Uruguay's National Electronic Health Record System

DIGITAL HEALTH CASE STUDIES

EDITION 02

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ABBREVIATIONS

AGESIC	Agency for e-Government and an Information and Knowledge Society
ASSE	State Health Services Administration
CCLIP	conditional credit line for investment projects
CDA	clinical document architecture
EHR	electronic health record
HCEN	National Electronic Health Record
ICT	information and communications technology
IDB	Inter-American Development Bank
JUNASA	National Health Board
MDS	minimum data set
MEF	Ministry of Economy and Finance
MSP	Ministry of Public Health
My HCD	My Digital Health Record
SMU	Medical Union of Uruguay
SNIS	National Integrated Health System
SNOMED CT	Systematized Nomenclature of Medicine–Clinical Terms
UNAOID	National Object Identifier Assignment Unit
URCDP	Personal Data Regulatory and Control Unit

EXECUTIVE SUMMARY

In 2007, the Uruguayan government launched a health sector reform that led to the creation of its National Integrated Health System (SNIS, from the Spanish). From the SNIS' earliest days, the need—both politically and logistically—for the National Electronic Health Record (HCEN, from the Spanish) was clear. Such a system would allow health care providers to access the electronic health records of all patients in Uruguay, regardless of the provider or facility that had initially collected the information and regardless of the user's geographic location.

To turn this vision into a reality, a process was started that led to the creation of the Salud.uy portal in 2012. Two years later, strategic guidelines were proposed to design and implement a national EHR that would better allow citizens to exercise their rights to high-quality health services, access their clinical information, and have that information available at the point of care. However, several challenges were identified. Among the most significant were the available technology, connectivity, interoperability, program funding, and change management. Under this project, health organizations and providers in Uruguay could use their own information systems, but the different systems needed to comply with certain standards for exchanging health data. Other key features of the project were a federated architecture,[3] a long-term vision, governance by a specific entity, and alignment with the SNIS strategy.

The central platform was designed to be scalable, flexible, user-friendly, integrated, and readily available, allowing for the instant and secure exchange of clinical data stored at the institution where a patient received care.

Various stakeholders consider the Uruguayan HCEN system's implementation strategy—with its focus on integrating the entire ecosystem[4] —to be one of its main strengths. Another key factor in the program's successful implementation was a conditional credit line (CCLIP)[5] received from the Inter-American Development Bank (IDB) for an estimated US$21 million, earmarked for creating and managing the central platform as well as change management and ecosystem integration processes. The CCLIP laid out five stages and an action plan specific to each type of health care institution.

The existing regulations also had to be adapted. Given the sensitive nature of health data, the issue of security was approached through a focus on information's integrity, confidentiality, and availability. It was also established that, unless a patient specifies otherwise, a physician may access their clinical information without their explicit consent, as this authorization is considered to be implied in requests for care.

In September 2019, the HCEN program launched an application called My Digital Health Record (My HCD, from the Spanish, *Mi Historia Clínica Digital*), which citizens can use to access their medical information online. The application has not yet reached mass adoption, according to the latest available data. As of mid-2021, the platform had received a total of 43,431 visits from 7,206 users (out of a pool of 2,700,000 potential users).[6] Salud.uy's most recent assessment in 2020 found that the HCEN's primary objectives have been achieved. By the end of 2020, 95,298,354 clinical events had been uploaded to the HCEN, representing 80 percent of the country's health care activities, and 95

[3] In a federated architecture, the different components (in this case, the clinical information collected by providers) are independent, standalone units that also all work together smoothly as a single system.

[4] This document uses the term ecosystem to mean all the actors that play a role in digital health, including academics, providers, citizens, professional associations, and government entities outside the health care sector.

[5] The Conditional Credit Line for Investment Projects (CCLIP) is an IDB financing option for programs involving one or more sectors. It is meant to streamline processes to prepare and approve loans, reduce loan-processing costs; and reward borrowers for good performance in executing projects.

[6] Data as of June 30, 2021.

percent of Uruguay's population had at least one clinical document on the platform.[7]

The assessment also revealed that both users and professionals see clear advantages in the new system: there were fewer questions about previous consultations or illnesses, fewer duplicate or unnecessary tests, and more efficient care. Providers reported improved data quality, while the Ministry of Public Health (MSP, from the Spanish) reviewed it favorably for its ability to provide higher-quality information.

During the public health crisis caused by the COVID-19 pandemic, the HCEN made it possible to produce high-quality, real-time data on COVID-19 (lab results, diagnoses, case follow-ups, bed occupancy rates, and saturation of health services) that was used to develop solutions such as the Coronavirus UY mobile app.

Going forward, the HCEN will focus on seven key objectives:

1. Making continued progress on clinical data structuring
2. Simplifying the National System of Medical Certifications issuing process
3. Implementing a national electronic prescription system
4. Adding patient summaries
5. Optimizing the secondary use of data, both for managing population health and generating high-quality information that informs public policy
6. Developing new digital health technology solutions
7. Cultivating more maturity among providers in the area of cybersecurity

For this study, we surveyed actors from several fields—health, e-government, academia, civil society organizations, and IT providers, among others—who highlighted these lessons learned during the process:

1. The project's joint development by actors from across the health care ecosystem
2. The development of a technological platform of their own
3. The platform's adoption as a state policy
4. The platform's implementation as a presidential policy, with a defined institutional framework

The HCEN's implementation in Uruguay can be considered a success because of its functionality, interoperability, nationwide implementation—in both the public and private spheres, which is uncommon in the region—and commitment to putting the patient/user at the center of the strategy, making them the owner of their medical records.[9]

Keywords: national electronic health record; HCEN; digital transformation; National Integrated Health System; Salud.uy; AGESIC; MSP; Uruguay; health; digital health.

[7] Uruguay has a population of 3,444,000 people, with a life expectancy of 73 for men and 80 for women, and an infant mortality rate of 6.07 per 1,000 live births. https://www.who.int/data/gho/data/countries/country-details/GHO/uruguay?countryProfileId=8e541240-6336-4e89-a982-8cabe671b690

[8] In 2020, 84 percent of patients reported that their physician pulled up their digital medical history quickly and did not need to ask questions about previous consultations or illnesses. Meanwhile, 9 percent reported that their physician was unable to access this information quickly and had to ask them about their medical history. Nine out of 10 users (90%) agreed that access to their digital medical history would improve care during consultations. *Source*: Pablo Orefice, *Uruguay: Un camino hacia lo digital*. 2021

[9] Ruling 12/018 of the Personal Data Regulatory and Control Unit (URCDP) .

CASE STUDY INTERVIEWEES[10]

Name	Title
Jorge Abín	CIO of Médica Uruguaya and Honorary Board Member of the Agency for e-Government and an Information and Knowledge Society (AGESIC; 2006–2020)
Miguel Acerenza	Former Deputy Technical Director of Asociación Española (2013–2019)
Rosario Berteretche	Medical Coordinator of Salud.uy and Former Director of Information Systems of the State Health Services Administration (ASSE; 2014–2020)
José Clastornik	Former Executive Director of AGESIC (2006–2020)
Arturo Echevarría	Former President of the National Health Board (JUNASA; 2016–2020)
Roberto Fernández	Former Lead Specialist at the Inter-American Development Bank (IDB)
Félix González	Former President of the State Health Services Administration (2009–2010) and Former Advisor to Salud.uy
Luis González Machado	Former Director of JUNASA (2020–2021), Former Director and Advisor to the Uruguayan Chamber of Health Institutions and Companies (2011–2019), and Former Member of JUNASA (2015–2019)
Gustavo Grecco	Former President of the Medical Union of Uruguay (SMU) (2019–2021)
Nicolás Jodal	CEO of GeneXus and Coordinator of the Coronavirus UY app development team
María Julia Muñoz	Former Minister of Public Health (2005–2010)
Pablo Orefice	Former Director of Salud.uy and Senior Digital Health Consultant at the IDB
Luis Pacheco	Critical Care Physician, Member of the SMU, and Participant in Salud.uy task forces
Hebert Paguas	General Director of the Presidency of Uruguay and Executive Director of AGESIC
Alejandro Pareja	Senior State Modernization Specialist at the IDB
Daniel Salinas	Minister of Public Health
Mario Sánchez	Lead Social Protection and Health Specialist at the IDB

[10] All quotes included in the case study were taken from the interviews conducted by the team.

1. INTRODUCTION

1. INTRODUCTION

1.1. Background and Examples from Around the World

When Uruguay's HCEN project began to take shape, several countries in Europe—such as Denmark, Austria, Spain, Sweden, and the United Kingdom—and other regions—such as Australia and Canada—had already made significant headway in implementing electronic health record (EHR) systems.

An analysis of the best practices of these countries' models identified nine success factors to guide the Uruguayan initiative: patient-centered information systems; alignment with the national health system strategy; national-level coordination; a long-term vision paired with intermediate goals; added value for all stakeholders, and success through collaboration with them; legal certainty to protect data and patients; knowledge management; qualified professionals working on the project; and, finally, financing.[11]

1.2. SNIS: A System That Paved the Way for the HCEN

In 2007, Uruguay passed a reform that changed the model for managing, providing, and funding health care. Law 18211 created the country's National Integrated Health System (SNIS, from the Spanish), which recognizes health as a citizen's right that should be guaranteed and financed by the social security system. The same regulation established the National Health Board (JUNASA, from the Spanish), which is under the authority of the MSP and tasked with administering the national health insurance scheme and ensuring that the SNIS's strategic objectives are met.

Universal coverage is central to the SNIS model, under which users receive complete or partial care services from the public and private health care providers of their choice. For such a system to work, all institutions had to be integrated, offer the same basic package of services in addition to comprehensive care, and have a contract with JUNASA. These elements laid the groundwork for implementing the HCEN.

Since the SNIS's conception, the government had foreseen a need for the HCEN, based on the belief that a patient-centered system ensuring continuity of care required knowledge of individuals' medical history. Furthermore, given that patients could now be seen by any of the numerous providers in the system, it was important to make sure that patients' medical records could be easily pulled up as necessary.

> ***"The SNIS aims to enshrine the right to health that all Uruguayans enjoy. Under this conception, there is a right to know the health status and history of diseases of any person who participates in the system, and this right is enshrined in the SNIS legislation as a basic human right. EHRs are among the tools best suited to protect it."*** María Julia Muñoz, Former Minister of Public Health (2005–2010)

[11] Salud.uy, *Líneas estratégicas para la definición, diseño e implementación de la Historia Clínica Electrónica Nacional para el Sistema de Salud en Uruguay*, https://docplayer.es/85454570-Resumen-ejecutivo-mayo-2014.html

1.3. Digital Transformation of the Uruguayan State and How It Was Applied to the Health Sector

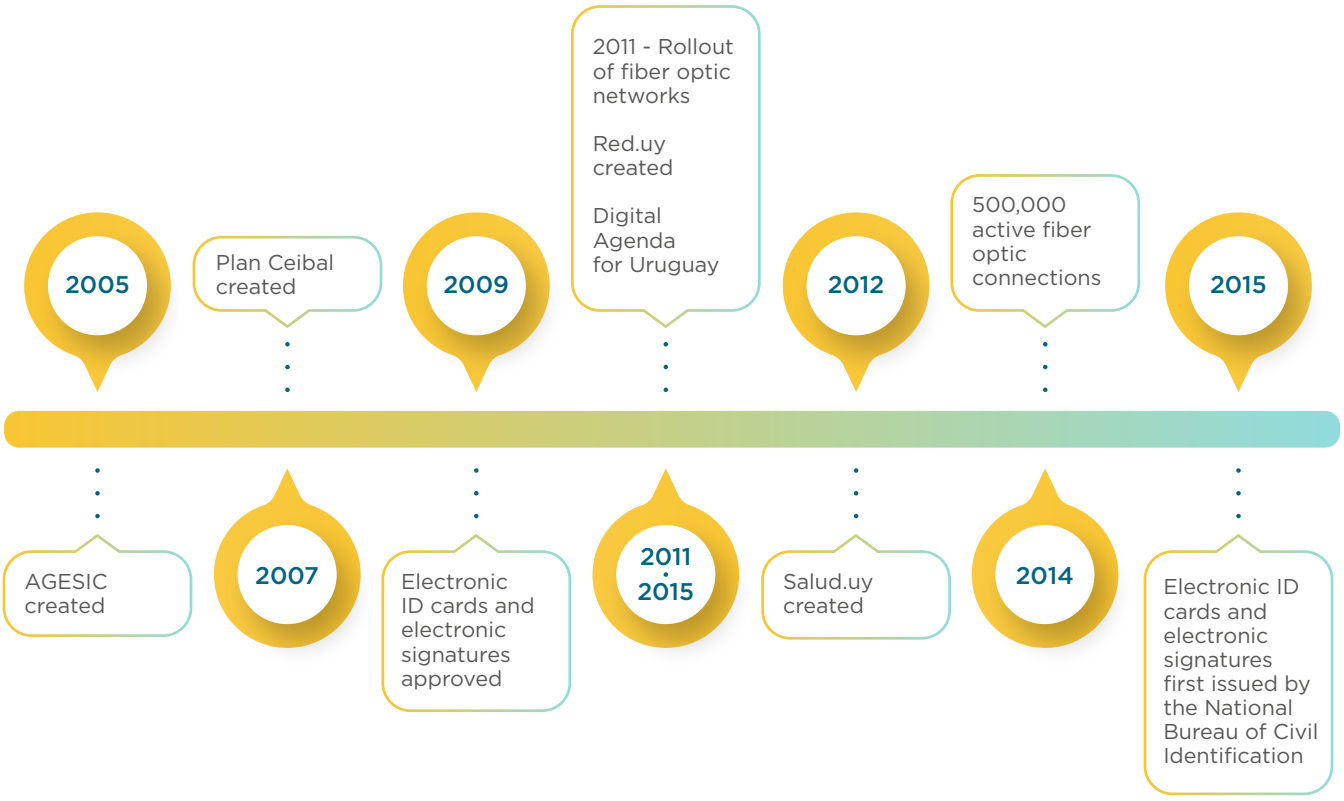
The greater context of digital transformation in Uruguay—which has become a state policy—was a decisive factor that opened the door for the HCEN's implementation.

Starting in the 2000s, new ways of thinking about the state and how it should be structured began to emerge, with a shift toward a governance model that used technology as a catalyst for transformation and made ordinary citizens the central focus. As shown in Figure 1, which traces the timeline of digital transformation in the Uruguayan state and health system, the creation in 2005 of the Agency for e-Government and an Information and Knowledge Society (AGESIC, from the Spanish) was key to this initiative. This agency's mission is to improve citizen services through information and communications technology (ICT) and promote the development of an information society.

The transformation also included the education sector, with the creation of the Plan Ceibal in 2007. This initiative aimed to deliver a laptop to every child and adolescent in Uruguay's public education system and offer free internet access through their schools. Plan Ceibal also provided programs, educational resources, and teacher training to transform teaching and learning practices.

