúde SP** helps restructure and enhance primary health care in the capital of São Paulo, especially improving the hospitalization and mortality rate indicators of the main chronic non-communicable diseases — diabetes and hypertension, in particular — and prenatal care, focusing on decreasing the rate of congenital syphilis. This shared management system benefits health professionals, public authorities and citizens.

The figures below highlight three benefits of the implementation of a clinical data platform for the population.

FIGURE 3:
Glycemic Self-Monitoring Program:



Source: Screenshots of the glycemic self-monitoring program.

The SMS began monitoring patients with diabetes mellitus in 2005, registering and delivering supplies to three thousand patients transferred from state centers. Since then, the program has grown, gained numerous reference units, and now has a digital tool for monitoring the glycemic level of insulin-dependent diabetics, available on the **E-Saúde SP** app.

The initiative is part of the PAMG (Glycemic Self-Monitoring Program), which provides glucometers, a device used to measure blood glucose levels, as well as strips, lancets and other inputs, to 128,000 people served by the São Paulo public health network. The device can be connected via Bluetooth to **E-Saúde SP** and daily glycemic index monitoring data transferred to the application.

The records are incorporated into the city of São Paulo database and allow remote monitoring of the patient's health. The system flashes red when the glycemic index is above normal. The alert allows the basic health unit to contact the patient and investigate the reasons for the results.

Remote monitoring reverses the current logic of assisting the patient in case of illness by anticipating the problem and indicating a care path. In addition, the integration of data between the device and the application feeds a daily database of health information and allows the SMS to create an epidemiological map of the population and monitor municipal cost controls.

Diabetes is one of the seven indicators that make up the Previne Brasil program, coordinated by the Ministry of Health. The measurement helps the Federal Government assess the rate of chronic diseases in the country, with qualitative evaluation of health care outcomes in states and municipalities.

MINHA SAÚDE

Integrated into the **E-Saúde SP application**, the **Minha Saúde** (My Health) section is another tool implemented by the SMS to stimulate patient autonomy and care management.

Like the **Glycemic Self-Monitoring Program, Minha Saúde** gives citizens the possibility to add to their medical and hospital history by entering daily blood pressure measurements, information on previous health situations, such as allergies, vital signs, or results of tests performed outside the SUS.

The data registered in the **Minha Saúde** section of the **E-Saúde SP** application go directly to the municipality's electronic medical records and help compose the epidemiological map of the population.

Once in the application, the user can also check their vaccination card, consult medical prescriptions, schedule an appointment with specialists, or receive alerts about the results of medical tests carried out in the municipal network.

WOMEN'S HEALTH

Four of the seven indicators monitored by the Ministry of Health through Previne Brasil refer to women's health: the proportion of pregnant women in prenatal care; the proportion of pregnant women tested for syphilis and HIV; the proportion of pregnant women with dental care; and the proportion of women who have undergone cytological testing. The city of São Paulo has taken a series of steps to support and welcome all pregnant women and mothers, without discrimination.

The SMS already carried out a consistent and careful monitoring of women's health, with a data set on pregnant women that goes beyond the essential information required by the Federal Government. The secretariat monitors and adds the results of congenital syphilis tests to **E-Saúde SP** to reduce vertical transmission of the disease in pregnant women during prenatal care.

As with glycemic index results, the platform notifies basic health units of changed test results for women in prenatal care. E-Saúde presents the data in a structured way, using a simple and visual methodology separated by target population, whether pregnant, diabetic or hypertensive. The information streamlines medical care and generates important epidemiological data for the municipality.

The information collected by **E-Saúde SP** goes beyond the requirement of the Ministry of Health and matches minimum data repository of the Digital

FIGURE 4:
Women's Health app

Health Strategy 2020-2028, anticipating the federal government in the qualification and expansion of general health indicators. In the municipality, a steering committee was created to discuss the next specialties selected for extra modules for expanding data collection and qualifying the information that will make up the **E-Saúde SP** platform and feed the National Health Data Network of the Federal Government.

5. TELECARE

5. TELECARE

The operating system for integrating telecare data is the clinical data repository, which also feeds the E-Saúde SP application.

In standard care, the health professional uses the health unit's electronic medical record to record patient data, which is then interoperable with the **clinical data repository**. In telecare, the path is reversed: All information collected during the consultation goes directly to the **repository** — whether medical prescription, image or video captures —, and is then integrated into the local unit's medical record. The reverse route guarantees the cataloging and integration of essential diagnostic data as required by the Ministry of Health for medical decision-making, in addition to feeding the database of indicators established by the federal government.

In three years, São Paulo registered a total of more than 1.7 million tele-services to the population through three different modalities of remote consultations: hybrid office, app-based teleservices, or teleservices in home visits.

App-based teleservices started with Central Covid, which was specifically created to serve people with symptoms of coronavirus infection. At the end of the pandemic, the **Pronto Saúde** option was added to the app's range of services, with the option of remote consultations with general practitioners. In total, more than **90,000 teleconsultations have been registered for covid** and just over **3,500** for consultations with general practitioners since the creation of Pronto Saúde in September 2022. With the service, patients can schedule an appointment with general practitioners capable of directing them to specialized care or examinations in the municipal health system.

For their part, **home teleservices**, carried out with the support of professionals from the family health team, speed up the care of patients who are unable to travel to a health unit. The health team arrives at the patient's home equipped with a tablet with Internet access, facilitating connectivity in situations in which the patient has poor Internet service or difficulties using technology. This option benefits patients with its convenience and saves time for doctors, who can see more patients in a single day. It also helps the Secretariat optimize resources and improve the care offered to the population. In a city the size of São Paulo, with frequent travel issues, home teleconsultation allows two different health teams to travel to different parts of the city while a single doctor performs both consultations remotely, speeding up care. The tool simultaneously improves the municipality's time, resource and team management.

