

Digital transformation of healthcare in El Salvador: Advances, challenges, and perspectives of telehealth

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Abstract

Objective: To describe the evolution and development of digital services related to telehealth in El Salvador from a narrative perspective, including the health digitization process, achieved advances, services implemented, and current challenges. **Methods:** Descriptive analysis of public policies, technological systems implemented, and telehealth modalities deployed by the Ministry of Health.

Results: Consolidation of a national health information system based on free software; Implementation of teleconsultation, telemonitoring, and telemanagement services; Development of a national teleconsultation agenda. **Conclusion:** El Salvador has demonstrated that, even within contexts of structural limitations, it is feasible to develop innovative digital solutions grounded in technical expertise and political will. Salvadoran telehealth has evolved from a pilot experiment to a cornerstone in the transformation of the health system; however, it still faces the need to consolidate a technical, normative, and legal framework and advance toward national interoperability. The coming years will be decisive for consolidating this model, expanding coverage, and ensuring sustainability.

Key-words: Health Information Interoperability; Telehealth; Health Information Systems; Digital Health Transformation

Resumen

Transformación digital de la salud en El Salvador: Avances, desafíos y perspectivas de la Telesalud

Objetivo: Describir la evolución y desarrollo de servicios digitales correspondientes a la telesalud en El Salvador desde una perspectiva narrativa: el proceso de digitalización de la salud, los avances logrados, servicios implementados, y desafíos actuales.

Métodos: Análisis descriptivo de políticas, sistemas tecnológicos implementados y modalidades de telesalud desplegadas por el Ministerio de Salud. Los datos cuantitativos provienen del análisis operativo del Contact Center nacional de salud, el cual opera con una planta de 100 médicos teleoperadores y 50 teleoperadores no médicos. **Resultados:** Se consolidó el Sistema Integrado de Salud (SIS) basado en software libre, promoviendo interoperabilidad clínica. Se institucionalizaron servicios de teleinterconsulta, teleseguimiento y telegestión, incluyendo la creación de una Agenda Nacional de Teleinterconsultas. Entre junio y noviembre, la unidad operativa de telesalud realizó 1,108,310 llamadas (6,676/día), logrando 698,235 interacciones efectivas (4,206/día). El teleseguimiento post-alta mantiene una tasa de éxito del 82% (1,180 interacciones efectivas/día). Entre los impactos clínicos destaca la detección oportuna y coordinación de emergencia de un Tromboembolismo Pulmonar Agudo Bilateral en una paciente ubicada en zona rural. **Conclusiones:** El Salvador ha avanzado hacia modelos de telesalud más proactivos y longitudinales. Aún existen pendientes estructurales como el marco normativo, la interoperabilidad y el fortalecimiento técnico-operativo. El Contact Center, con sus servicios de telegestión y teleseguimiento, se ha consolidado como un componente esencial de la infraestructura digital del SIS, con impacto clínico y operativo comprobado.

Palabras clave: Interoperabilidad de la Información en Salud, Telesalud, Sistemas de Información en Salud, Transformación Digital en Salud

Transformação digital da saúde em El Salvador: avanços, desafios e perspectivas da telessaúde

Objetivo: Descrever a evolução e o desenvolvimento dos serviços digitais relacionados à telessaúde em El Salvador, por meio de uma abordagem narrativa, contemplando o processo de digitalização da saúde, os avanços obtidos, os serviços implementados e os desafios atuais. **Métodos:** Análise descritiva das políticas públicas, dos sistemas tecnológicos adotados e das modalidades de telessaúde implementadas pelo Ministério da Saúde. **Resultados:** Consolidação de um sistema nacional de informação em saúde baseado em software livre; Implementação de serviços de teleinterconsulta, telesseguimento clínico e telegestão; Elaboração de uma agenda nacional de teleinterconsultas. **Conclusão:** El Salvador demonstra que, mesmo em contextos de limitações estruturais, é possível desenvolver soluções digitais inovadoras a partir de conhecimento técnico especializado e vontade política. A telessaúde salvadorenha evoluiu de um experimento piloto para um componente fundamental na transformação do sistema de saúde; contudo, ainda há necessidade de consolidar um marco técnico, normativo e legal, além de avançar na interoperabilidade nacional. Os próximos anos serão decisivos para a consolidação do modelo, expansão da cobertura e garantia da sustentabilidade.

Palavras-chave: Interoperabilidade da Informação em Saúde; Telessaúde; Sistemas de Informação em Saúde; Transformação Digital em Saúde.