Another important step was the passage of Law 18331[13] on the Protection of Personal Data in 2008, which would prove helpful in overcoming a major obstacle during the HCEN's planning phase. This regulation states that the actions of those

FIGURE 1:
Timeline of Digital Transformation Milestones in Uruguay and Its Health Sector[12]



[12] *Source*: Author's compilation from regulations and official publications.

[13] https://www.impo.com.uy/bases/leyes/18331-2008

responsible for databases, both public and private, shall be governed by principles of legality, reliability, purpose, prior informed consent, data security, confidentiality, and accountability. Law 18331 also created the Personal Data Regulatory and Control Unit (URCDP, from the Spanish).

Additional parallel developments were vital to the HCEN process's success. In 2009, Uruguayan lawmakers approved the introduction of electronic identity cards and electronic signatures,[14] although the cards were not issued by the National Bureau of Civil Identification until 2015. In 2011, the deployment of fiber optic networks that enable higher-speed internet access and data transfer heralded a new era in how information reaches people. By the time the proposed HCEN's main features were being defined in 2014, 44 percent of Uruguayan households had been connected to a network, for a total of 500,000 active connections.[15]

Also in 2008, the AGESIC set up Red.uy, a high-speed, high-availability private data network connecting all of Uruguay's government agencies. In 2011, the agency created the e-Government Platform (commonly known as the "PGE") to integrate different government services. Within the platform's framework, AGESIC developed the Interoperability Platform, which later played a key role in the HCEN's creation.

The AGESIC also released the 2011–2015 Digital Agenda for Uruguay,[16] an initial roadmap for a national policy on building an information and knowledge society.[17] This document identified ICT as holding "great potential to improve health services management." It also listed hospital connectivity and computerized medical records as factors that reduce costs and enhance patients' quality of care. More specifically, the digital agenda set 2012 as the target for developing and managing an EHR platform and creating a health data network integrated with the existing academic network. It was in this context that Salud.uy was born.

1.4. The Creation of Salud.uy

On October 4, 2012, the Ministry of Economy and Finance (MEF) and the MSP signed a framework agreement with AGESIC that created the Salud.uy program. As a joint initiative of the Presidency of Uruguay, the MSP, the MEF, and AGESIC, Salud.uy pushes for increased ICT use in the health sector to improve service quality and support the SNIS.[18]

Salud.uy's origins are tied to the development of Uruguay's HCEN, although it carries out complementary projects as well. In addition to[19] defining the standards, health informatics guidelines, and technical and regulatory context needed to implement the HCEN, Salud.uy brought health system stakeholders together to strategically lay out what patient-centered health informatics would look like.

Today, Salud.uy is responsible for operating the system that exchanges health information in a secure and trustworthy environment. It is also tasked with developing the health system's technological infrastructure and horizontal information systems and enforcing the EHR system's rules for operations and access. Finally, Salud.uy makes tools for health information interoperability available to providers, manages databases, and sets and ensures compliance with policies regarding the information that is handled.[20]

[14] https://www.impo.com.uy/bases/leyes/18600-2009

[15] In Uruguay, the government-owned company ANTEL is responsible for the mass deployment of fiber optic infrastructure. In 2014, 44 percent of households were connected to a fiber optic network, increasing to 81 percent by 2019. See https://www.antel.com.uy/institucional/nuestra-empresa/resena-historica

[16] https://www.gub.uy/uruguay-digital/sites/uruguay-digital/files/documentos/publicaciones/Agenda%2520Digital%25202011-2015.pdf

[17] https://www.gub.uy/agencia-gobierno-electronico-sociedad-informacion-conocimiento/politicas-y-gestion/trabajamos-sociedad-informacion

[18] https://www.gub.uy/agencia-gobierno-electronico-sociedad-informacion-conocimiento/politicas-y-gestion/convenios/ministerio-salud-publica-msp-ministerio-economia-finanzas-mef-agesic

[19] https://centrodeconocimiento.agesic.gub.uy/web/salud.uy/terminolog%C3%ADa

[20] https://www.gub.uy/agencia-gobierno-electronico-sociedad-informacion-conocimiento/politicas-y-gestion/convenios/ministerio-salud-publica-msp-ministerio-economia-finanzas-mef-agesic

2. URUGUAY'S HCEN

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2.1. The Decision to Create the HCEN

The SNIS's creation in 2007 produced a resolve to establish a single information system usable by all providers. It was agreed that while providers could use their own information systems, these systems would be built on a common set of standards to ensure they could exchange data with each other.

According to José Clastornik, AGESIC's executive director from 2006 to 2020, gathering support for the HCEN required strategies with both political arguments—such as achieving equity in health—and technical arguments—such as embracing cutting-edge solutions. While discussions on how to proceed were underway, consultants were hired to prepare a document titled "*Strategic Guidelines for Defining, Designing, and Implementing a National Electronic Health Record for the Uruguayan Health System.*"

The report concluded that the timing was excellent for the government to implement a national EHR system that would honor citizens' rights (to quality health services, access to their clinical information, and data availability at the point of care). The document also defined the project scope, as shown in Table 1.

While the state's digital transformation initiatives and general ICT trends in health care helped lay the foundation for the HCEN, public and private health workers' knowledge and experience implementing other EHR projects were valuable as well. A growing awareness of the importance of e-health in the academic sector coupled with its willingness to train future professionals to use such a system also worked in the HCEN's favor. The stability of the country's rule of law and the fact that the Salud.uy program was the driving force behind the process also played important roles.

However, the consultants identified weaknesses, such as disparities in the different institutions' management models and use of ICT, and varying levels of readiness (budgetary, financial, training, regulatory, and technological) to participate in the project. Other factors worth noting were inconsistencies in how different leadership bodies managed and applied ICT, used data, produced information, and generated new knowledge.

In his first speech after taking office in 2015, Uruguayan president Tabaré Vázquez gave the HCEN a political boost when he stated that "the creation of the electronic health record and referral management system [would] be completed" during his administration. A physician by training, Vázquez viewed the project as a key condition for improving health care quality, according to former minister of public health María Julia Muñoz (2005–2010). She affirmed that "Vázquez saw it as essential to improving the quality of care. Essential because it would mean that providers would always be able to access the records of the patients they see, and also because each patient who comes to a consultation has the right to have information about all the health events they have experienced in their life."

TABLE 1:
Project Scope of Uruguay's HCEN System

Users and patients	All residents of Uruguay and all individuals who have received health care.
Service providers	All providers, whether public or private, comprehensive or partial.
Health centers and services	All entities authorized to provide care in Uruguay: hospitals, polyclinics, emergency medical services, doctor's offices, community pharmacies, laboratories, and clinics.
Health professionals and technicians	All personnel of licensed health centers or services.
Content of the HCEN	Reports and documents established previously or as required by MSP regulations or other provisions.
Use of the information	• The objective of the project is health care. • In accordance with future regulations, information will be used for knowledge management, public health, and research. • Appropriate security measures will be taken when accessing and processing information.

Source: From Table 3.1 in the executive summary of *Strategic Guidelines for Defining, Designing, and Implementing a National Electronic Health Record for the Uruguayan Health System* (2014), at https://docplayer.es/85454570-Resumen-ejecutivo-mayo-2014.html.

2.2. What HCEN Is: Objectives, Stakeholders, and Team Profile

Decree No. 242/017 defines the HCEN as "a set of people and institutions, procedures, and technologies that interact to make it possible to exchange medical information and achieve continuity of care for users and patients."

The decree also established that all health care providers, whether public or private, had to implement an EHR—a comprehensive set of electronically processed medical, social, and financial data on a person's health from their birth until their death, serving as the functional equivalent of the paper medical record—for each citizen. It also established that the providers would be responsible for its completeness and security. The decree also set forth the EHR's governing principles: purpose, reliability, completeness, confidentiality, information, and accessibility.

The HCEN's main objective is to "promote and improve the continuity of the care process for users of the Uruguayan health system"[21] and improve health care quality at the same time. To this end, two crucial strategic objectives were defined: all service providers must use an EHR compliant with standards that ensure interoperability, and the HCEN must create a reliable environment that allows secure access to clinical information during patient care or when requested by a patient.[22]

[21] https://www.gub.uy/agencia-gobierno-electronico-sociedad-informacion-conocimiento/node/312

[22] Salud.uy, *Strategic Guidelines for Defining, Designing, and Implementing a National Electronic Health Record for the Uruguayan Health System,* https://docplayer.es/85454570-Resumen-ejecutivo-mayo-2014.html.

To achieve this, Salud.uy developed a mechanism to standardize and provide access to health care users' complete medical information when they need care, regardless of the user's health care provider and geographic location. In particular, the mechanism makes it possible for health care personnel to access patients' digital health records during appointments, medical care, and emergencies. Similarly, it provides patients access to their medical information. Physicians can thus connect to the system to learn the medical history, diagnoses, and previous consultations of the patients they are seeing, which results in better care.

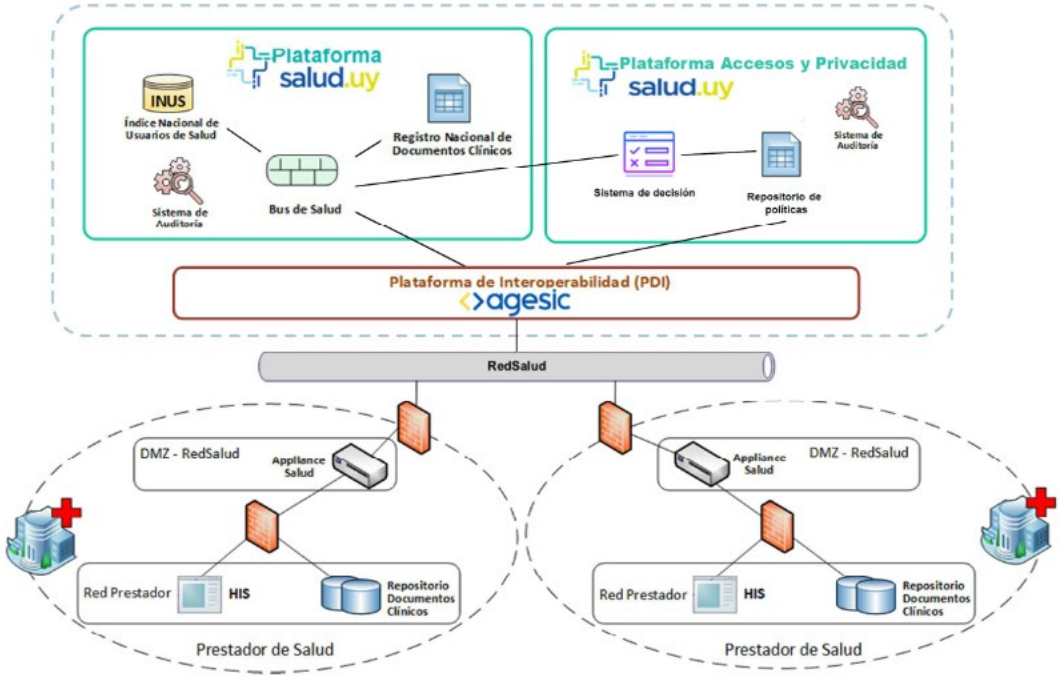
In this context, the decree ordered the creation of a platform adhering to the state's security and interoperability policies to "ensure continuity of care through access to and consultation of all electronic health documents of a person."[23] Its use is mandatory for all providers.[24]

In response, a private, high-speed data network called Red Salud was created to connect all providers, as shown in Figure 2.

Red Salud's design was based on the government's experience with Red.uy,[25] which connects government agencies and features rules of use, security, and a single point of access to public consumer services. Some components such as the government interoperability platform and authentication mechanisms were adapted to connect public and private providers to the new Red Salud. The network has its own security policies—with active monitoring—and regulations so health sector stakeholders can be confident that the network receiving their data is private and operates under strict conditions of security and confidentiality.

242/017 also defined the institutions' access management responsibilities and the process for

FIGURE 2: Red Salud



Source: Agesic[26].

[23] Red Salud has its own sector-specific interoperability platform, which runs parallel to the state's interoperability platform.

[24] https://www.gub.uy/agencia-gobierno-electronico-sociedad-informacion-conocimiento/comunicacion/noticias/decreto-hcen-todos-prestadores-salud

[25] https://www.gub.uy/agencia-gobierno-electronico-sociedad-informacion-conocimiento/que-es-reduy

[26] The diagram shows the relationship between the main infrastructure components and providers' systems. https://centroderecursos.agesic.gub.uy/web/arquitectura-salud.uy/inicio/-/wiki/Arquitectura+para+Salud/Arquitectura+Tecnol%C3%B3gica

exchanging medical information. It further established that JUNASA is responsible for ensuring compliance with these regulations.

Prior to the start of the HCEN project, two Salud.uy governance bodies—its steering committee[27] and advisory council—played a central role in moving the plan forward and making the case for its importance.[28] Their efforts were supported by both task forces and nationally and internationally recognized experts.

Several stakeholders point to the work strategy and the integration of the entire ecosystem as strengths that were pivotal to the process of implementing Uruguay's HCEN and successfully implementing the plan. In a series of interactive sessions, members of the task forces were encouraged to share their perspectives and take an open-minded approach, allowing them to maximize synergies between their diverse know-how, skills, and interests. One group, the Medical Union of Uruguay (SMU, from the Spanish), explicitly decided to be actively involved, announcing at its 2014 medical convention its decision to "widely adopt" an EHR system, which it considered to be a tool "that contributes to improving medical care."[29]

2.3. HCEN Architecture and Interoperability Standards

Choosing how to structure the HCEN proved a challenge. Ultimately, a federated system built on top of Red Salud and in line with international health information exchange standards was chosen. It was considered to be the only model that met all the requirements, in contrast to centralized and decentralized systems. Furthermore, it was the system that received the fewest objections in the consulting workshops. The platform's guiding principles were scalability, flexibility, usability, integration, and availability.

The SNIS has a total of 44 comprehensive providers and insurers plus another three partial public services that look after Uruguayans' health. **60 percent of the country has private insurance coverage, while the other 40 percent uses public insurance.**[30] This landscape meant that mandating a single information system for all organizations—in which providers would pursue their individual business strategies and continue competing to enroll new customers—was never a feasible option.

Other benefits of interoperability include the ability to maintain a standard or best practice for storing data, provide access to members, and send reports to the regulatory authority. Allowing providers to use their own systems also gave them the freedom to devise customized solutions for specific problems.

For these reasons, it was decided that each health service provider would develop its own information system, either in-house or by hiring a third party. In turn, the mechanisms for sharing clinical information had to be established. **These common mechanisms ensure that, given the way that the system is structured, as shown in Figure 3, whenever a patient receives medical care—regardless of whether the provider is in the same network—the facility's health care team is able to access the patient's complete medical history.** During consultations, a digital document is generated that is then stored by that organization. An additional record is uploaded to the HCEN platform, although the information is not necessarily stored there. As explained above, information is stored in the repositories of different providers, each of which has its own computerized system and is connected to the HCEN platform.[31]

[27] Members: the MSP, JUNASA, AGESIC, the MEF, and the Presidency of Uruguay.