Among teleservices, the model with the highest acceptance so far is the **hybrid office**, in which specialists connect remotely with patients who are at a health unit with access to connectivity and the technological equipment provided by the municipality. With a high adherence rate, a satisfaction rate of more than 95%, and recognition from the Regional Council of Medicine of the State of São Paulo (CREMESP), the hybrid office is already available at 57 health establishments in the municipality, adding agility and quality to the care of low-priority patients who arrive at municipal units. Three hybrid offices have been installed in emergency care units (UPAs) and the rest in basic health units (UBSs).

FIGURE 5:
Hybrid office

In the **hybrid office**, only the physician works remotely. Examinations and procedures are available *on site* for the patient. This modality makes it possible to perform a cardiac consultation under medical supervision, or procedures such as otoscopy and retinoscopy with the support of a nursing technician. Patients can be directed to undergo complementary examinations in the same health unit; visit the pharmacy after treatment to obtain any drugs prescribed; or to be assisted into an ambulance if transfer to a specialized care unit is needed.

Unlike remote care offered via app, the hybrid office eliminates the potential problems associated with waiting for the patient to access a virtual room on their own, subject to connection failures or technological mismatches. The entire structure, with data package, connectivity and technical support, is guaranteed by the municipality. Patients, in turn, feels welcomed when having their questions answered by a health professional with convenience and agility. The service flow of the unit also improves, with a reduction in waiting time in queues, both in the emergency room and urgent care.

From October 2022, when the project began, through September 2023, more than 28,000 consultations were carried out in hybrid offices in the city of São Paulo.

Most visits were routine or return visits with general practitioners. The city's goal is to expand the number and diversity of digital services to gradually include other medical specialties and the option of scheduled consultations. The pioneering format could become a model for in teleservice in the country combining the benefits of remote and face-to-face models.

6. RISK CLASSIFICATION

6. RISK CLASSIFICATION

Before the project began, patients with identical symptoms were admitted to different emergency care units in São Paulo and received different diagnoses, treatment and referral. One might be sent home after the first consultation, while the other might be referred for additional tests after hours of waiting in the screening queue. The lack of pre-established criteria or protocols generated unequal data for the municipality, compromised the flow of care at the unit, put the patient's health at risk, and burdened the Secretariat's accounts with unnecessary exam expenses that could have been avoided with more careful consultations or agile referrals.

A sensitive point in the care of the population offered by any health network, the initial care offered by the urgent care and emergency network was one of the bottlenecks in health care in São Paulo. Better organizing medical and hospital care, defining appropriate flows and the referral process became priorities for the plan. Therefore, the Health Department invested in the implementation of an international risk classification protocol capable of systematizing criteria and medical referrals offered to the population. Previously, all screening care was done manually by the nurse and recorded on paper forms, with each unit using different criteria and fields.

Created in 1997 and used in several countries around the world, the **Manchester protocol standardizes parameters based on a screening system that uses colors to determine the health risk presented by each patient** — red, orange, yellow, green and blue, on a scale that goes from needing more urgent care (red) to waiting longer for a consultation (blue). A nurse provides initial care, collects vital signs and ascertains the main symptoms presented by the patient. The information is directly included in the **E-Saúde SP** platform and includes determinants to define the degree of urgency of the service. Patients classified as red should receive immediate care, while green and blue patients have the option of being referred for consultation at a basic health unit or for a hybrid visit.

With risk classification, services are more agile, fair and accurate. The routine imposed by the protocol also results in more rigorous management of time, expenses and investments required by the health unit, from the flow of the patient wait list to the purchase of medicines and supplies. Unified criteria for risk classification also generate a careful and systematic mapping of care, allowing an analysis of potential bottlenecks at units and fragile primary care points in each region.

In São Paulo, implementation of risk classification through the Manchester protocol began in 2020, during the coronavirus pandemic. In a coincidence of challenges, the risk classification system needed to be put into operation in time to meet the demand for careful screening during a unique global health emergency. Low-risk patients could be referred for care at basic health units or for teleconsultations, reducing overcrowding in emergency rooms and the risk of contamination and speeding up the hospitalization of severe cases.

Automated screening based on predefined criteria, with data entered directly into the digital platform, contributed directly to reducing queues and reorganizing information and care, with effects throughout the primary care system. The use of the Manchester protocol associated with **the digital recording of patient data reduced the average screening time in the emergency room from six minutes to two and a half**. The joint implementation of both systems has simplified the recording of the patient's medical history, previously done on paper, and made care more agile, efficient and secure.

Entering urgent and emergency room data directly into the **E-Saúde SP** platform assists in the organization of primary care for the population. Patient medical history is available to the entire municipal health network, streamlining future care, reducing the risk of inconsistent information and increasing the efficiency of medical care. The data collected for electronic medical records facilitate evaluation and auditing, offering more security to the population.

Initially proposed for implementation at 49 urgent care and emergency units in the municipality, the **Manchester protocol is already available at 53 health units**, with plans to expand to new services in the city. To enable implementation, the Secretariat invested in training more than two thousand primary care professionals to apply the protocol properly at health units.

BENEFITS FOR PRIMARY CARE

By prioritizing care by clinical severity and not by order of arrival, the risk classification system modifies the standard of care for patients who are admitted to an emergency room and causes a cultural shift away from the phenomenon of patients mistakenly seeking emergency care when they should visit a basic health unit for routine or low-priority follow-up.

The combined implementation of **risk classification** and **telemedicine** created conditions for the provision of remote care at digital points of service installed in emergency care units, helping reorganize the flow of the unit, reduce patient waiting times and improve the quality of health care offered to the population. Low-complexity patients are eligible for teleconsultations and, if they agree with the format, can migrate from the urgent care and emergency queue to a remote consultation held at the unit itself, using the technological structure and support of health unit professionals.

The reorganization of emergency room service has also reduced expenses by facilitating patient referral for consultations and exams at other hospitals. With the integration of data in the **E-Saúde SP platform**, for example, a neurosurgeon can receive a patient's scan results via **asynchronous teleconsultation** without the need to transfer the patient to a more complex unit. Health professionals have access to patient's clinical information and exam results through the digital platform. If necessary, the doctor can still schedule an appointment with the patient or a **teleconsultation** with other professionals to discuss information before giving the final diagnosis.