Resumo

INTRODUCTION

Telehealth has emerged as an essential component of contemporary health systems, marking a radical shift in how health services are offered, coordinated, and managed. In Latin America, the COVID-19 pandemic catalyzed this change. Countries like Chile and Brazil have had a clear path since the beginning of the last decade, developing regulatory frameworks, technological infrastructures, and remote care models^{1 2}, which allowed them to respond with greater agility to face the health crisis. In contrast, El Salvador faced this situation without a robust platform and structured mechanisms for digital care, which showed a historical legacy with the digital transformation of the health sector.

However, this situation also provided an unprecedented response, accelerating institutional innovation. What began as a tactical response during a health emergency turned into a long-term structural strategy. This article seeks to present in depth the evolution of telehealth in El Salvador, not only as a set of remote services, but as a model that reconfigures the relationship between the health system and the citizenship, while identifying the challenges that persist and the opportunities that are envisioned.

This report details the evolution of telehealth in El Salvador, highlighting advances, implementation of services, and the operational role of the national Contact Center, a key to the current digital health model.

METHODS

This document is presented as a descriptive and management report on the evolution, implementation, and performance of telehealth during 2020-2024.

Information sources

1. Policy and normative analysis:

Review of the main normative instruments, among them:
 the National Teleconsultation Procedure
 the Electronic Clinical Records Regulations
 Reference, Return, and Interconsultation Lines
 the Data Security Law

2. Operational and quantitative analysis:

Data comes from the national health Contact Center, including telephone management, teletracking, and telemanagement metrics between June 6th and November 18th.

Operational Structure of the Contact Center

The information capture and scaling model operates on two key components:

- **Medical Plant (100 doctors):**

Responsible for clinical telemonitoring, especially daily monitoring of all hospital discharges in the country.

- **Teleoperator Plant (50 doctors):**

Responsible for humanized calls to family members, administrative management, reminders, and notifications.

Background: from fragmentation to integration

Until 2020, the public health system in El Salvador operated on a fragmented basis. Different levels of care, from the first community level to specialized hospitals, use disconnected tools, often in analogue formats or with local digital solutions that are not interoperable. This disarticulation prevented longitudinal clinical follow-up of patients, doubled administrative efforts, and undermined the efficiency of the system. The lack of an electronic clinical record and shared technical standards creates structural barriers for continuous, patient-centered care.

The pandemic showed the vulnerabilities of this healthcare model. In March 2020, there were 49 ICU beds available nationally, highlighting the need for resources to face the pandemic. This situation prompted the accelerated construction of Hospital El Salvador, which was designed as an intensive care facility and COVID-19 hospitalization with an operational core based on surveillance and monitoring technologies remote⁸. This is where the first half of a comprehensive digital transformation began. For the first time, the country experimented with an effective centralization of clinical data in real time, using technological tools such as dashboards, biometric sensors, and clinical video call systems, anticipating what many health systems have already developed.

Based on this experience, a group of doctors, technologists and engineers from El Salvador led the design and development of the Integrated Health System (SIS-Sistema Integrado de Salud), a platform created internally, based on free software, and adapted to the needs of the national environment. The SIS has been more than an information system: it has been a critical infrastructure to promote clinical interoperability, coordinate care levels⁸ and enable and scale telehealth services.

Teleinterconsultation: Innovation in Decentralized Care

One of the most highlighted achievements of the process in El Salvador has been the

institutionalization of the teleconsultation service, defined as a structured exchange of clinical information between professionals, which allows improving diagnoses and making therapeutic decisions remotely, in real time, or in a deferred manner. The creation of the National Teleinterconsultation Procedure brought formality and sustainability to this modality⁵, ensuring its integration with the operational flow of the national health system.

Through its National Digital Health Strategy, Brazil has implemented the development of interoperable ambulatory regulation services as a strategic instrument to improve the efficiency of the health system. This initiative includes interoperability between both public and private scheduling systems.³ Based on this scheduling model, El Salvador developed a National Teleinterconsultation Agenda, the offer of specialties and hourly availability is nurtured and updated according to the supply of specialist hours in each hospital in the country. This centralized database allows the first level of care to request interconsultations in different specialties without depending on the geographic location of the patient, optimizing resources and reducing waiting times, and positively impacting the patient's pocket.

Start date: September 2024

- Currently, the teleinterconsultation service is implemented in more than 10 primary care facilities and in 3 hospitals in the National Network, which has allowed the availability of specialties to be expanded across complexity levels.
- The training process for health personnel lasts approximately two months. During this time, technical and clinical sessions are conducted, focusing on the use of the platform, the flow of scheduling and the resolution of interconsultations are developed. The attitude of medical staff has been mostly favorable, as teleconsultation facilitates access to specialized services that are not available in most less complex facilities. Even in hospitals of the same level, the centralization of scheduling allows "sharing supply", optimizing the availability of specialist hours and reducing operational gaps between institutions.
- From the users' perspective, the reception has been highly positive, as appointments with specialists have considerably shorter waiting times. This is because care does not depend on the geographic location of the patient or the local availability of specialists, eliminating traditional barriers to access and strengthening the continuity of care.