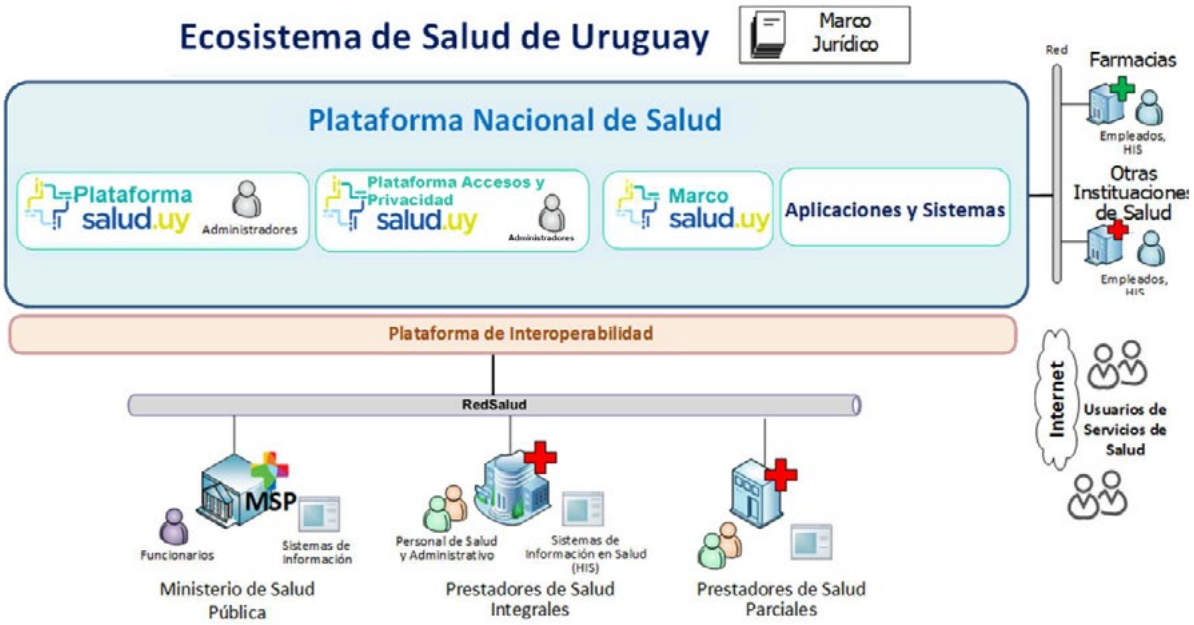
[28] Members: the ASSE; Social Security Bank (BPS); Chamber of Health Care Providers; Chamber of Emergency and Out-of-Hospital Medical Care (CEAMEX); Uruguayan Medical Association (CMU); colleges of nursing, engineering, and medicine; Federation of Medical Providers of the Interior (FEPREMI); National Resource Fund (FNR); the SMU; Uruguayan Society for Standardization, Exchange, and Integration of Health Services Data and Information (SUEIIDISS); National Movement of Public and Private Health Care Users (MNUSPP); and a representative from the Inter-Union Assembly of Workers–Workers' National Convention (PIT-CNT).

[29] http://www.convencionmedica.org.uy/9cmn/grupos/g4/2014.06.07.%20Grupo%204.%20Informe%20Plenario%20ok.pdf

[30] https://www.gub.uy/ministerio-salud-publica/sites/ministerio-salud-publica/files/documentos/publicaciones/Informe%20Cobertura%20poblacional%20del%20SNIS%20seg%C3%BAn%20prestador%202018.pdf

[31] E. García and M. Rivero, *Engineering thesis on the Uruguayan Health Self-Management System.* (December 2020).

FIGURE 3:
HCEN Architecture



Source: Knowledge Center, AGESIC.

From a technological perspective, the HCEN is an interoperability project. The core structure of its system is based on international standards for exchanging clinical information.

The model's syntactic and technical standards are based on HL7[32,33], version 3, with the clinical document architecture (CDA)[34] standard for defining clinical documents, and HL7 version 2.xml[35] messaging standard for exchanging these documents. At the core of the HCEN's design is the CDA clinical information model, defined for a set of clinical events and based on a strategy using the minimum data set (MDS) necessary to support continuity of care.

For the HCEN's semantic aspects, SNOMED CT[37] (Systematized Nomenclature of Medicine–Clinical Terms)[38] was chosen by a majority, as this comprehensive, multilingual collection of clinical terminology for EHR coding is considered to have the greatest breadth, precision, and prevalence. Using this system, health professionals can encode, retrieve, report, and analyze clinical data to represent information appropriately, accurately, and unambiguously.[39]

Organizationally, the information exchange processes were transformed based on the international recommendation of Integrating the Healthcare Enterprise (IHE),[40] using the IHE's cross-enterprise document sharing (XDS)[41] profile to define the model.

[32] https://www.hl7.org/

[33] To comply with the law, public and private providers must follow the guidelines set by the MSP, which are based on these HL7 and IHE standards.

[34] http://www.hl7.org/implement/standards/product_brief.cfm?product_id=7

[35] https://www.hl7.org/implement/standards/product_brief.cfm?product_id=275

[36] https://centrodeconocimiento.agesic.gub.uy/documents/207224/425682/Gu%C3%ADa+de+implementaci%C3%B3n+CDA+M%C3%ADnimo+HL7+V3+CDA+-+R2+-+Versi%C3%B3n+2.2.pdf/0d6b8cd0-7cf5-5f5d-400e-e2f224ad31b6

[37] Salud.uy, "SNOMED CT," https://www.gub.uy/agencia-gobierno-electronico-sociedad-informacion-conocimiento/node/346

[38] *Guía de Introducción a SNOMED CT*. https://centrodeconocimiento.agesic.gub.uy/documents/207224/425682/Gu%C3%ADa+de+introducci%C3%B3n+a+SNOMED+CT.pdf/abf1cdf7-0326-20d2-8da0-518334039ed8

[39] In accordance with SNOMED CT editorial guidelines, Uruguay releases a new edition every six months.

[40] https://www.ihe.net/

[41] https://wiki.ihe.net/index.php/Cross-Enterprise_Document_Sharing

To ensure the integrity of the data being exchanged, information from across the system was used to create master tables that helped standardize its use. There are master tables to identify individuals, institutions, inputs (medications, lab results, imaging studies), and services.

As shown in Table 2, Uruguay's National Object Identifier Assignment Unit (UNAOID, from the Spanish)[42] is the agency responsible for defining the object identifiers in these master tables.

> ***"We worked closely with the MSP to make the master tables. One result of our work that I consider fundamental was a governance scheme with the different stakeholders: with associations of mutual insurance companies or health insurance cooperatives; with people from ASSE [State Health Services Administration], academia, and the medical schools; and with subject-matter experts from laboratories and chemists. We set benchmarks for different areas and studied how to best use informatics to identify the matters that the committee was focused on. As a result of that governance, the platform's interoperability standard was created after two or three months of analysis."*** Félix González, former president at ASSE (2009–2010) and former advisor to Salud.uy.

2.4. Privacy and Security in the Unified HCEN Model

For the HCEN to become a reality, providers needed to move from paper to digital medical records, which brought security, privacy, and confidentiality challenges. These challenges were present from the very beginning and were thus taken into account while designing the HCEN's architecture and undertaking the necessary regulatory reform.

Given the sensitive nature of health data, security was ensured through a three-pronged approach. The first focus was data *integrity*, meaning all generated data must be complete and cannot be

TABLE 2: UNAOID Codes for Personal Identification Document Types

Private Health Care ID Card	69020
Public Health Care ID Card	69019
Social Assistance ID Card	69018
Marine Pilot License (ICAO - CP)	68932
Military ID Card	69017
Border Crossing ID Card or Document	69096
Professional ID Card or License	69015
Police ID Card	69016
Identity Card (ICAO - ID)	68909
Voter Registration Card (ICAO - CC)	68944
Crew Member Certificate (ICAO-AC)	68946
Travel Document - UN 1951 - (ICAO - UN)	68939
Identity Document (ICAO - DN)	68910
Un Laissez-passer (ICAO - LP)	68927
Voter Registration Booklet (ICAO - LC)	68918
Marine Pilot Assistant Booklet (ICAO - LB)	68933

Source: Tabla de Tipos de Documentos. UNAOID. http://unaoid.gub.uy/descargas/especificaciones-identifican-personas.pdf

[42] Documents available from UNAOID. http://unaoid.gub.uy/documentacion.aspx

modified or deleted without a record of the alteration, in accordance with Article 13 of Decree No. 242/017.

To ensure the second focus of data *confidentiality*, Salud.uy's My HCD application allows users to both access their digital clinical information and monitor and configure permissions and privacy settings to control SNIS providers' access to their digital clinical information. The final focus of data *availability* was achieved by making the platform available 24 hours a day, seven days a week.

To control how much of their information outside providers can view, My HCD users can choose from three levels of access: allowing access to health personnel for health care purposes, allowing partial access to predefined providers for a limited time, or allowing access only in emergencies. If the patient does not set a level of access, the physician may access their clinical information without their explicit consent, as such authorization is considered to be implied in requests for care, as mentioned previously.

At the access level, it was established that following identification and authentication processes, physicians may only access patients' clinical information when caring for them in an authorized center and view the information to modify data.

Independent audits ensure the platform's security. As of the end of this case study—seven years after the HCEN network's implementation—various stakeholders concur that there have been no major security incidents.

2.5. Sources of Financing

The first option that AGESIC considered for financing the HCEN was through Uruguay's state coffers, requiring an annual cost of US$4 million. When this proposal was unsuccessful, AGESIC turned to the IDB, which had provided technical cooperation and loans related to its national e-government strategy since 2008.

The IDB was already working on similar projects with countries such as the Dominican Republic, and it saw Uruguay's HCEN project as an extension of its digital transformation strategy to improve public management. The bank thus decided to support the HCEN's implementation and proceeded to outline a program with an estimated total cost of US$21 million, financed by a CCLIP credit line of up to US$18 million. The IDB planned three US$6 million loans, each with a local counterpart contribution totaling US$1 million: the first from 2013 to 2017,[43] the second from 2017 to 2021,[44] and the third from 2021 to August 2024.[45]

The first loan was aimed at setting up a digital network of health service providers, making progress on creating an EHR system with consistent technical and management standards at the national level, and implementing a national imaging system for use on the new network.

The purpose of the second loan was to consolidate the HCEN platform and make it easier for health care providers to produce and exchange clinical information in digital format. The third, meanwhile, was intended to further the objectives of the previous loan and increase the use of medical record data to strengthen high-level decision-making by providers. It would also go toward financing the development and implementation of a national management system for prescribing and dispensing medications.

The IDB has noted that Uruguay met all requirements and deadlines for the deliverables of the CCLIP.[46]

[43] IDB (Inter-American Development Bank), "Proyecto para Gestión de Gobierno Electrónico en el Sector Salud," (IDB), https://www.iadb.org/es/project/UR-L1082

[44] IDB (Inter-American Development Bank), "Proyecto para Gestión de Gobierno Electrónico en el Sector Salud II," (IDB), https://www.iadb.org/es/project/UR-L1143

[45] IDB (Inter-American Development Bank), "Proyecto para Gestión de Gobierno Electrónico en el Sector Salud III," (IDB), https://www.iadb.org/es/project/UR-L1163

[46] "The operation presented in this document is the third and last of this CCLIP, and it cements the achievements of the first two (3007/OC-UR and 4300/OC-UR, implemented between 2013 and 2020)." https://www.iadb.org/projects/document/EZSHARE-1347937280-52?project=UR-L1163

The Uruguayan government decided it would not be the main funder of the health care providers' own platforms, which needed to be self-funded, but that it would provide certain funds for these investments, as well as technical support. In 2013, JUNASA established an investment surcharge,[47] that is, additional funds for institutions that included the HCEN among its line items (alongside infrastructure, equipment, and IT development). This additional funding for developing and implementing the HCEN—which ended in 2017—had a cap of 3.51 percent of providers' capitation revenue,[48,49] as shown in Table 3.

In May 2016, when the surcharge was about to end, the Uruguayan government sent a bill to parliament to authorize a new investment surcharge. The bill also proposed giving special treatment to EHR project-implementation funding. However, the initiative was shelved in 2019 by the finance committee of the chamber of representatives, so it was never implemented.

Other goals defined by JUNASA to support the EHR project's development centered on fines instead of payments. In the case of the Oncology Electronic Health Record—an oncology-specific EHR system that gives a comprehensive overview of cancer patients and helps improve their medical care—an exclusive line item was added for compliance with its implementation.[50]

2.6. Stages of Implementation

In 2017, Ordinance No. 1085, which contains the regulations for implementing Decree 242/017, was issued to establish the HCEN adoption plan that health care institutions were required to follow. It also laid out the details of different processes needed to implement the project in the SNIS. The adoption plan included a classification of health institutions, grouping them according to coverage type—comprehensive or partial, private, or public—and the number of users or members, as shown in Table 4.

Four implementation stages were defined, with a fifth stage added in August 2019. The results of the institutional classification were then used to

TABLE 3:
Investment Surcharge Year by Year: Total Amount Requested by Providers and Total Amount Executed by the MSP for HCEN Implementation and Development

	Amount budgeted (US$)	Amount executed (US$)	Executed/budgeted (%)
2013	95,850,763	11,358,022	11.9
2014	116,793,40	58,005,814	49.7
2015	119,506,228	101,888,616	85.3
2016	128,610,421	121,933,154	94.8
2017	128,610,421	127,524,536	99.2

Source: Author's calculations.

[47] Law No. 18922, passed in 2012, authorized JUNASA to pay an investment surcharge to the Collective Medical Care Institutions that make up the SNIS for investment projects approved by the MSP and the MEF. This surcharge was temporary and could not exceed 3 percent of the value of the individual, collective, and capitation payments. The institutions were required to fund a minimum of 30 percent of the projects with funds not from the investment surcharge. Another condition was that the period for collecting the surcharge for the authorized project could not exceed 12 consecutive months.

[48] Uruguay's health reform brought changes to the payment scheme. The SNIS purchases insurance from comprehensive providers, paying prices based on capitation rates adjusted for beneficiaries' risk profiles, which take into account their age and sex.

[49] The per-person capitation rate is updated annually. In 2021, it was UR$1,267.15.

[50] Established in Ordinance No. 641. In 2018, the government released its adoption plan, with a target completion date of August 31, 2019.

TABLE 4:
Institutional Characterization

Comprehensive provider: more than 50,000 users.[51]
Comprehensive provider: fewer than 50,000 users.
Comprehensive insurers.
Public health services provided by public entities to their own employees and/or third parties: National Police Health Service, National Armed Forces Health Service, State Insurance Bank, Social Security Bank, Hospital de Clínicas "Dr. Manuel Quintela," and departmental health services.
Partial private providers: more than 50,000 users.
Partial private providers - fewer than 50,000 users.
Highly specialized medical institutes.

Source: Ordenanza N°1085.

create an action plan. While the start date for each stage varied by provider type, there were certain shared goals that the different stakeholders had to meet,[52] as shown in Table 5 and Figure 4.