7. INVESTMENTS, PROFILES AND FUNCTIONALITIES OF MANAGEMENT SYSTEMS

7. INVESTMENTS, PROFILES AND FUNCTIONALITIES OF MANAGEMENT SYSTEMS

The administrative management of the public health network in São Paulo suffered from a lack of systems capable of offering an integrated and global view of the flow of contracts, acquisition of medicines and supplies or management of municipal partnerships. The network worked with outdated systems that could not keep up with the growing demand for automated data integration necessary to meet the needs of the municipal care network.

In some sectors, such as the legal area, contract control was done manually, with data managed in an Excel spreadsheet. Ordering supplies required accessing multiple systems and spreadsheets before generating a single purchase order. Not only were the systems decentralized, but orders were made individually based on the demands of different health units, compromising the negotiation of prices, logistics and deadlines.

In the three contracted systems — Integrated Partnership Control and Evaluation System (SICAP), Administrative Contract Management System, Procurement/Contract Systems and Centralized Supply Management — the new tools aimed to improve the Secretariat's management and decision-making capacity with more precise deliveries, improved time and cost controls and more transparent negotiations, with easy and organized access to transaction history.

Using partnership control and supply control tools still in the process of implementation, the systems have modified the flow and routines of the entire team, changing the division of tasks and assignments. In both departments, the process requires permanent technical support from the implementation teams, as well as training and outreach to help professionals adjust to the sectors' digital transformation.

Most of the time, initial difficulty with the system can be addressed by a redivision of tasks that reduces unnecessary work overloads, such as exhaustive checks of documents and spreadsheets and successive requests for information from regional health coordinators.

Ultimately, combined investment in the technical improvement of the administrative area goes beyond the department divisions where it was implemented and guarantees more agile delivery of products or services to the more than 1000 health units in the network, improving the quality-of-care management offered to the São Paulo population.

7.1. Integrated Partnership Control and Evaluation System (SICAP)

The Coordination of Partnerships and Contracting of Health Services (CPCs) of São Paulo is responsible for the assistance and financial control of a significant number of contracts and agreements for 76% (345) of the municipalities Primary Health Care units (UBS/AMA) in partnership with 9 entities qualified as Social Organizations through Management Contracts and Agreements. The department is responsible for the Secretariat's highest volume of financial transfers: approximately

R$800 million per month in payment transfers for more than 30 different contracts, involving more than 500 health units distributed among the six municipal regions.

SERMAP needed an ordering tool capable of helping it take the lead in managing accounts and meeting the goals of contracts, agreements and collaborations established in the municipality. In practice, however, the department was grappling with emergency demands passed on by the regional offices without being able to order priorities or establish a cost forecast for service performance.

Before Avança Saúde SP, CPCS used a system that functioned as a consolidator of dispersed, manually entered information. Data collection did not follow any automated capture strategies. The entire flow of investigation, verification and insertion of information was done individually by office employees in permanent contact with health establishments across the municipality. The system was made even more fragile by work overloads and undifferentiated functions. In addition to monitoring accountability and compliance with the care goals of management contracts, employees exercised informal supervision of SO's work and other agreements and partnerships to collect data.

The original system had not been updated since 2015 and could no longer keep up with the new controls and monitoring required by SMS. Since then, the CPCS team manually entered data into separate spreadsheets, making it difficult to monitor and evaluate care or consolidate financial information for service planning or delivery. Nor was it possible to generate *business intelligence* analyses or other automated processes for managing results.

The preponderance of manual functions delayed the HSE's responses to the demands of the regional health offices and exposed the department to the risk of data errors and inconsistencies. Internal control bodies (such as the Mayor's Office, the Secretary's Office, the Municipal Council of Health and Ombudsmen) and external bodies (such as the Municipal Court of Auditors, TCE and TCU, the Public Prosecutor's Office, and the Federal Police), as well as civil society in general (under the Access to Information Law), were unable to monitor the municipality's accounts. These were delayed due to lack of updating and inadequate management of the system, with some contracts inactive since 2002.

The situation was aggravated by the pandemic. Changes in legislation to expedite emergency purchases required the CPCS team to take extra steps to check data and speed up the release of orders, further burdening employees who already faced daily challenges. The **Integrated Partnership Control and Evaluation System (SICAP)** was contracted to reorganize workflows, bringing security and transparency to the entire process of monitoring, controlling and evaluating service contracts with social organizations and outsourced companies in general. The new system also offers viable conditions for internal and external control by inspection agencies.

SICAP was developed in response to demand for meeting São Paulo's health management needs. One of the requirements of the project was for SICAP to remove as many manual data entries in the system as possible and allow integration with other official SMS systems. The most sensitive point in the process was the systematization of criteria for the documentation provided by social organizations, and operationalization of monitoring, inspection, contract execution, control standards and accountability procedures.

With SICAP, the entire SMS contract, agreement and terms process has begun following a uniform and automated flow of data entry and cost approval. Under this system, social organizations submit the needs and survey expenses to be validated and approved by SERMAP. The office can form an overview of the entire municipality and decide in advance which demands and costs to prioritize.

SICAP has imposed a paradigm shift by creating a uniform data completion and validation flow across all territories. If two regions request identical services, it is up to the Secretariat to evaluate criteria and possibilities for deciding which to address first. The system also allows the Secretariat to monitor indicators and measure results between different social organizations, evaluating criteria such as speed, transparency and efficiency in the execution of contracts and partnerships.

FIGURE 6:
SICAP access screen

To enable the new working structure, the Secretariat held a first round of dialogue and awareness of the importance of SICAP. It then offered a series of on-demand trainings to social organizations. It also provided an EAD course by module, to answer additional questions from the teams. Finally, the Secretariat created a technical document establishing the fields and criteria to be followed in future contracts and agreements.

The first months of work were dedicated to designing a single workflow capable of meeting the demands of coordinators, the Secretariat and control bodies, comparing them with the sector's pre-existing service provision manual. After mapping and defining the basic operating structure of the system, connections were initiated with other public databases to facilitate the insertion of information in SICAP and programs to train public servants in the adoption of the tool.