Teletracking and Telemanagement: The Proactive Role of the Contact Center

Strategies parallel to teleconsultation were designed to respond to aspects related to follow up and management in processes related to clinical care. In this way, telemonitoring has established as a key modality, especially in the management of chronic non-communicable diseases such as diabetes, hypertension and chronic kidney disease. Using defined clinical criteria, hospitals select patients who are candidates for remote follow-up, scheduling subsequent appointments that allow them to monitor the evolution of their health status without the need for physical displacement.

On the other hand, remote management has expanded the administrative dimension of telehealth. From the so-called contact center, teams of medical and non-medical operators manage appointments, test results, notifications, and logistical follow-ups that traditionally fell to the patient or their family. This approach has had a tangible impact on the user experience, reducing the frustration associated with complex in-person processes and providing a sense of support that strengthens the bond between the healthcare system and the public.

1. Clinical Telemonitoring

- 82% contact success rate, with 1,180 effective interactions daily.
- It represents 28% of the total Contact Center activities.
- Direct impact on the reduction of clinical risks, continuity of care and coordination with the Medical Emergency System (SEM 132)

2. Telemanagement and Humanization (50 non-medical teleoperators)

- 52% of successful managements correspond to calls to approach family members
- **Daily average:**
 - 2,179 successful calls for hospitalization updates
 - 200 appointment notifications
 - Management of vaccination records in pediatric population

National Volume of Interactions

- Total calls: 1,108,310
- Effective interactions: 698,235
- Daily average:

- 6,676 calls per day
- 4,206 effective interactions per day

Benefited population

- Rural and urban users
- Patients with and without health insurance coverage
- 100% coverage of hospital discharges nationwide.

Clinical Success Story: Risk Reduction

An emblematic case occurred on August 30, during a post-discharge telemonitoring call with a 56-year-old patient from Cantón Santa Isabel who had undergone spinal surgery (L4-L5 arthrodesis):

- The teleconsulting doctor identified serious symptoms: shortness of breath, vomiting, dehydration.
- Emergency extraction was coordinated with the Medical Emergency System (SEM 132).
- Transfer to a higher-level referral hospital where acute bilateral pulmonary thromboembolism was diagnosed.
- In less than 12 hours, the patient received anticoagulation treatment in the ICU, preventing a fatal outcome.

Conclusion of the case: Clinical telemonitoring is a critical tool for patient safety, extending hospital protection to the home.

Current challenges: a route with structural obstacles

1. Interoperability

Despite the progress of the SIS (75% utilization in the National Health System), local systems still operate in data silos. The lack of a unified data model and the absence of an official national HL7 FHIR guideline hinder the development of a single national electronic health record.

2. Technological Infrastructure and Connectivity

Currently, a dedicated 5Gbps link is available for the service; however, achieving optimal connectivity and having the appropriate equipment readily available is still a challenge. Factors such as obsolescence and the systematization of preventive and corrective maintenance for all equipment nationwide are other challenges that have been faced.

3. Legal and Regulatory Framework

El Salvador has Teleconsultation Procedures,³ Reference Compliance, Return, and Interconsultation Guidelines,⁶ the Electronic Medical Record Regulations,⁴ and a Data Security Law.⁷ However, the inclusion of other regulatory and legal frameworks will strengthen shared legal responsibility, the regulation of third-party technology platforms, and informed consent.

4. Financial Sustainability

Defining the national strategy, including telehealth, will allow for planning the regular budget and future financing plans, which will guarantee the sustainability of the project in the medium and long term.

Future perspectives: towards a digital health ecosystem

El Salvador has successfully consolidated a robust and operational national telehealth model based on an Integrated Health System that prioritizes continuity of care, clinical safety, and the humanization of services. The Contact Center has evolved from a pilot project into an essential component of the system, managing nearly 700,000 effective interactions in six months.

Among the future opportunities are:

- Consolidation of the regulatory and legal framework
- Expansion of modalities such as telerehabilitation and telemonitoring
- Prioritization of rural and vulnerable populations
- Integration of artificial intelligence for risk stratification and diagnostic support
- Strengthening of digital governance

The proactive model based on medical personnel and the local development of computer tools is the key that has allowed services to reach the entire population, regardless of their geographical location.

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It is declared that all authors participated in the development and preparation of the work, with the responsibilities of each author in the production of the article detailed below:

- Research, drafting, writing, and critical reading.
- Dr. William Hoyos: conception and design of the study, critical review of the intellectual content.
- Dr. Edgar Escobar and Dr. Herber Trejo: document analysis and technical drafting of the manuscript.
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