The achievement of these goals—aimed at boosting the use of the interoperability platform—was delayed multiple times and later affected by the COVID-19 pandemic.[53] For this reason, on June 5, 2020, the MSP issued Ordinance 439/020 to extend some of the deadlines of Stage Five of the HCEN adoption plan. In addition, it required public and private health institutions to submit COVID-19 information to the MSP and adopt various digital tools within the framework of the National Coronavirus Plan.

[51] This category includes ASSE as a comprehensive provider.

[52] See Appendixes I and II.

[53] See Appendix IV.

TABLE 5:
Stages and Milestones Established by the MSP for the Initial Adoption Plan[54]

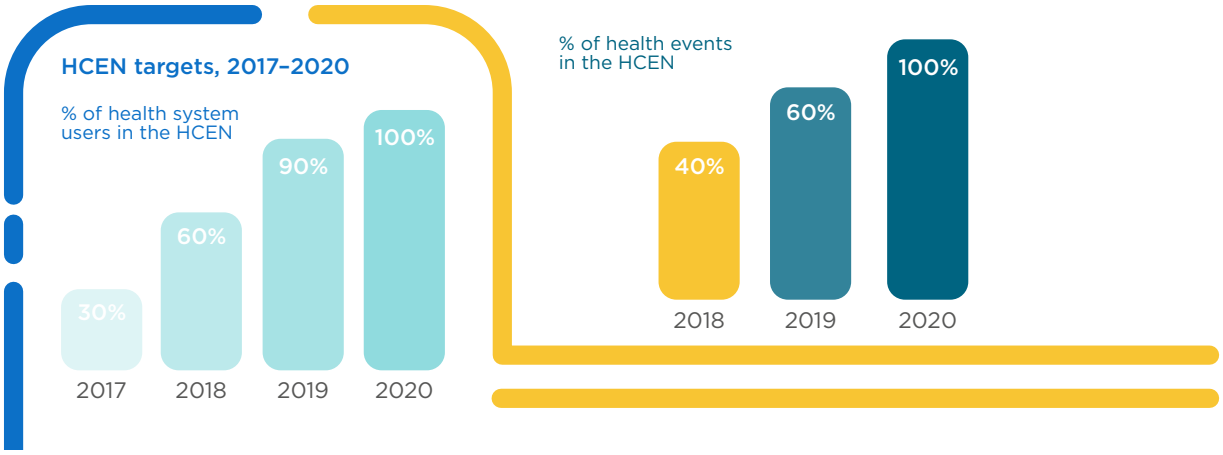
STAGE 1 IDENTIFICATION	The institutions had to prepare their work plan and be able to upload their registry into the user registry. **Milestone 1:** Connect to Red Salud. **Milestone 2:** Send production environments, identification message, and demographic data of health users to the registry of persons.
STAGE 2 STANDARDIZATION	The institutions' systems had to be able to generate documents in accordance with the HCEN technical guidelines provided by Salud.uy and save and store them. Furthermore, the institutions had to ensure that their EHRs generated HCEN-compatible documents. **Milestone 1:** Generate and store electronic clinical documents from one of the organization's services.
STAGE 3 PUBLICATION	The institutions had to develop their IT capabilities in order to register and send user events to the HCEN platform. **Milestone 1:** Have 30% of its users registered in the HCEN platform's events log. **Milestone 2:** Have 60% of its users and 40% of its clinical documents (based on its 2018 events) registered in the events log. **Milestone 3:** Have 90% of its users and 60% of its clinical documents from that year registered in the events log. **Milestone 4:** Have 100% of its users and 90% of its clinical documents from that year registered.
STAGE 4 UNIFIED MODEL	The institutions had to ensure that their computer system could interact with the HCEN. **Milestone 1:** EHR has the ability to access and view the HCEN platform's events log. **Milestone 2:** EHR has the ability to allow access and viewing of clinical document(s) selected by the health care team, regardless of document origin.
STAGE 5 ANALYTICS	The institutions had to achieve semantic interoperability and be able to submit various clinical documents. This stage focuses on CDAs, which are used in data analysis and to improve health care planning and patient care quality. Examples included: centralized urgency/emergency consultation documents, out-of-hospital urgency/emergency consultation documents, nonurgent consultation documents, and hospital discharge documents. To implement the MDSs, three phases were developed:[55] **Phase 1:** Register 40% of the clinical documents it has generated in the events log. **Phase 2:** Increase the percentage of registered documents to 60%. **Phase 3:** Register 90% of these clinical documents in the events log. These documents should be counted according to Salud.uy's implementation guidelines.

Source: Author calculations based on decrees and rules.

[54] See Appendix I.

[55] See Appendix III.

FIGURE 4:
Goals of the HCEN Adoption Plan

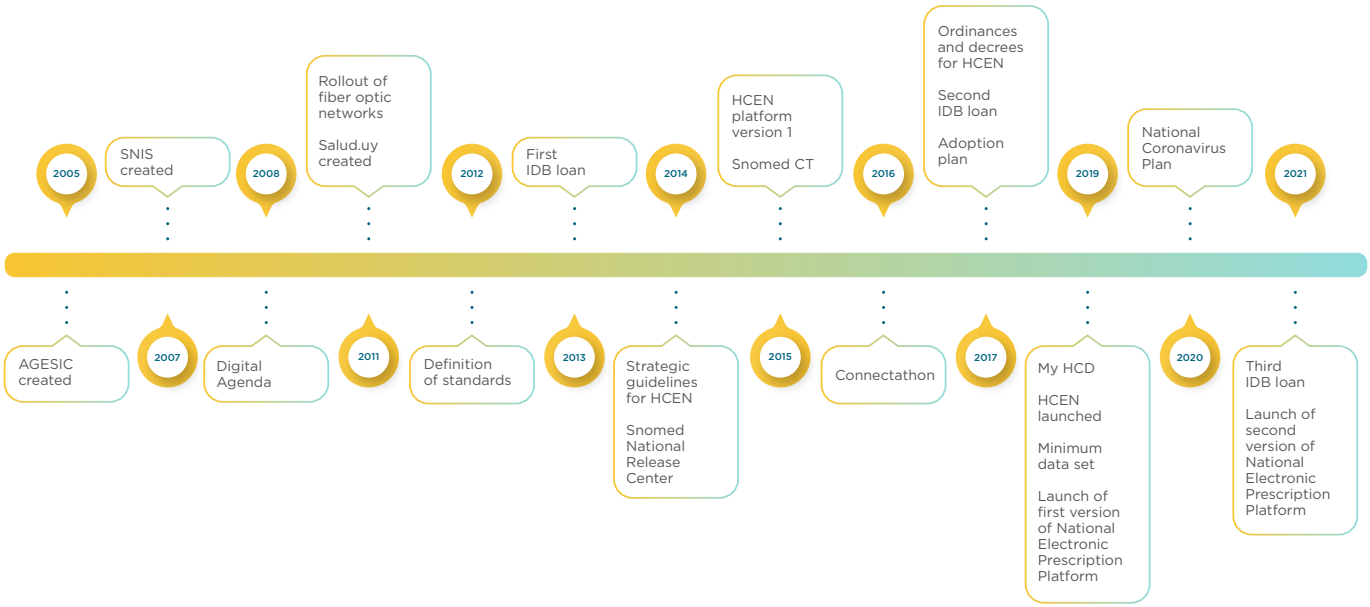


Source: M. Bouza [Engineer, HCEN coordinator], "Uruguay, el camino a una sociedad Digital." https://www.flacso.edu.ec/flax15/graficos/MauricioBouza.pdf

In December 2020, the MSP issued Ordinance No. 457/021 to postpone the deadline for reaching the milestones of Stage Five of the HCEN adoption plan for four months, until April 2021.

Figure 5 shows the main milestones of the HCEN development plan.

FIGURE 5:
HCEN Development Milestones



Source: Author's elaboration based on regulations, Salud.uy, and official publications.

2.7. Regulatory Reform

To develop and implement the HCEN, Uruguay had to reform certain existing regulations through laws, decrees, and ordinances. The drive for reform had the backing of the Uruguayan president, who declared in his inaugural speech in 2015 that the HCEN would be a priority of his administration. Table 6 provides a summary of the legislation adopted during this period.

2.8. HCEN Connectathon: A Milestone

In what would prove to be a key landmark for the HCEN's implementation, in 2016 Salud.uy and the MSP organized a Connectathon to test the platform's operations.

This event required the simultaneous collaboration of technical teams from more than 40 Uruguayan

TABLE 6: Main Regulations and Opinions Enacted

Year	Regulation	Content
2015	National Budget Law (19355)	• This law granted the executive branch the power to establish the mechanisms for exchanging clinical information for health care purposes through the HCEN system, to guarantee the right to health protection and access to the SNIS's integrated networks. • It established that the confidentiality of exchanged clinical information must be guaranteed, in compliance with the Personal Data Protection Act.
2017	Decree 242/017	• This decree regulated aspects of electronic processing and the exchange of personal information by institutions and the HCEN.
2017	Ordinance No. 1085 of the MSP	• This ordinance established the HCEN adoption plan for health institutions.
2018	Accountability Law (19670)	• Established that health care entities must be incorporated into the HCEN and individuals can be integrated by registering their information through their provider. • Established that users may refuse access to their clinical information at any time.
2018	Opinion 12/018 of the URCDP	• This law established that a patient's medical record is their property and is under the custody of the health care provider. • It established that use of the HCEN system and platform is mandatory for SNIS providers. • It established that health data processing must comply with the data protection and confidentiality principles currently in effect.
2019	Decree 122/019	• This decree regulated how users and health service providers manage data on the HCEN platform. • It established Stage Five of the HCEN adoption plan and the MDS that must be included in electronic clinical documents. • It set requirements for the institutions, such as having a local repository of electronic clinical documents in compliance with relevant standards and adding clinical events to the appropriate registry within 24 hours.

Source: Author's elaboration based on laws, decrees, and rules.

TABLE (*Cont.*): Main Regulations and Opinions Enacted

Year	Regulation	Content
2019	Ordinance No. 1017/019 of the MSP	• This ordinance established that the institutions must be identified through the use of an advanced electronic signature certificate for legal entities within an established period. • It established that when an institution requires information available on the platform, it must issue a service order with the unique patient identifier, the institution identifier, the name of the person making the request, and space for comments. • It established that 80% of electronic clinical documents must be entered into the events log within 24 hours. • It created a work plan to implement the MDSs defined in Decree No. 122/019, to be carried out in three phases. • It modified the provisions of Ordinance No. 1985 by revoking the requirement to meet at least 90% of the indicators (milestone 4 of Stage Three) and compliance with Stage Four of the adoption plan for highly specialized medical institutes.
2020	Ordinance No. 1707/020 of the MSP	• This ordinance made the initial modifications to the MDS deadlines established in Stage Five.
2020	Ordinance No. 439/020 of the MSP	• This ordinance once again deferred the MDS deadlines for Stage Five. • It established that institutions must report to the MSP "hospital admissions and discharges by level of care; COVID-19 test results; outpatient, emergency, home, and telemedicine consultations for suspected COVID-19 cases; and clinical diagnoses of the disease through the mechanisms established in the Technical Guidelines published by the Salud.uy Program, within the framework of the National Coronavirus Plan," and that they must use the digital tools indicated by the National Coronavirus Plan.
2021	Law No. 19996 - Article 342	• This law established that the only valid source to establish the illness of any worker shall be the information generated in the HCEN of their health care provider, under the coverage provided by the SNIS, regardless of the modality of care. The deadline was set for December 31, 2022.

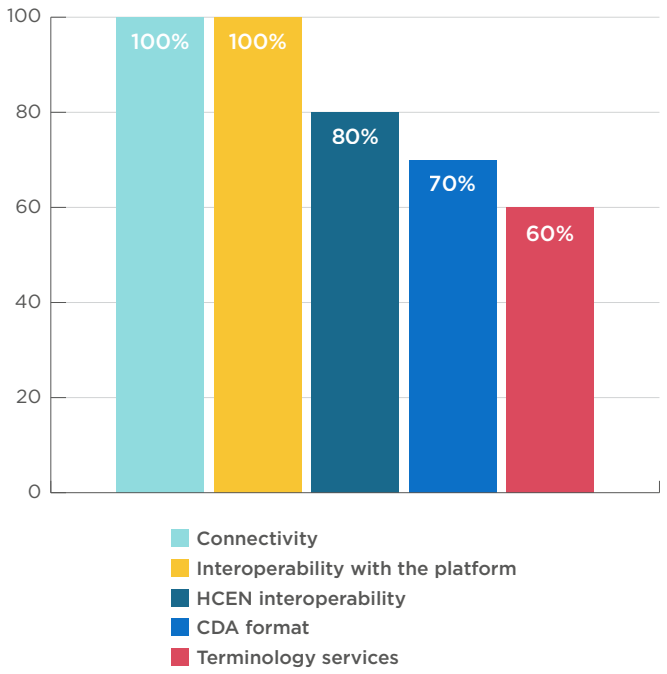
and international (Argentina, Brazil, and Spain) organizations and companies, ultimately bringing together more than 160 people from 21 health care providers, 6 state providers, and 14 suppliers. International delegations (Argentina, Brazil, Chile, Spain, Peru, Costa Rica, and Colombia) were also in attendance, having expressed an interest in learning from Uruguay's experience.

The objective of the Connectathon was to provide a space to run simultaneous connectivity and interoperability tests between the providers' individual systems and the platform. More specifically, participants tested the systems' connectivity (a prerequisite), interoperability, exchange of clinical documents and appointments, and core services and imaging. By meeting in person, participants had the opportunity to identify possible problems and solve them on the spot.

All the participating organizations—representing nearly 95 percent of the users of Uruguay's health care system—achieved real-time interoperability during the event. More than 60 percent successfully passed the three other tests as well.[56]

As Figure 6 makes clear, participants exceeded the targets for the event. In a presidential news bulletin, Selene Indarte, an international expert in medical technology who formed part of the HCEN's implementation team, described the 2016 Connectathon[57] as "a historic event," explaining that: "Those of us who work in this field have been waiting for this for a decade. It has demonstrated that, when properly applied, technology can serve as a tool to help us improve the quality of information and thus the quality and safety of patient care." In retrospect, the event came to be seen as a turning point.

FIGURE 6: Connectathon Tests



Source: Gub.uy, AGESIC, "Graph of Advances in Use Cases," *Conectatón* (2016).

2.9. A Key Step: My HCD

In 2019, the initiative received a major boost with the implementation of My HCD. This application allows users to access all their clinical information—from care events to the access history of their data—regardless of the provider who treated them. It also enables them to configure their privacy settings.

By empowering SNIS users to access and be informed about their health information, the application helps strengthen certain pillars of the HCEN such as equity. "The HCEN is for everyone, and My HCD makes that a reality," commented Pablo Orefice, the then director of Salud.uy, and Elisa Martínez, the head of My HCD development, in *E-Health Reporter*.

However, several stakeholders who were consulted said that My HCD was not promoted vigorously enough to encourage widespread uptake of the tool. The numbers bear this out: between September 27, 2019, and June 30, 2021, the application was accessed 43,431 times by a total of 7,206 users, out of a target audience of 2,700,000, according to Salud.uy data provided for this report.