The new system allows the user to take advantage of the database of previous negotiations and contracts and streamlines the routine of entering, adjusting and adapting information. It is integrated with the databases of the Treasury Department and the Federal Revenue Service, cross-listing data for checking and validating invoices and services. It also draws on essential indicators reported in the ESUS-AB and SIGA databases, avoiding manual data entry, and it is customizable, accepting the addition of new contract models at no extra cost for the service.

SICAP has implemented a new requests and approval system and allows the Secretariat to make data-based decisions based on a comprehensive view of municipal demand. The system also standardizes and regularizes workflows, creating identical conditions and methods of analysis and validation for the entire municipality.

With SICAP, management contracts, agreements, and collaboration and promotion with SOs and other partner institutions are managed directly in the system. The data are available to SMS technical areas, enabling them to improve their processes. Whenever necessary, technical supervisors request additional budgets and data from the regional coordinators. HSE decides what to implement and contract after evaluating and defining the municipality's priorities. The Secretariat works to ensure the quality of data entered the system, creating the necessary conditions for the information made available in SICAP to be accurate and complete and allow an accurate analysis of the department's workflow.

SICAP development and implementation began in January 2023 and is expected to be completed by mid-2024. Five months were spent establishing requirements gathering information, defining indicators and building the system architecture. Employee access to SICAP began in June 2023, with adjustments and technical monitoring for gradual adoption of the tool. The estimated deadline for completing the migration to the new system is the first half of 2024.

With SICAP, training must be continuous to keep up with the needs of each new contract and team added to the SMS partner list. Social organizations that join the Secretariat's portfolio need to understand the workflow and submit updated records. Only then will SERMAP technicians be able to complete the operational work of calculating and entering data on the platform and assume the role of controlling, checking and validating the information in the system.

The new workflow will guarantee SMS a single and transparent view of the entire process of contracting partnerships and services, with greater control of resources for social organizations, enhanced transparency in the presentation of accounts, and more efficient management of deliveries.

SICAP has the potential to become the country's largest public health control and transparency project.

The system is being closely monitored by the Federal Court of Accounts and the State Public Prosecutor's Office due to its potential to deliver transparency, efficiency and account management.

7.2. Administrative Contract Management System

The administrative contracts division serves the entire Municipal Health Department. In all, the sector manages an average of 400 active contracts per year, all of which require formalizations, amendments, extensions, adjustments and contractual guarantees. Despite being strategic for the functioning of the municipality's health network, the division had managed the entire flow of contracts manually. Prior to the program, there was no system for integrating data, generating alerts or assisting with management.

The absence of a computerized system for managing the sector made it difficult to control suppliers, requiring multiple checks and repetition of tasks to ensure the transparency and assertiveness of the process. It was all recorded in a huge data sheet, with information on prices, deadlines, suppliers, and due dates entered by different employees in the department. To add to the challenge, data entry did not follow a pattern. Every professional entered the information in the way he or she judged best.

The sector's demand increased even more during the pandemic, with numerous requests for contracts to be produced and signed under an emergency regime to improve health care for the municipality's residents. New contractual models had to be created, with their own fields and drafts to be developed. Avança Saúde SP itself caused extra challenges for the team by contracting more than 100 projects and opening numerous bids to meet the program's needs.

The tool selected to serve the department can integrate spreadsheets, interoperate systems, allow customizations, and make it possible to enter data directly on the platform, in addition to generating reports on demand. The company that developed the tool mapped the area's workflow, parameterized the system to meet the needs of the sector and customized its functionalities. A support team monitored the entire process, from the initial requirements survey in late 2022 to the system's implementation in mid-2023.

BENEFITS

The tool makes it possible to distribute automatic email alerts about expiration and renewal terms throughout the life of the contract to the multiple teams involved in the process.

The unified database brings more reliability, transparency and agility in accessing information. Only the contract team is authorized to edit the material, and it is committed to keeping the system up to date. Nevertheless, professionals from different SMS management levels can view the information made available in the system and generate reports segmented by topics of interest. The ease of access associated with data transparency creates a new model for information management and decision-making in São Paulo health.

LEGACY

The experience gained from the implementation of the contract system for the HSE office will serve as a starting point for the tool's application in the six regional offices. Health unit teams participated in the initial data parameterization conversations and were able to contribute suggestions about the flow of information needed to feed the system. In the intersectoral dialogue, it was possible to identify that the unit's needs could be met by the city's contract system, with small adjustments. The exchange of knowledge served as a starting point for the expansion of technology to the units.

By the end of 2024, regional coordinators will be able to use the same system to exchange information and knowledge with each other. The different regions will be able to check if the database already contains a contract template that meets their need, such as hiring a cleaning supplier. The Department of Health will be able to check the units' existing contracts, generate data reports and manage key information for municipal decision-making.

The experience acquired by one coordinator will help inform the work of another regional coordinator, with benefits for the entire municipality: the units gain agility, the city government gains transparency with unified access to administered contracts, and the citizen gains access to increasingly efficient and assertive health care.

7.3. Procurement/Contract Systems and Centralized Supply Management

The São Paulo Health Department manages the purchase and inventory of **more than six thousand items, including supplies and medications, to serve almost one thousand health units spread over a 1,509 km² territory— larger than 24 of the world's countries** — with the potential to serve approximately 11 million inhabitants. If it were a country, São Paulo would be the 79th most populous nation in the world. Managing inventories in real time to supply a network of almost 1,000 units is one of the great challenges of municipal health care.

To coordinate demand, Avança Saúde SP envisaged the development and implementation of an integrated and interoperable procurement and contracting system using the main inventory, budget and logistics control tools available in the municipality. The challenge was to establish a system capable of controlling the flow of medicines and supplies from the Secretariat, anticipating inventory write-offs, average consumption per product and expiration dates, and entry and exit tickets for materials.

The selected tool was fully adjusted and modulated to the care needs of the public health system (SUS) in general, and to São Paulo's specific municipal demands. This system makes it possible to manage inventory and orders in a single tool, improving purchasing management of medicines and supplies from the municipality and shortening the item's journey to the patient or the health unit.

Prior to this system, each order involved the cross-analysis of data from more than ten different platforms, monitored manually. No manager was responsible for end-to-end monitoring of the purchase order. Each stage of the product trajectory, from the initial bidding to the arrival of the item in stock, was facilitated by a different professional from the secretariat. In addition, processes requesting the purchase of a certain item were opened and monitored separately; in other

words, while one employee ordered the purchase of gloves for primary care, another managed the purchase of the same product for SAMU, and a third party could request the item for hospitals.

This created chronic systemic difficulties with inventory in the municipality. Without unified purchasing management or an alert system for possible inventory write-offs, São Paulo was facing problems with shortages. Patients might arrive at the basic health unit and be unable to find items that were available the day before. There was no inventory flow control to guarantee the advance purchase of items, an example of the technical-administrative challenges affecting health care and citizen health.

The new system communicates with platforms such as Health Systems Management (GSS), responsible for controlling the entry and exit of materials from basic health units, and the municipality's Budget and Financial System (SOF), to name just a few key administrative tools. Purchasing decisions are made based on an analysis of the stock balance of each item provided by HSE, by health unit, based on cross-information and integrated from multiple municipal databases. Bids and contracting awards, steps required by the public authorities, are also incorporated into the system modules to better meet municipal needs.

With the tool, the result is more accurate and assertive purchasing decisions, based on indicators and made nimbly and transparently. For example, needles, gloves or geriatric diapers can be requested in a single order for all units of the city's health care network, monitored by a single manager, from stock monitoring to the item's arrival in the distribution system. Centralized orders generate equally unified deliveries, with single shipping per item, whether ordered for primary care or the hospital network.

The payment flow can also be tracked end-to-end, from initial budget to billing. Finally, a report covers all processing information — balances, coverage, purchase and payment, delivery and distribution, in a 360° management of the acquisition and inventory control of health care products in the municipality. Profile-controlled access to system data and reports allows employees of the regional offices and health units to monitor the processing of the request and the use of the municipality's resources.

Before the system was implemented, inventory at the municipal distribution center had to be checked to start planning acquisitions. Currently, the stock of the Drugs and Related Items Distribution Center (CDMEC), individual distribution centers and the health units is compiled and gathered in the system, making it possible to make decisions based on concrete, integrated and reliable data.

WORKFLOW CHANGE

The system's implementation generated a change in the workflow of purchasing departments for medicines and supplies. Before, an item's journey was overseen by multiple secretariat employees, each assuming a stage of the process, i.e., one technician handled the bid, another issued the request, and a third followed up with the commitment.

Now that tasks are divided by product category, each item has a single manager to supervise its various acquisition stages. End-to-end monitoring places the professional at the forefront of product management, ensuring responsibility for purchase and distribution for the entire municipal health network.

Task adjustment was the most challenging stage of the process for the department's management. The decision to organize purchasing management by product category was implemented throughout the system as a solution for reordering the department's routine.

Under this system, each technician gains autonomy to manage an item's route within the platform, from the initial order to arrival at the city warehouse. It is possible to identify breaks in the order and to adjust quickly and assertively.

The individuation of the process allows for more careful monitoring of the supervision of the department and control bodies. Buying an item isn't enough; it is necessary to know what, how, for how much and why a certain item was requested, what it is for, and how urgent it is for use in health care, with an awareness that the management of inputs and medicines saves lives and impacts the day-to-day of health units.

Another area that was on the margins of digital systems and spreadsheets was legal action. Before, the Secretariat could not monitor items requested by court order. The process occurred outsides of the control platforms. With the new system, it is possible to know which items are demanded from the city, in what quantity and how often, reducing the chances of future disputes and improving service to the population.

TABLE 2:
Avança Saúde SP: results achieved

Measure	Results achieved:
Creation of a **minimum data repository for primary health care**.	The system aggregates information from primary care, hospital care, examination results and the regulatory process in one place. It has an integrated database with more than **26 million SUS cards** (as of September 2023).
Launch of the **E-Saúde SP** application.	The application, downloaded more than any other municipal app, has **15.6 million logins** and **3.1 million registered users** (data from July 2023).
Implementation of an integrated **risk classification** system.	Implemented at **53 health units**, the system helps reduce screening time and increases the efficiency and assertiveness of care, contributing directly to the organization of patient flow in primary care.
Creation of a **telecare** system.	The three different forms — **digital consultations, home care or app** — of telecare have recorded a total of **1.7 million** consultations (data from September 2023).
Implementation of **integrated administrative management systems**.	The three management systems implemented — **Integrated Partnership Control and Evaluation System (SICAP), Administrative Contract System, Procurement/Contract Systems** and **Centralized Supply Management** — allow more precise deliveries, improved time and cost controls, and more transparency for negotiations, with easy and organized access to the history of health transactions in the municipality.

8. CHALLENGES IN IMPLEMENTATION

8. CHALLENGES IN IMPLEMENTATION

Digital transformation is only possible with the involvement of professionals who work on the front lines of health care for the entry, use and daily management of data in digital systems and tools.

Without team engagement, platforms and applications expire due to lack of use, updates age before being implemented, and new forms of service remain unimplemented due to lack of professional engagement.

Investing in technology isn't enough; time must be dedicated to attentive listening and ongoing team training for innovation to truly transform the provision of health services in the country. More than the ability to use a new tool or technical ability to develop a platform, the challenge is to face the resistance to changing ingrained habits and abandoning the comfort zone that can derail a digital transformation project.

The successful implementation of systems, tools or platforms does not follow a single path. Contrary to the use and installation manuals commonly associated with the installation and handling of technological solutions, digital transformation in health involves diverse and complex realities; emergency situations that endanger human lives; hybrid teams, composed of servers and outsourced personnel, with multiple academic backgrounds, high turnover of shifts and teams; and complex and dispersed data coming from multiple sources and systems, which require careful, integrated and consistent analysis for any effective decision-making.