Government officials have acknowledged that their efforts to publicize the application fell short. During the previous administration (2015–2020), work had begun on an awareness campaign, but it never materialized. That work was followed by plans to develop other strategies with a limited reach, such as posts on social media.

[56] https://centrodeconocimiento.agesic.gub.uy/documents/207224/0/Anexo+1+Fundamentos_Conectaton.pdf/4dd5794c-7c5f-db3d-6b04-6c940e05e786

[57] https://www.gub.uy/agencia-gobierno-electronico-sociedad-informacion-conocimiento/comunicacion/noticias/conectaton-2016-cooperacion-intercambio-de-experiencias-y-conocimiento

2.10. Resistance and Challenges

The HCEN implementation has faced challenges and resistance since its concept phase. The first challenge was getting the health care ecosystem on board with the idea of implementing a national EHR. Next, these same actors had to agree on how to structure the system and ensure the chosen model would be fully compatible with the SNIS.

The strategic guidelines for developing the HCEN prepared in 2014 included a section on challenges, barriers, and resistance. These obstacles were identified (see Figures 7, 8, and 9) in workshops held with 83 actors from both public (43 percent) and private (49 percent) institutions.[58]

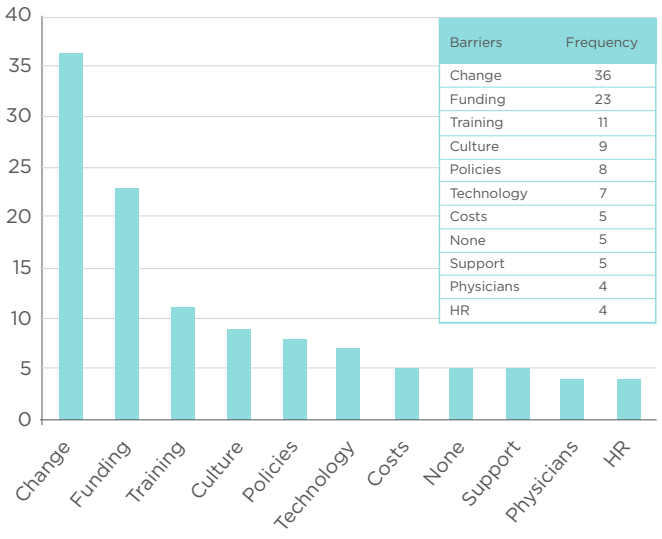
Funding, interoperability, and resistance to change were found to be the HCEN's main challenges. The barriers cited in the guidelines were related to change, funding, training, and culture. Technicians, followed by physicians, were identified as the groups most resistant to using the HCEN.

At its 2014 national medical convention, the SMU fostered discussions on the HCEN as well as the main barriers and facilitators of the implementation process. The barriers identified included the systems' lack of user-friendliness, the lack of uniform user interfaces among the institutions, short windows for uploading information, the need for standards, and the lack of clarity for professionals on the system's benefits. For other actors such as JUNASA, finding the right balance between pressure, incentives, and persuasion to ensure buy-in from all stakeholders was one of the biggest challenges.

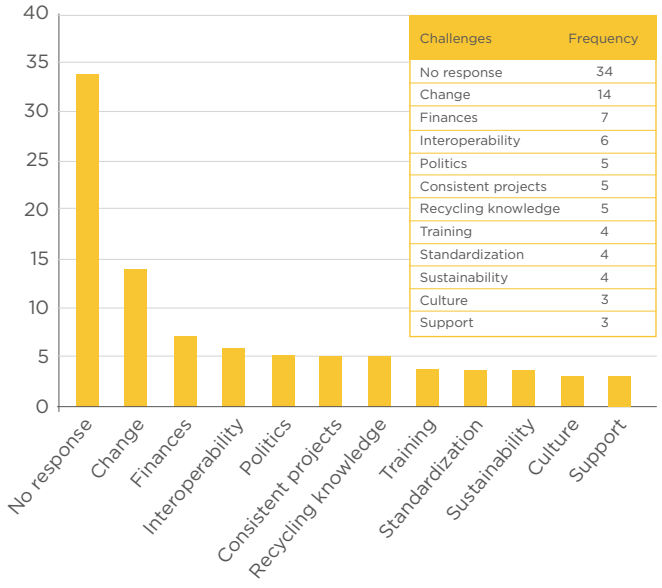
These challenges and resistance only became clearer as the project moved forward. While many providers were on board with the strategy and were convinced of its benefits—which, despite the requirement to implement their own EHR solutions, included lower costs in the medium term—their funding was, and largely still is, seen as a sticking point.

Source: Charts from "Metodología aplicada, actividades realizadas, resultados obtenidos, conclusiones y lecciones aprendidas," and consulting work for *Strategic Guidelines for the Definition, Design, and Implementation of a National Electronic Health Record for the Uruguayan Health System* (2014), https://docplayer.es/85454570-Resumen-ejecutivo-mayo-2014.html.

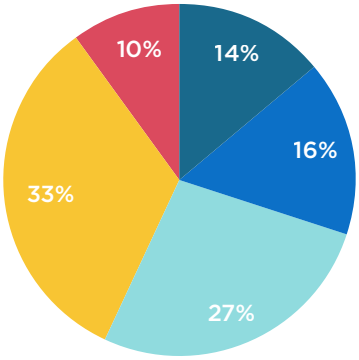
FIGURE 7, 8, AND 9: Barriers, Challenges, and Resitance Faced by the HCEN



Barriers	Frequency
Change	36
Funding	23
Training	11
Culture	9
Policies	8
Technology	7
Costs	5
None	5
Support	5
Physicians	4
HR	4



Challenges	Frequency
No response	34
Change	14
Finances	7
Interoperability	6
Politics	5
Consistent projects	5
Recycling knowledge	5
Training	4
Standardization	4
Sustainability	4
Culture	3
Support	3



Resistance to using EHRs, by profession

Resistance	Total
Nurses	13
Physicians	22
Technicians	27
Other	8
No response	11
Total	**81**

[58] Participants by institution type: 43 percent public institutions, 49 percent private institutions, and 8 percent no response.

Another obstacle for providers was the requirement to connect their individual systems to the platform. **A case in point is the State Health Services Administration (ASSE), which had to connect 900 health care facilities with different levels of complexity.** As a result, the entity had to map out the facilities to find the best technological solution for each one. For rural areas, ASSE opted for a system that downloads previously saved information (such as appointments) offline and uploads and synchronizes newly generated medical information when the system is back online. This approach ensured that all users would have a record of their medical history regardless of the part of the country they lived in.

The EHR solution Uruguay chose was technologically innovative. While there were some experiences with this type of system in other countries, its use had been limited, so it was necessary to build capacity and rigorously test the platform and its connectivity.

Connectivity was another challenge. Developing connectivity within the existing network and creating mechanisms to link the private sector proved complex, leading to provider pushback and funding difficulties.

At the technological level, ensuring interoperability, growing a data culture, and providing the MSP real-time access to information were and remain challenges. According to the IDB, as it is currently set up, Uruguay's HCEN struggles to store and manage large volumes of data. In addition, the system's registered clinical events allow access to only a limited amount of structured patient data.

In terms of privacy and security, one of the main challenges for providers was safeguarding information and preserving its confidentiality while ensuring that data could be shared instantly when needed for patient care.

Another challenge identified was the ability of staff to adapt to the new model and keep pace with the rapid technological change.

Physicians' resistance first to the EHR and then to the HCEN was noted by both the government and the SMU. During the first pilot rollouts, some professionals complained about the difficulty of simultaneously providing care for and examining a patient while having to do a write-up. Another complication was knowing that their notes could be read by others, even by the patients themselves. ***"There was resistance, as in any process of change. There were questions about where the information was going, who was managing it, and how it was being governed,"*** explained Luis González Machado, former director of JUNASA (2020–2021), former member of JUNASA (2015–2019), and former director and advisor of the Chamber of Health Institutions and Companies of Uruguay (2011–2019).

For its part, the SMU saw resistance to the changes ushered in by the technology as "inevitable," especially among older physicians and technicians. However, these perceptions shifted as they gained experience using the new technology. According to the professional association, the system's many benefits are now evident, and resistance has dropped off. As Gustavo Grecco, former SMU president (2019–2021) explained, "There were major stumbling blocks that held up efforts to connect the private and public systems. Each mutual insurance company is like an island with its own systems, so the requirement to upgrade them to connect to a master platform was met with significant resistance. Also, joining the project requires increased investment. In short, it was a complex undertaking."

To help overcome this resistance, providers offered support and training before and during implementation and introduced administrative measures, among other steps. Stepping into its role as a leader in the health care ecosystem, Salud.uy led digital health promotion activities to dispel doubts and signal that HCEN partners were united in moving forward. Through these messages, Salud.uy sought to increase awareness about the work required for a successful transition to the HCEN system. They also stressed the lack of immediate results, an important emphasis given that physicians were being asked to register information but would not see the continuity of care benefits until interoperability was achieved at a later date.

Behind the scenes, Salud.uy leveraged two information systems that it had developed and implemented—the Integrated Diagnostic Imaging Network and the Oncology Electronic Health Record—to promote change management strategies aimed at supporting digitalization processes and creating a shared vision of the HCEN.

[59] Information from the IDB's Health Sector e-Government Management Project III.

2.11. The Current Situation in Numbers: How Access to the HCEN Has Varied

Since 2014, Salud.uy has been measuring the health care industry's use of ICT, including the HCEN, every two years. The latest study data available is from 2018, as the agency is currently processing 2020 data.

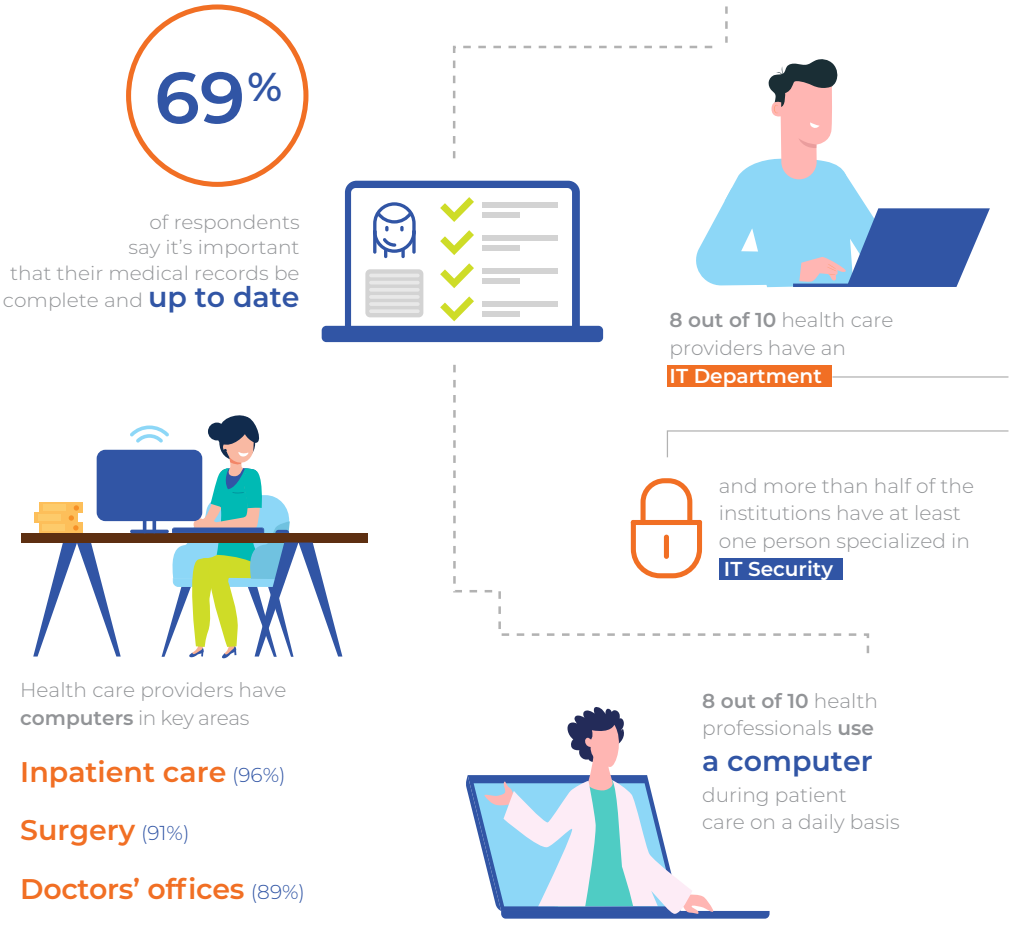
In 2018, a large majority of respondents (69 percent) agreed that it was important that their medical records be complete and up to date. Furthermore, eight out of 10 health care providers had an IT department, and more than half had at least one person specialized in IT security, as shown in Figure 10.

The success of the HCEN hinges on implementing EHR systems at comprehensive institutions and providers. In 2014, 55 percent of institutions used software to record clinical information, rising to 78 percent by 2018, as shown in Figure 11.

In 2018, 22 percent of institutions had no system for digitizing the clinical information of their patients. This segment corresponds exclusively to mobile emergency medical services in the interior of the country and is the most critical in terms of ICT adoption.

Implementation was also analyzed by sector, region, and type of care, as shown in Table 7. The study found that 79 percent of private and 65 percent of public institutions, 84 percent of institutions located in Montevideo and 67 percent of those in the rest of the country, and nearly all

FIGURE 10: Statistics on ICT in Health Care



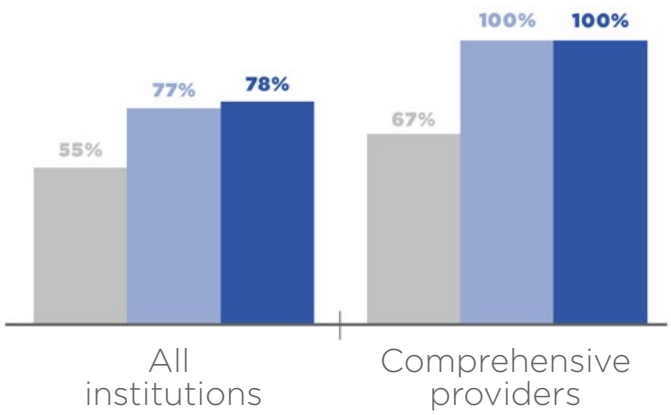
Source: Salud.uy, *ICT in the Health Sector 2014-2018.*

FIGURE 11:
Implementation of EHR Systems

Has your organization implemented an EHR system?

2014
2016
2018

Calculated based on all institutions.



Source: Gub.uy, Salud.uy, *Informe Medición TIC Salud 2018*.

TABLE 7:
Implementation of an EHR System in Facilities by Sector, Region, and Type of Care (2018)

Has your organization implemented an EHR system?

	TOTAL	Public	Private	Montevideo	Rest of the country	With inpatient services	No inpatient services
Sí	71%	65%	79%	84%	67%	94%	68%
NO	29%	35%	21%	16%	32%	6%	32%
Ns/Nc	0%	1%	0%	0%	0%	0%	0%
TOTAL	100%	100%	100%	100%	100%	100%	100%

Source: Gub.uy, Salud.uy, *Informe Medición TIC Salud 2018*.

institutions with inpatient services (94 percent) had implemented an EHR system.algún sistema de HCE.