In July 2023, more than 100,000 active professionals were linked to the Municipal Health Department of São Paulo in a wide range of employment contracts.

Before making a positive impact on the population's care and well-being network, digital transformation in health affects the structure and work routine of the professionals who care for citizens. That is why it is so important to orient those who orient others, offering permanent training and open dialogue so that they understand the importance of digital transformation.

Four areas of the Secretariat faced distinct obstacles to the implementation of digital management systems but managed to overcome resistance and share the importance of the culture of innovation to achieve better results for improved health care.

MEDICATION AND SUPPLY MANAGEMENT

The supply department had a deadline for implementing the digital platform, but had to step back, review deadlines, adjust goals and think of new ways to mobilize the team to enable use of the system. More than cross-referencing data and entering information in spreadsheets, digitalizing the supply area motivated a structural change in the sector's organization and the division of tasks among professionals.

The proposal was to start 2023 with the team working from a new task configuration, with purchasing management organized by product group. A month later, however, inventory was out of stock and the distribution of essentials was on the verge of a collapse. It was necessary to step back and postpone the decision to divide the team into groups until everyone was more familiar and comfortable with using the system.

It took another three months of dialogue, meetings and training to prepare the team for the new configuration of the work routine. The company responsible for implementing the system carried out additional training and made the support team available to professionals, with real-time adjustments to better meet the department's needs.

Merely learning to use the system was not enough; users needed the confidence to implement the new work dynamic with a revised flow of requests, deadlines and commitments for medicines and supplies. Employees were won over one by one, after close attention was paid to their individual difficulties and concerns.

Currently, the supply division team is divided into nine medical supply management groups and six that monitor the purchase and stock of medications. With this work model, each professional follows the purchase order of a certain item from end to end, from the initial order to the arrival of the stock. The new division of tasks makes each employee the manager of a stock item for the entire municipal health network. More than placing an order, each technician in the sector is a cog in a gear that drives a system that saves lives and assists people.

RESTRUCTURING OF INFORMATION IN ADMINISTRATIVE CONTRACTS

The first difficulty encountered in the process of implementing the administrative contract management system was to define the best way to systematize and catalog the data on the platform. In addition to breaking ingrained habits of entering data, and its impact on the team's work routine, a uniform data entry model had to be introduced to gather information previously dispersed among different documents into one place.

Another challenge faced by the department was the difficulty of integrating with some municipal systems. For security reasons, data from the Electronic Information System (SEI) could not be interoperable with the contract platform. Part of the information had to be entered manually, requiring teamwork. The company responsible for developing and implementing the tool inserted the material, which was checked and validated by city professionals.

To streamline the process, the insertion of active 2023 contracts was prioritized — 380 in total, all inserted in the platform and already being monitored through the digital base. Future contracts will require less work from the team. The data to be entered manually was added to the Excel spreadsheet but will now reach the system in an organized and uniform way, following pre-established fields and methods.

CREATING TELECARE TEAMS

When it comes to telecare, clinical experience is not enough to guarantee excellence in service if professionals resist the new technology. SMS understood that there are different profiles for the two types of care and that some doctors prefer to work from home or their private offices, without having to cross the city to reach the health unit. The time that would have been lost in traffic can then be invested in a quality remote call.

Some doctors provide service from other cities or even other states, managing to overcome the screen barrier to offer the patient careful and attentive care. Many who overcome the initial barrier of distrust became devoted practitioners of telecare, due to its potential to expand the health offering to the population.

Whatever the profile, physicians underwent extensive training to adjust to the remote care protocol and put into practice one of the principles of SUS: equality, or guaranteed access to health for the entire population, expanding access to primary care in the municipal network. Regardless of the format — app, family health team or digital office — patients save time waiting in line for an appointment and receive humanized service. Interacting onscreen with their doctors while filling out the electronic record helps create a bond with the patient, and the time gained by avoiding travel provides the opportunity for the type of informal conversation that is unusual in emergency rooms at peak times.

DATA MANAGEMENT FOR E-SAÚDE SP

Managing data requires legal support and responsible use of information. In parallel to the technological challenge for data integration in E-Saúde SP, SMS also needed to add various contracts for responsible access to selected population health information.

Of the more than one thousand health units and services that make up the São Paulo municipal network, 90% already have data integrated into the **E-Saúde SP** platform, with contracts added for access to the information that makes up the minimum repository of clinical data of the population served by the municipal SUS.

The remaining 10% are institutions that handle data that falls outside the municipal scope and are awaiting a technical-legal solution for the selective exchange of data with the system. New service contracts signed with the city of São Paulo already have a clause that authorizes the integration of selected clinical patient data, facilitating the interoperability of databases and adherence to the **E-Saúde SP** platform.

9. CONCLUSION

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- **São Paulo was the only municipality in the country to anticipate and exceed the requirement of the minimum data set (CMD)** established by the managers of the Unified Health System in the three management spheres to reduce the fragmentation of information systems that contain clinical-administrative data on health care.

- **Investment in the E-Saúde SP platform, combined with telemedicine and risk classification at emergency rooms, provides a 360° overview** of primary health care in the municipality and contributes the main indicators required by Previne Brasil.

- **In less than five years, São Paulo has accumulated health information from more than 26 million users** served by all connected systems in the municipality, forming one of the largest databases in the sector worldwide.

- **It is already possible to conclude that integrated use of the E-Saúde SP platform associated with the risk classification system** has reduced service times at municipal emergency rooms and helped reorganize and redirect low-risk care to basic health units or hybrid offices covered by telemedicine.

- **E-Saúde SP has given doctors and patients a shared commitment to care management and health.** Through the platform, health units can receive alerts about selected test results and notify patients, making them more active in their care. At the touch of a button, patients can access their full consultation and exam history and manage their own health by entering data for monitoring chronic diseases, scheduling new appointments or checking their vaccination record.

- **Facilitated access to shared management tools for continuous monitoring of chronic diseases, such as My Health** or the **Glycemic Self-Monitoring Program** through facilitated telecare, the app, family physician team or hybrid office actively contribute to the restructuring of primary care. The integration of data into a digital platform also made prescriptions more secure for pharmacies and patients.