From a user perspective, the 2018 study shows that half (49 percent) of adults were seen by a professional who used EHR—with higher rates observed for private health care providers, as shown in Figure 12. Of this group, 77 percent reported that the physician was able to pull up their medical history and did not need to ask questions about previous consultations or illnesses. This is important because it indicates that for the vast majority of patients, EHR use had a positive impact, at least in terms of reducing the number of questions and requests for information from the physician treating them.

Another aspect measured was how the institutions keep patient records. While in 2014 most records were paper-based (72 percent), by 2018 the

majority (59 percent) of records were partially or fully electronic, as shown in Figure 13.

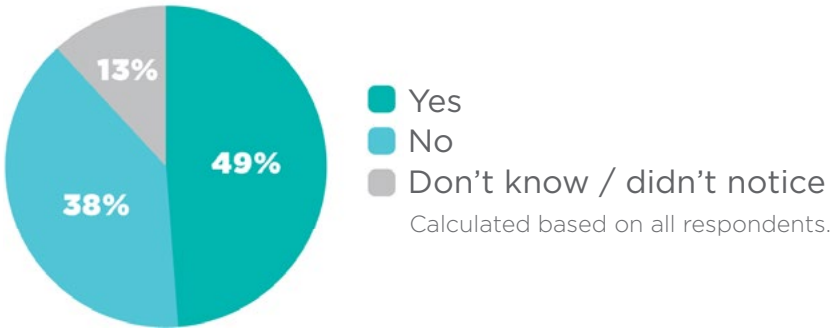
Figure 14 breaks this information down by sector, region, and care type. In private institutions, 71 percent of records in 2018 were electronic (fully or partially), while the level for public institutions sat at 50 percent. Geographically, 76 percent of institutions in Montevideo had most or all of their records in digital format, while in the interior of the country the percentage fell to 55 percent.

By 2020, 1.8 million SNIS users (around 50 percent) had benefited from the HCEN, and more than 12,000 professionals had used the system.[60] According to Salud.uy's annual report, all the HCEN's key milestones were met in 2020, which means that all comprehensive SNIS providers are now fully able to exchange clinical documents with each other through the platform.

The report notes that by the end of 2020, 95,298,354 clinical events had been uploaded to

FIGURE 12: Use of EHRs (2018)

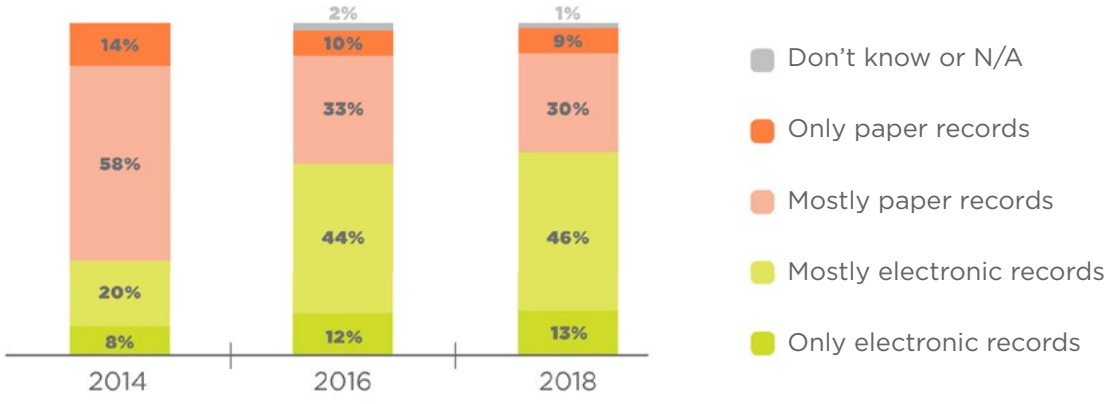
Have you been seen by a physician who used their institution's EHR?



Source: Gub.uy, Salud.uy, *Informe Medición TIC Salud 2018*.

FIGURE 13: How Patient Records Are Kept, by Format

How does your institution keep patient medical records?

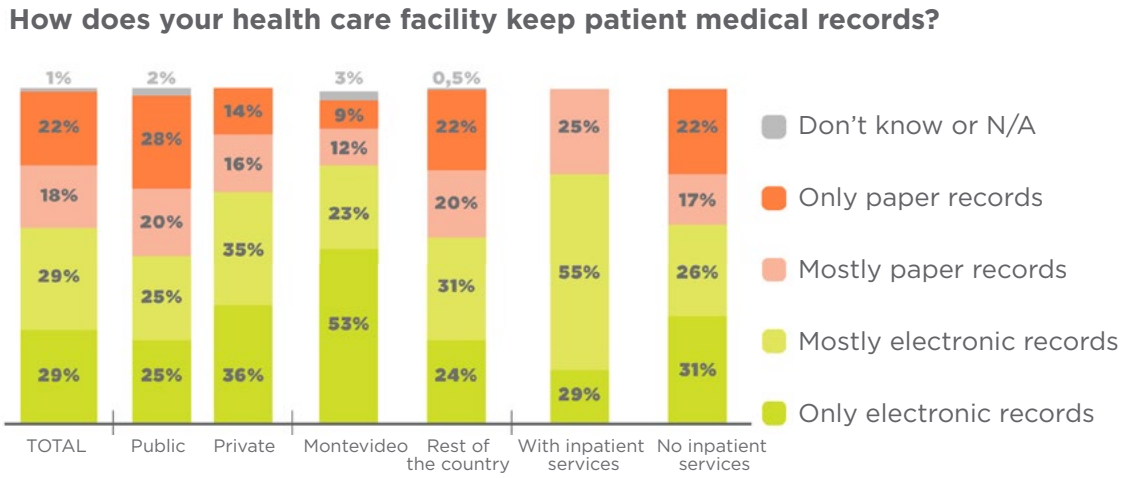


Calculated based on all institutions.

Source: Gub.uy, Salud.uy, *Informe Medición TIC Salud 2018*.

[60] Orefice, *Uruguay: Un camino hacia lo digital.*

FIGURE 14:
How Patient Records Are Kept, by Sector, Region, and Type of Care



Calculated based on all institutions.

Source: Gub.uy, Salud.uy, *Informe Medición TIC Salud 2018*.

the HCEN and 95 percent of Uruguay's population had at least one clinical document on the platform. As of May 2021, 23,464,391 events had been consulted, 701,016 documents had been exchanged, and 76,855,107 documents had been entered in the HCEN. Lab results, clinical notes for both urgent and nonurgent care, vaccination records, and imaging reports were the document types most frequently entered in the platform.

2.12. Impacts of the HCEN on Users, Providers, and Professionals

While it is difficult to directly measure the HCEN's impact on outcomes, especially those related to quality, health personnel and users were surveyed to evaluate a number of dimensions.

There is broad agreement that the HCEN offers several advantages for both physicians and patients during care. The advantages are clearest when providing care to patients with information about their previous consultations and medical history on the platform, providing a context for their current situation. This makes it possible, for example, to detect domestic violence situations. In pediatric care, physicians no longer have to rely on what the patients' parents remember and report during consultations, as the information they need is now available in the HCEN. This impact was quantified in 2018, with seven out of 10 practitioners stating that using an electronic system improves treatment quality.[61]

Patients have also noticed changes since the new system was implemented. In 2020, 84 percent of patients reported that their physician pulled up their digital medical history quickly and did not need to ask questions about previous consultations or illnesses. Meanwhile, 9 percent reported that their physician was unable to access this information quickly and did have to ask them about their medical history. 9 out of 10 patients (90 percent) agreed that access to their digital medical history would improve care during consultations.[62]

The launch of My HCD has also brought value and the potential for a significant benefit for patients. Despite the government's challenges in raising awareness about the tool, nine out of 10 users gave high marks to its ability to provide access to their clinical information, according to a study cited in AGESIC's 2020 annual report.

[61] *Uso de tecnologías de la información y la comunicación. TIC en el sector de Salud 2014-2018*, (AGESIC, MSP, and the Presidency of Uruguay).

[62] Orefice, *Uruguay: Un camino hacia lo digital.*

The impact of the use of EHRs was measured in a research study (see Figure 15) based on structured interviews with the directors or technical directors of each institution together with their IT officers. The majority of respondents agreed that EHRs increase the efficiency of care (70 percent) and the workflows of their teams (80 percent), as well as the overall quality of treatment (70 percent); improve patient satisfaction (60 percent) and decision-making quality (60 percent); and decrease duplicate or unnecessary tests (60–80 percent), medical errors, (60–70 percent), and medication administration errors (60–70 percent).

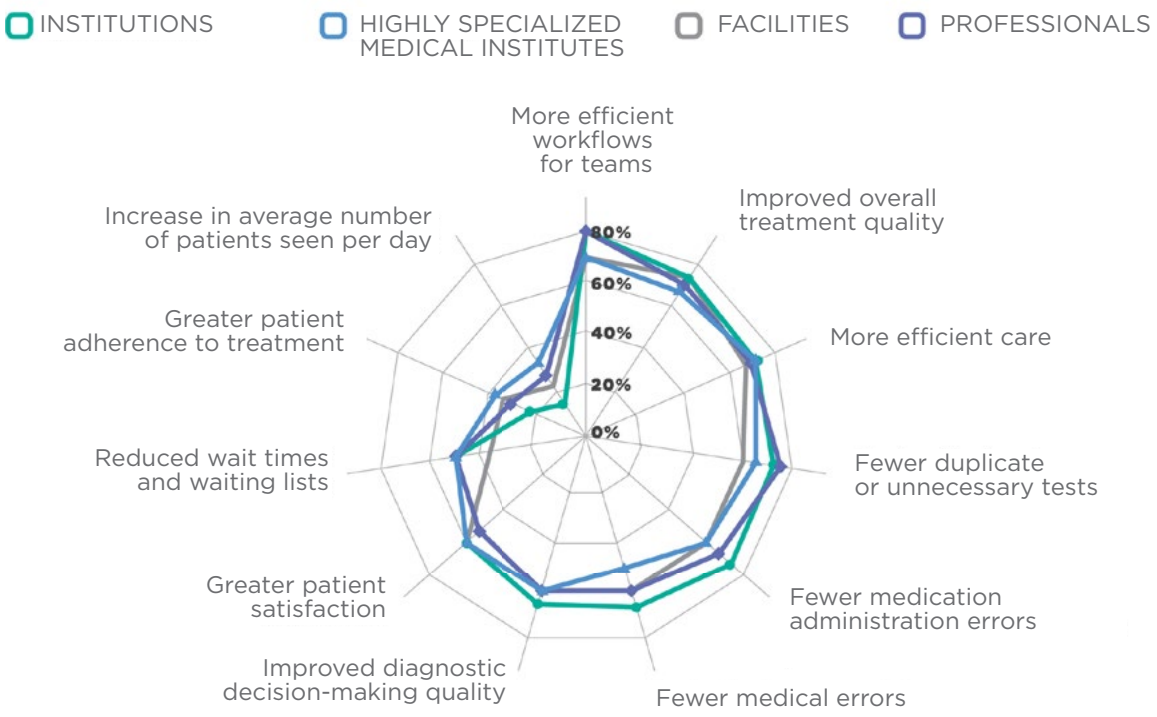
The tools had less of an impact when it came to helping providers see a greater number of patients per day (10–30 percent saw improvement), improving patient adherence to treatment (20–40 percent saw improvement), and reducing waiting lists and wait times (50 percent saw improvement).

The transition to the HCEN required a major cultural shift. Management teams had to move from paper forms to digital information systems and build a data culture from the ground up, which required them to understand and contextualize information to apply it and guide decision-making.

The HCEN also had macro-level impacts—especially for the MSP, providing this leadership and policy-making body with access to quality information. Nonetheless, the main stakeholders all state that there is still considerable room for improvement in this regard.

In the IDB's view, the use of clinical data in decision-making is still in its infancy when it comes to patient care, the management of health institutions, and the MSP's leadership role.[63] However, the COVID-19 pandemic expedited certain advances, such as the use of data in decision-making.

FIGURE 15:
Impact of the Tool on Institutional Executives and Practitioners



Calculated based on all institutions (ASSE included at only the central level), all facilities, all highly specialized medical institutes, and all professionals

Source: Gub.uy, Salud.uy, *Informe Medición TIC Salud 2018*.

[63] Information from the IDB's Health Sector e-Government Management Project III.

"Providing citizens with access to all their clinical information, which they own, is a tremendous achievement that helps empower them in their health care and in their rights as users of the National Integrated Health System." Pablo Orefice, former director of Salud.uy and senior digital health consultant at the IDB.

"The results are all positive. When I ask a patient what's wrong and they start telling me, I don't have to ask them what conditions they have. I can get that data from their medical record instead. I can see what medications they take and no longer have to rely on their memory. I have a list as well as test results." Miguel Acerenza, former deputy technical director of Asociación Española.

"For health care teams, being able to access all that information allows them to make decisions that are much more accurate." Rosario Berterretche, medical coordinator of Salud.uy and former director of information systems of ASSE (2014–2020).

2.13. Main Lessons Learned

Since its conception, the HCEN was envisioned as a joint project between all health care ecosystem actors. Its success at turning this model into reality and building a digital health community was highlighted by many of the interviewees.

The initiative's implementation under the auspices of the presidential office is widely considered to have been a key factor in its success. Given the progress made on projects now underway, an evaluation is currently underway to decide what agency should lead the activities, team, and related governance going forward. With regard to implementation, some stakeholders commented that individuals and organizations should have received more support to navigate the changes brought by the new technologies. Others said that a different funding model with upfront incentives for providers would have sped up progress. Despite these criticisms, the decision for Uruguay to have and run a platform of its own was rated highly.

Overall, most interviewees agreed that the HCEN is a success, chiefly because of the patient-centered design underlying the innovative technologies and economic and health system sustainability it delivers. Another reason for this positive assessment was that no matter where patients are seen, physicians can see their history, and patients themselves can access it at any time.

There was a consensus on recommendations for countries interested in similar initiatives: take into account the starting point and local context when replicating others' systems, propose a governance structure for the health care ecosystem, have solid leadership to provide support, bring in experts, and work within an enabling framework. ***"It's important to make human support a priority, understanding the impact it has on organizations and finding ways to support the process of switching from paper to digital. You have to manage this process carefully, because otherwise it can become very much an uphill battle,"*** explained Rosario Berterretche.

Another factor behind the HCEN's success is that it was made a state policy—one continued by multiple government administrations that saw the advantages of implementing it—and had the backing of the entire ecosystem, which helped ensure its long-term sustainability. Shortly after Luis Lacalle Pou became president in 2020 (a candidate of the National Party, following three Broad Front presidencies), the HCEN made it possible for Uruguay to implement several digital solutions during the COVID-19 pandemic that earned it worldwide recognition.

"The time we invested in dialoguing with ecosystem actors and building a shared vision paid off. It was a slower process this way, but the resulting consensus, discussions, and common focus between all parties translated into significant advantages. It also helped convince ecosystem actors that these transformations toward a better future were imperative, independent of regulatory requirements or any economic arguments that could be made." Pablo Orefice, former director of Salud.uy and senior digital health consultant at the IDB.

"One thing we got right was including the entire initiative within the presidential agenda. That gave it a tremendous momentum that seemed unstoppable." Luis González Machado, former director of JUNASA (2020–2021), former member of JUNASA (2015–2019), and former director and advisor to the Uruguayan Chamber of Health Institutions and Companies (2011–2019).

"It's no small feat for a country to successfully implement an EHR that can be seen by all relevant actors. There are no other examples in Latin America, nor in the United States or Canada. Indeed, there are only a handful of places in the world where no matter what institution you are treated at, doctors will have your information." Arturo Echevarría, former president of JUNASA (2016–2020).

2.14. HCEN's Impacts on the Pandemic

Uruguay's digital response to the pandemic received international praise, and there was a clear link between the HCEN and how fast and effectively the government acted. As highlighted by AGESIC in its 2020 annual report,[64] the country's "high level of maturity" in digital health and its HCEN made it easier to manage the pandemic's clinical and epidemiological aspects, as well as to structure high-quality COVID-19 data for instant access: lab results, diagnoses, case follow-up, bed occupancy rates, and saturation of health services.

At the start of the pandemic, Salud.uy put out its *Guide for COVID-19 Coding in the EHR for the MDS*,[65] aimed at informing public and private health institutions about terminology related to patients' reason for consultation, diagnosis, and lab tests.

The high level of digitalization of laboratories and providers meant that information on cases, deaths, admissions to intensive care units, vaccination, and vaccine effectiveness was readily available. The HCEN was also key to ensuring that this information could be collected quickly and would be of sufficient quality.

Before the pandemic broke out, the HCEN system's digital infrastructure was being used regularly. However, it then reached mass use very quickly and successfully navigated the strain of this rapid growth.

When the development team of the Coronavirus UY mobile app began its planning process, it found that the HCEN had already laid part of the groundwork, whereas teams in other countries had to start from scratch. This tool—which includes features for telemedicine, scheduling, and vaccine certificates—has won Uruguay international acclaim.[66] The app connects to providers' phone systems and the call center specially created for COVID-19 care, and it also passes the information on to the HCEN, allowing users to be automatically connected to their health care provider. Vaccine certificates and test results—among other information available in the app—are stored in the HCEN rather than in the app itself.

The national health emergency also led to a surge in the use of telemedicine and teleconsultations, with the HCEN recognized as a contributing factor to this growth. As it turned out, the pandemic lowered physicians' resistance to the HCEN because, among other things, it allowed them to know whether the patients they attended to during in-home visits had COVID-19.

[64] Gub.uy. Agesic. "Memoria anual 2020". https://www.gub.uy/agencia-gobierno-electronico-sociedad-informacion-conocimiento/institucional/informacion-gestion/memorias-anuales/memorias-anuales

[65] https://centrodeconocimiento.agesic.gub.uy/web/salud.uy/terminolog%C3%ADa

[66] https://www.uruguayxxi.gub.uy/es/noticias/articulo/uruguay-elegido-por-google-y-apple-para-luchar-contra-el-coronavirus/

Furthermore, for providers, the progress made on HCEN meant that most of the process for submitting information to the MSP was already in place. It also helped them improve patient flows during triage.

2.15. The Future of the HCEN

Now that 95 percent of the Uruguayan population has at least one of their clinical documents uploaded to the HCEN and execution of the third IDB loan began in the second half of 2021, several new lines of action have been established: patient summaries, electronic prescribing, applications, certificates, and HCEN use for developing public health policies. Other issues to be addressed in the future include governance of the platform and provider funding.

As of the publication of this report, work is underway on a national electronic prescription system, which is a priority for the MSP. However, the financial implications of this innovation present certain challenges, particularly for private institutions.

By 2023, the project's main aim is to produce patient summaries that are the first thing to appear on physicians' screens when they provide care, highlighting key data.

Compiling health care statistics is another strategic pillar, and it is one that will require new regulations to support the process. This data will allow the MSP to create public policies and identify population segments in order to design targeted policies.

For its part, the Uruguayan government plans to give a strong boost to the system through the proposed National Budget Law,[67] which would designate the HCEN as the sole source for certifying a worker's illness.

In the meantime, Salud.uy is planning to create applications for users and health care professionals that would enable citizens to access their digital history and information, file complaints and claims with their providers, access educational resources, and receive government alerts, among other features.

For physicians, Salud.uy aims to provide a fast and seamless means of communication among health care professionals, permitting them to carry out procedures, receive notifications, and access clinical support tools, calculators, and clinical practice guidelines.

In parallel, the MSP is developing its Sisalud project, consisting of a system that integrates and interoperates with all its information systems. Likewise, Salud.uy has constructed a data lake containing a breakdown of COVID-19 cases and deaths, management of the vaccination schedule, and vaccine coverage and efficacy.

The government has not yet resolved the issue of funding by the providers—which is needed to move forward with the digital transformation process—and is currently evaluating alternatives.

Much of the HCEN's future is set by the terms of the third IDB loan, with the stated objective of increasing the amount of structured information stored in the HCEN platform and adding new functionalities. To this end, the loan will fund the development and implementation of a nationwide drug prescription and dispensing management system, the design of a system of catalogs for structuring medical information, the implementation of SNOMED terminology services, and a cybersecurity model for the HCEN platform.

At the same time, the plan is to increase the use of HCEN clinical data to support direct health care and decision-making on how best to allocate human and material resources at the provider level, as well as to help the leadership body set and monitor health care objectives and social benefit goals.[68]

More specifically, the MSP plans to retool the HCEN to have more information about different noncommunicable conditions—such as cancers, high blood pressure, heart failure, and cardiorespiratory conditions, as well as infectious conditions that could have been prevented—to design new policies. When defining the main impact of this operation, the IDB and the government set their sights on improving preventive care for people with chronic noncommunicable diseases.

[67] https://www.impo.com.uy/bases/leyes/19996-2021

[68] IDB, "Proyecto para Gestión de Gobierno Electrónico en el Sector Salud III." https://www.iadb.org/es/project/UR-L1163

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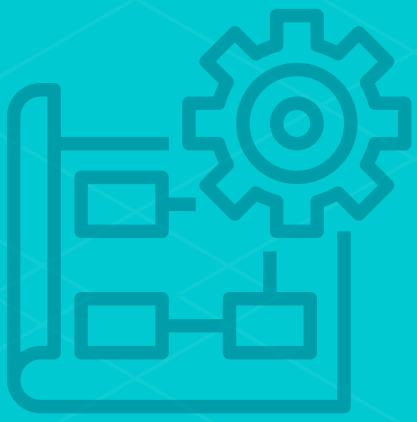


APPENDIX I - HCEN INITIAL ADOPTION PLAN

STAGE 1

Comprehensive providers, more than 50,000 users

- Starts 30 days after ordinance takes effect.
- Must be connected to Red Salud when stage ends two months after start.
- Send production environments, identification message, and demographic data of health users to the registry of persons.

Comprehensive providers, fewer than 50,000 users

- Starts 120 days after ordinance takes effect.
- Must be connected to Red Salud when stage ends two months after start.
- Send production environments, identification message, and demographic data of health users to the registry of persons.

Comprehensive insurers

- Starts 120 days after ordinance takes effect.
- Must be connected to Red Salud when stage ends two months after start.
- Send production environments, identification message, and demographic data of health users to the registry of persons.

Public health services provided by public entities to their own employees and/or third parties

- Starts 180 days after ordinance takes effect.
- Must be connected to Red Salud when stage ends two months after start.
- Send production environments, identification message, and demographic data of health users to the registry of persons.

Partial private providers, more than 50,000 users

- Starts 60 days after ordinance takes effect.
- Must be connected to Red Salud when stage ends two months after start.
- Send production environments, identification message, and demographic data of health users to the registry of persons.

Partial private providers, fewer than 50,000 users

- Starts 210 days after ordinance takes effect.
- Must be connected to Red Salud when stage ends two months after start.
- Send production environments, identification message, and demographic data of health users to the registry of persons.

Highly specialized medical institutes

- Starts 180 days after ordinance takes effect.
- Must be connected to Red Salud when stage ends two months after start.
- Send production environments, identification message, and demographic data of health users to the registry of persons.

STAGE 2

Comprehensive providers, more than 50,000 users

- Starts 30 days after ordinance takes effect.
- Must be able to generate and store electronic clinical documents from one of the organization's services when stage ends three months after start.

Comprehensive providers, fewer than 50,000 users

- Starts 120 days after ordinance takes effect.
- Must be able to generate and store electronic clinical documents from one of the organization's services when stage ends three months after start.

Comprehensive insurers

- Starts 120 days after ordinance takes effect.
- Must be able to generate and store electronic clinical documents from one of the organization's services when stage ends three months after start.

Public health services provided by public entities to their own employees and/or third parties

- Starts 180 days after ordinance takes effect.
- Must be able to generate and store electronic clinical documents from one of the organization's services when stage ends three months after start.

Partial private providers, more than 50,000 users

- Starts 60 days after ordinance takes effect.
- Must be able to generate and store electronic clinical documents from one of the organization's services when stage ends three months after start.

Partial private providers, fewer than 50,000 users

- Starts 210 days after ordinance takes effect.
- Must be able to generate and store electronic clinical documents from one of the organization's services when stage ends three months after start.

Highly specialized medical institutes

- Starts 180 days after ordinance takes effect.
- Must be able to generate and store electronic clinical documents from one of the organization's services when stage ends three months after start.

STAGE 3

Comprehensive providers, more than 50,000 users

- Starts 90 days after ordinance takes effect.
- By six-month mark, must have at least 30% of its users registered in the HCEN platform's events log.
- By December 31, 2018, each institution must have 60% of its users registered in the events log and 40% of its clinical documents (based on its 2018 events) registered.
- By December 31, 2019, each institution must have 90% of its users registered in the events log and 60% of its clinical documents (based on its 2018 events) registered.
- By December 31, 2020, each institution must have 100% of its users registered and 90% of its clinical documents (based on its 2020 events) registered in the events log.

Comprehensive providers, fewer than 50,000 users

- Starts 180 days after ordinance takes effect.
- By six-month mark, must have at least 30% of its users registered in the HCEN platform's events log.
- By December 31, 2018, each institution must have 60% of its users and 40% of its clinical documents (based on its 2018 events) registered in the events log.
- By December 31, 2019, each institution must have 90% of its users and 60% of its clinical documents (based on its 2019 events) registered in the events log.
- By December 31, 2020, each institution must have 100% of its users and 90% of its clinical documents (based on its 2020 events) registered in the HCEN platform's events log.

Comprehensive insurers

- Starts 180 days after ordinance takes effect.
- By six-month mark, must have at least 30% of its users registered in the HCEN platform's events log.
- By December 31, 2018, each institution must have 60% of its users and 40% of its clinical documents (based on its 2018 events) registered in the events log.
- By December 31, 2019, each institution must have 90% of its users and 60% of its clinical documents (based on its 2019 events) registered in the events log.
- By December 31, 2020, each institution must have 100% of its users and 90% of its clinical documents (based on its 2020 events) registered in the HCEN platform's events log.

Public health services provided by public entities to their own employees and/or third parties

- Starts 240 days after ordinance takes effect.
- By six-month mark, must have at least 30% of its users registered in the HCEN platform's events log.
- By December 31, 2018, each institution must have 60% of its users and 40% of its clinical documents (based on its 2018 events) registered in the events log.
- By December 31, 2019, each institution must have 90% of its users and 60% of its clinical documents (based on its 2019 events) registered in the events log.
- By December 31, 2020, each institution must have 100% of its users and 90% of its clinical documents (based on its 2020 events) registered in the HCEN platform's events log.

STAGE 3

Partial private providers, more than 50,000 users

- Starts 120 days after ordinance takes effect.
- By six-month mark, must have at least 30% of its users registered in the HCEN platform's events log.
- By December 31, 2018, each institution must have 60% of its users and 40% of its clinical documents (based on its 2018 events) registered in the events log.
- By December 31, 2019, each institution must have 90% of its users and 60% of its clinical documents (based on its 2019 events) registered in the events log.
- By December 31, 2020, each institution must have 100% of its users and 90% of its clinical documents (based on its 2020 events) registered in the HCEN platform's events log.

Partial private providers, fewer than 50,000 users

- Starts 365 days after ordinance takes effect.
- By six-month mark, must have at least 30% of its users registered in the HCEN platform's events log.
- By December 31, 2018, each institution must have 60% of its users and 40% of its clinical documents (based on its 2018 events) registered in the HCEN platform's Events Log.
- By December 31, 2019, each institution must have 90% of its users and 60% of its clinical documents (based on its 2019 events) registered in the events log.
- By December 31, 2020, each institution must have 100% of its users and 90% of its clinical documents (based on its 2020 events) registered in the HCEN platform's events log.

Highly specialized medical institutes

- Starts 240 days after ordinance takes effect.
- By six-month mark, must have at least 30% of its users registered in the HCEN platform's events log.
- By December 31, 2018, each institution must have 60% of its users and 40% of its clinical documents (based on its 2018 events) registered in the events log.
- By December 31, 2019, each institution must have 90% of its users and 60% of its clinical documents (based on its 2019 events) registered in the events log.
- By December 31, 2020, each institution must have 100% of its users and 90% of its clinical documents (based on its 2020 events) registered in the HCEN platform's events log.

STAGE 4

Comprehensive providers, more than 50,000 users

- Starts 90 days after ordinance takes effect.
- By one year from the beginning of this stage, each institution's EHR must allow their health team to access and view the HCEN platform's events log.
- Additionally, their EHR must allow the health care team to access and view the clinical document(s) they select, regardless of the documents' origin.

Comprehensive providers, fewer than 50,000 users

- Starts 180 days after ordinance takes effect.
- By one year from the beginning of this stage, each institution's EHR must allow their health team to access and view the HCEN platform's events log.
- Additionally, their EHR must allow the health care team to access and view the clinical document(s) they select, regardless of the documents' origin.

Comprehensive insurers

- Starts 180 days after ordinance takes effect.
- By one year from the beginning of this stage, each institution's EHR must allow their health team to access and view the HCEN platform's events log.
- Additionally, their EHR must allow the health care team to access and view the clinical document(s) they select, regardless of the documents' origin.

Public health services provided by public entities to their own employees and/or third parties

- Starts 240 days after ordinance takes effect.
- By one year from the beginning of this stage, each institution's EHR must allow their health team to access and view the HCEN platform's events log.
- Additionally, their EHR must allow the health care team to access and view the clinical document(s) they select, regardless of the documents' origin.

Partial private providers, more than 50,000 users

- Starts 120 days after ordinance takes effect.
- By one year from the beginning of this stage, each institution's EHR must allow their health team to access and view the HCEN platform's events log.
- Additionally, their EHR must allow the health care team to access and view the clinical document(s) they select, regardless of the documents' origin.