- **The expectation is that patients, especially those with chronic diseases, will benefit from the transformation for permanent monitoring facilitated through digital tools.** The continuous care of chronic diseases via app and telecare contributes to avoiding the recurrence of routine patient consultations at health centers, contributing to the reduction of queues and the improvement of the flow of primary care.

BEYOND MINIMUM DATA

The strengthening of primary care based on consolidated clinical information contributes to positioning São Paulo as one of the municipalities most advanced in the construction of a health data repository. This pioneering effort has encouraged the Secretariat to go beyond the minimum required to build the national health data network to include a new layer of care information in the municipal system.

Data quality is the mission of a management committee at the Secretariat and the guiding principle of health action in the municipality. In line with the steps takin in Women's Health, the proposal is to expand the minimum data set of other focus groups relevant to health management in the city.

In addition to expanding access to data, giving more robustness to the patient's clinical history, SMS is studying ways to better share the information gathered among regional coordinators, units and social organizations. The goal is to overcome the diagnostic and predictive phases of data mapping to reach the intelligence analysis stage, capable of generating valuable insights for public health management.

Improving the data integration between systems is a further step in the qualification of health information, creating the conditions to implement additional actions and services for complete epidemiological mapping.

INTEGRATED CARE

Perhaps the most visible face of the combined effects of Avança Saúde SP on different and complementary fronts such as digital transformation and investments in structural works is telecare, especially in the digital office format offered at more than 50 emergency care units in the municipality.

Digital office telecare guarantees a complete service flow to the São Paulo citizen. Low-risk patients who access remote telecare *in situ* at an emergency unit can pick up prescriptions directly from the pharmacy or have tests on the spot.

It is not yet possible to translate the impact of telecare into numbers, but a survey conducted by SMS recorded more than 90% patient satisfaction with the service. At the health unit level, it is already possible to see a reduction in patient travel expenses for additional examinations and evaluation by specialists.

Currently, if a patient needs to undergo a CT scan, a neurosurgeon at the designated center can analyze the result, avoiding unnecessary patient travel around the city. The physician has the authority to decide whether the patient can remain at a less complex unit or needs to be sent to a referral unit for surgical treatment, for example. **Teleconsultation**, the exchange of information between health professionals, ensures agility in the diagnosis and lowers costs for the municipality.

EFFICIENCY TRANSLATES INTO FINANCIAL HEALTH FOR THE MUNICIPALITY

It is not just the health of citizens that benefits from digital transformation. Data connectivity gives public administration the ability to continuously analyze the service offered to the population. With risk classification implemented at the health units, the regional coordinators are able to identify the locations and peak times of urgent care and emergency queues, wait times and the pace of care offered by each professional at each unit. Classification reports by color, time or professional guarantee a panoramic view of the quality of service offered to the population and enable the ongoing adjustment of primary care service.

Digital data platforms allow greater clarity in the analysis of results and reduce the chances of health management errors. Unit failures are more easily identifiable and can be adjusted with the integrated view of the services offered to the population. The greater the interoperability of data, the more complete the monitoring and the more assertive the health services made available to the citizen. The integration of the multiple databases still used in the public health network saves the time for health professionals, speeds up care and improves the quality of service. The units' expectation is for greater robustness in the data set mapped and interoperable by the **E-Saúde SP** platform in the medium and long term.

Qualification and information sharing also characterize the supply management and procurement system. Regional coordinators and unit supervisors have access to the system, which is under the responsibility of the supply directorate. The system has more than 250 aggregated users with access to balance information and purchase planning by health unit. Professionals can track whether an item has already been ordered or is on the way, and will soon be able to request emergency orders, currently made through Excel spreadsheets.

APPENDIX 1 – INFRASTRUCTURE INVESTMENTS

APPENDIX I - INFRASTRUCTURE INVESTMENTS

The Municipal Health Department of São Paulo faces the daily challenge of monitoring the growth of a city that faces, within its territory, contrasts and contradictions of continental proportions, in which financial inequality, urban expansion and the consequent environmental imbalance, violence and daily stress contribute to increased rates of chronic disease and affect the quality of life of the population. Health equipment distributed throughout the municipality needs to follow the demands of care and adhere to the needs and specificities of each territory, reordering the health system with a focus on expanding rationalization and efficiency.

Among the HSE goals covered by Avança Saúde SP, they are the expansion of coverage and qualification of access to health services with adequate care times, with an emphasis on humanization, equality and meeting health needs by improving basic, specialized, outpatient and hospital care. In infrastructure, the program aims to reduce unequal access and differences in the quality of service between the different regions of the municipality, and to optimize the resources invested in the improvement of health equipment distributed in the city, where many health units occupy old facilities built before current accessibility or sanitary requirements without renovation or repairs.

Started almost simultaneously with the announcement of the coronavirus pandemic, in December 2019, the work followed the IDB's sustainability and energy efficiency requirements, the regulatory processes, practices and quality standards for products and services of the National Health Surveillance Agency (Anvisa), and all safety protocols established for COVID-19. Decisions on what to build and renovate were made after public consultation and dialogue with regional coordinators, under the premise that primary care is the main determinant of health care and the municipality's top priority.

With Avança Saúde SP, SMS had the opportunity to carry out the largest program of recovery and requalification of health equipment ever implemented in the municipality. The scheduled work included the structural reform of **88 basic health units and five emergency care units, the renovation of an Integrated Continuous Care Center (ICC)** in the eastern part of the city, **the emergency room of the Hospital do Servidor Público Municipal (HSPM)**, and the r**enovation of equipment for Parelheiros Hospital**. In addition to the renovations, the scope of work inluded **the construction of 8 UPAs and 11 UBSs, as well as the Hospital da Brasilândia** in the city's north, which has already been completed.

The general infrastructure renovation of the **Hospital do Servidor Público Municipal (HSPM) Emergency Room** integrates the adult and pediatric emergency rooms, pediatrics and psychiatry, child and adolescent psychology units and provides for the installation of air conditioning in the operating room, obstetric center, adult ICUs and laboratory.

The **Vergueiro Emergency Care Unit (UPA)** was built on a vacant space on the hospital grounds, taking some of the pressure off Hospital do Servidor. The unit has 23 beds for observation and isolation, and provides primary care for surgical cases and trauma. With 24-hour service, the unit is the first in the central region of São Paulo and has the capacity to provide about 15,000 monthly services.

FIGURE 7:
Renovated UPA and UBS

At the southern end of the capital is the locality of Parelheiros, an agricultural outpost of a metropolis best known for its skyscrapers and highways and the region with the worst human development index in the municipality. The local population had access to a basic health unit, but they need to travel almost 70km for specialty consultations. Avança Saúde SP, proposed the renovation of equipment at the Parelheiros Municipal Hospital and construction of the Parelheiros emergency care unit (UPA), which assists in medium-complexity health care and adds services to the basic and hospital care network, offering urgent care and emergency services in clinical medicine, pediatrics, dentistry and laboratory tests.

With 27 beds, 84 rooms (offices, risk assessment, social service, nursing station, isolation rooms, reception and waiting areas), **UPA Parelheiros** has the capacity to provide about 16,000 monthly services. The southern region of the municipality also benefited from the renovation of UPA D. Maria Antonieta F. de Barros, the construction of four UBS, and the renovation of eight other units, exponentially increasing the number of services in the region.

The overcrowded eastern zone was chosen to house the first unit of the Integrated Continuous Care Center in the municipality of São Paulo. The **East ICC - Armelino Matarazzo** was designed to

FIGURE 8:
CCI Leste - Ermelino Matarazzo

relieve the pressure on hospitals in the region and offer continuous, intensive and integrated care to surgical patients in the municipal network. The unit will house patients in need of surgery, prolonged treatment or long and medium term ICU, with rehabilitative care. CCI Leste will be the precursor of this model of health provision in the municipality. If the pilot project meets the city's expectations, it plans to build six more units in the southeast, south, center, west and north.

Another important example of the restructuring of health care occurred with the construction and renovation of units in Brasilândia, the most populous district in northern São Paulo. With 41 thousand square meters of built area, the **Hospital da Brasilândia** was designed to function as a flagship facility to serve the region's population and its surroundings, with about 500 thousand inhabitants. The unit was built to fill part of the care gap in the region, and to supply the shortage of hospital beds available to the population, mainly for clinical, surgical and ICU care, as well as obstetrics. Among the services offered are urgent, emergency and outpatient care in the specialties of Medical Clinic, Surgical, Obstetrics, Pediatrics and Psychiatry, in addition to diagnostic support for radiology, laboratory, graphic methods and endoscopy.

The same region saw the renovation of the **Elisa Maria I Basic Health Unit**. Located in the heart of the Brasilândia community, the unit was reconditioned to offer better and safer conditions for the population. Elisa Maria I operates as an Integrated UPA and UBS with new facilities in the same building. The basic health unit has the capacity to offer more than 3,400 monthly services provided by community agents, general practitioners, and nursing technicians, among others. The emergency care unit offers urgent and emergency services in medical clinic, pediatrics, dentistry and other specialities.

At the end of 2019, the year in which the partnership with the Inter-American Development Bank for the implementation of Avança Saúde SP was signed, there were 3,293 Primary Health Care beds available in the municipality of São Paulo under municipal administration. By the end of 2022, the number of beds administered by the municipality in primary care had reached 4,429. The increase reflects the effort and investments made in the renovation, expansion and construction of Primary Health Care equipment, which jumped from 929 units in December 2019 to 1,021 units in December 2022, and 1,027 in 2023, distributed in all regions of the city. No other health care network in the country can boast such significant numbers.

A.1.1. Historic investments in restructuring and renovating the public network

In 2016, São Paulo had only 451 UBSs, three UPAs and 20 municipal hospitals. A historic series of combined investments in restructuring, reorganization and integration of health equipment has made the municipality's public health a unique network in terms of size and service capacity in the country.

Since 2017, the municipality has gained 20 new UPAs. From January 2018 to December 2022, more than 500 renovations, 45 constructions and 107 retrofits were carried out, a 600% increase in the municipality's Primary Care service capacity alone. From 2021 to 2023, the municipal management also delivered ten new hospitals to the population.

In 2023, the municipal health network of São Paulo had 1,027 health units distributed in all regions of the city. A significant part of the investments in reform and structural expansion of the health care network was the result of the Avança Saúde SP (box). **The data are from SMS-SP and can be accessed online.**

A.1.2. ONA Certification

In parallel, the Secretariat is in the process of qualifying all Basic Health Units in the municipality to implement **certification by the National Accreditation Organization (ONA)**, an institution responsible for the development and management of Brazilian standards of quality and safety in health. The proposal is to accredit **the services offered by 340 UBSs** to meet the quality standards required by the certification.

Two hospitals in the municipality have a maximum level of ONA certification, valid until 2024: Dr. Moysés Deutsch (M 'Boi Mirim) and Dr. Gilson de Cassia Marques de Carvalho (Vila Santa Catarina). The two units received Level 3 accreditation approval — Accredited with Excellence — demonstrating an organizational culture of continuous improvement with institutional maturity.

ONA is the only one accreditation in the country with certifications at three different levels — accredited, fully accredited, accredited with excellence — making it possible to evaluate continuous improvement in the management and processes of health organizations. ONA I and ONA II certificates are valid for two years, and ONA III is valid for three years.

BOX 2 Avança Saúde SP: Investments in restructuring the local health care network[5]:

Basic Health Units
Construction of **10** new units
Renovation, expansion and modernization of **88** units
Emergency Care Units
Construction of **eight** new units
Renovation, expansion and modernization of five units
Hospital de Brasilândia
Construction
Integrated Continuous Care Center (ICC)
Construction
Hospital do Servidor Público Municipal
Emergency Room Renovation
Hospital Municipal de Parelheiros
Equipment Procurement

[5] Final numbers to be achieved by the end of the program in 2024.

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