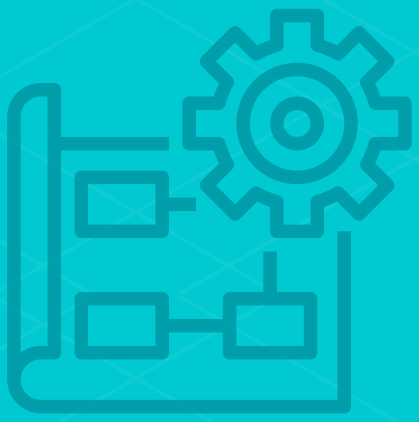
Partial private providers, fewer than 50,000 users

- Starts 365 days after ordinance takes effect.
- By one year from the beginning of this stage, each institution's EHR must allow their health team to access and view the HCEN platform's events log.
- Additionally, their EHR must allow the health care team to access and view the clinical document(s) they select, regardless of the documents' origin.

STAGE 4

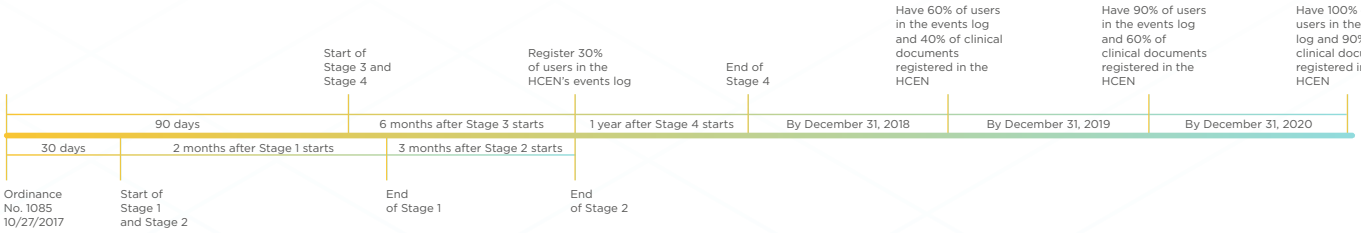
Highly specialized medical institutes

- Starts 240 days after ordinance takes effect.
- By one year from the beginning of this stage, each institution's EHR must allow their health team to access and view the HCEN platform's events log.
- Additionally, their EHR must allow the health care team to access and view the clinical document(s) they select, regardless of the documents' origin.

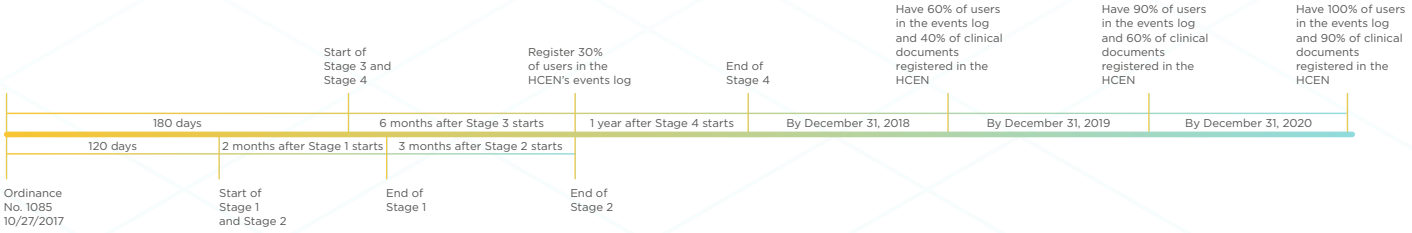


APPENDIX II - INITIAL HCEN PLAN BY INSTITUTION

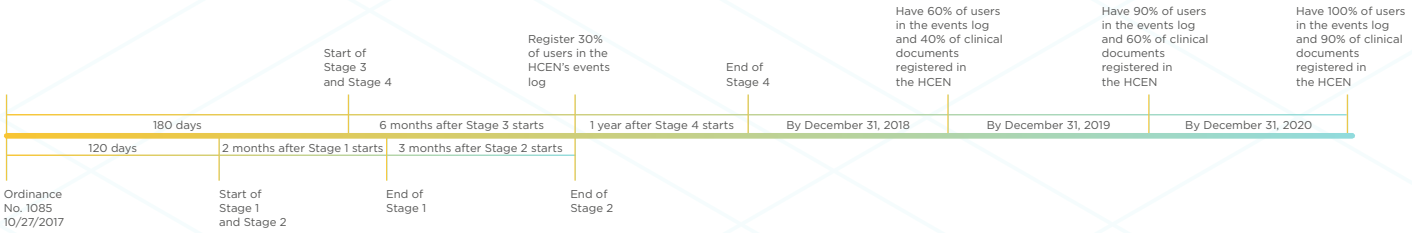
Comprehensive providers – more than 50,000 users



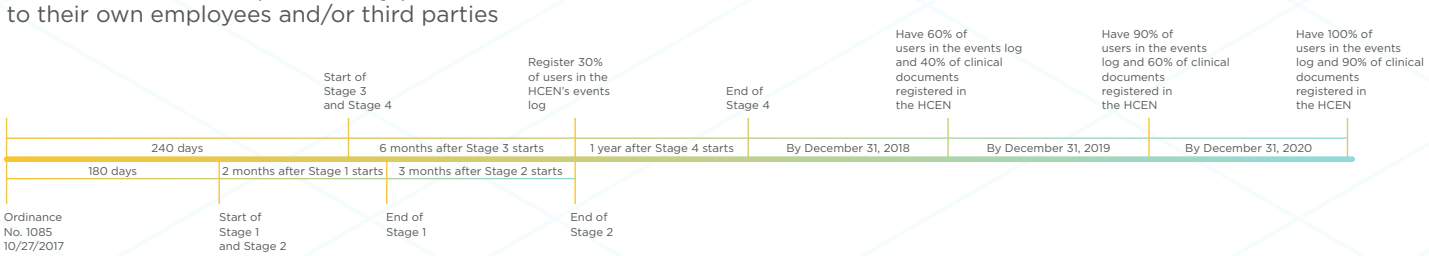
Comprehensive providers – fewer than 50,000 users



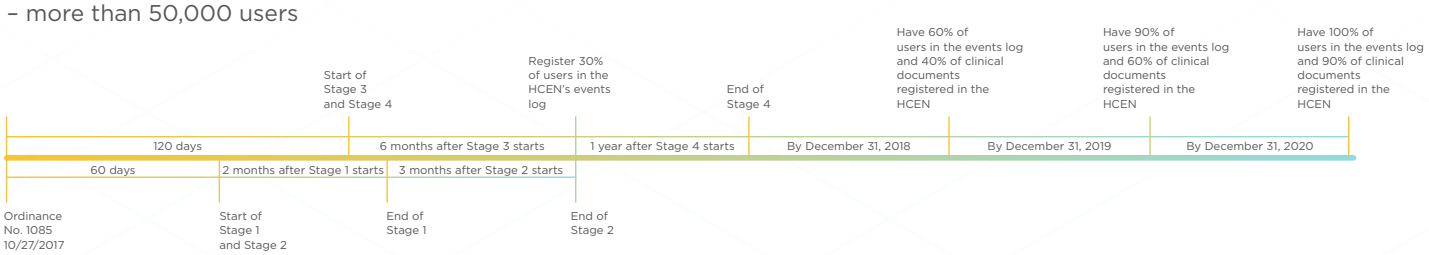
Comprehensive insurers



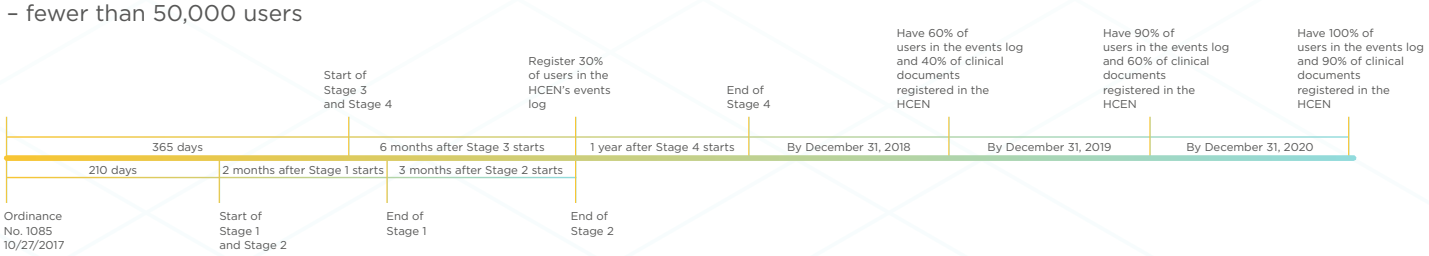
Public health services provided by public entities to their own employees and/or third parties



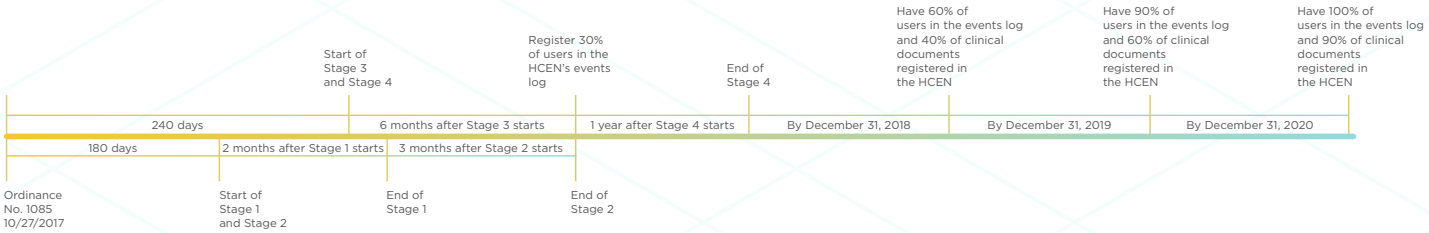
Partial private providers – more than 50,000 users

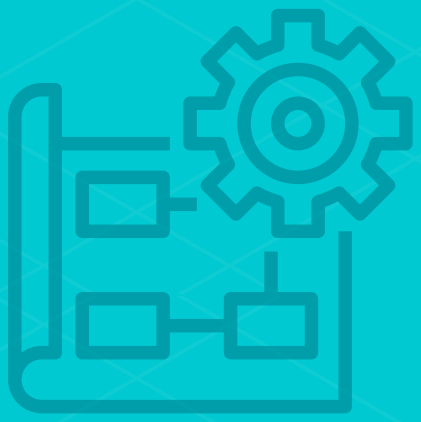


Partial private providers – fewer than 50,000 users



Highly specialized medical institutes

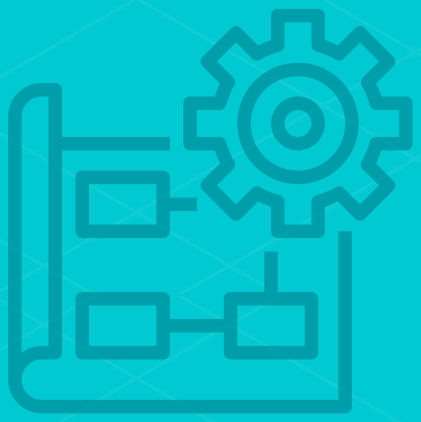




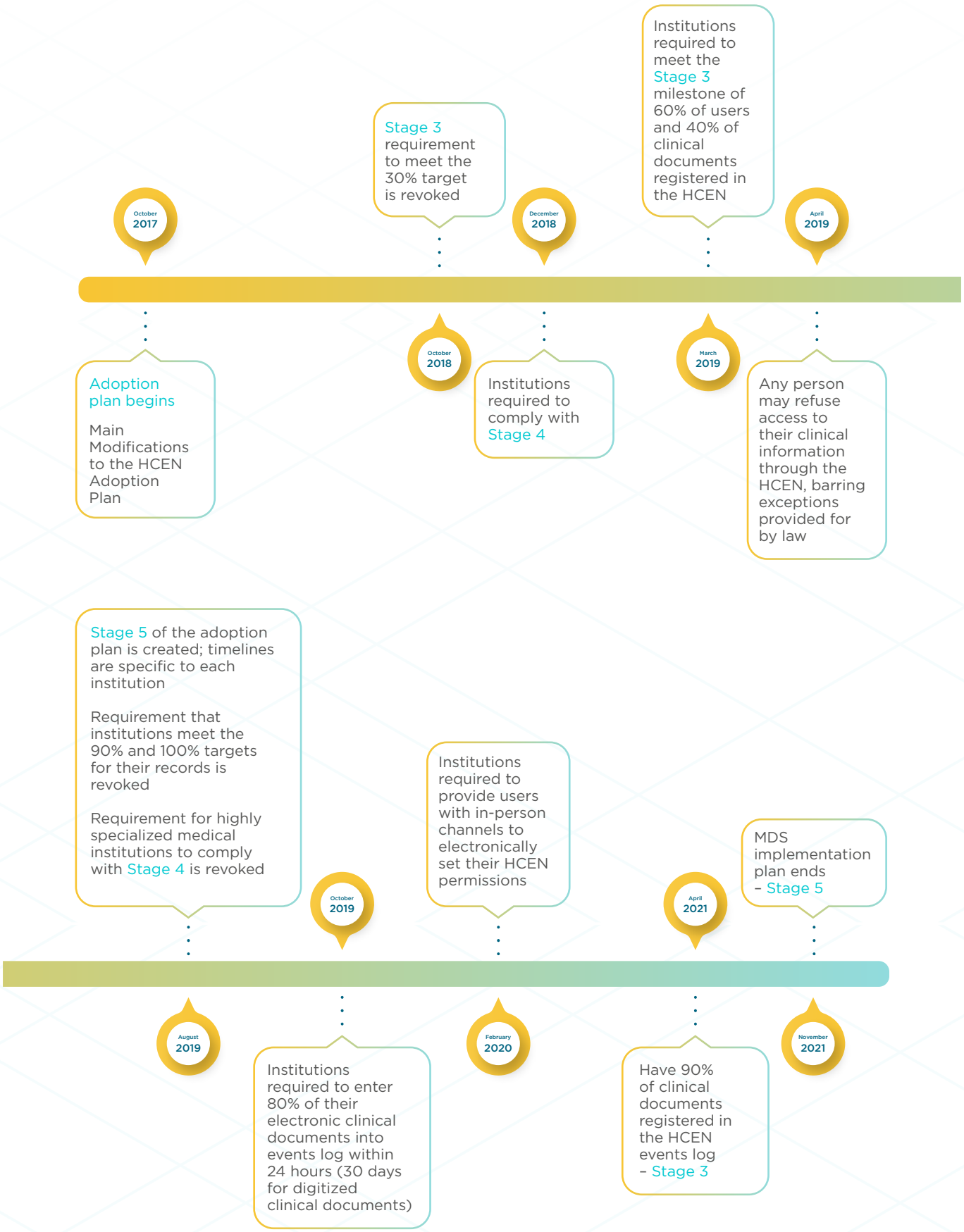
APPENDIX III - INITIAL STAGE FIVE TIMELINE

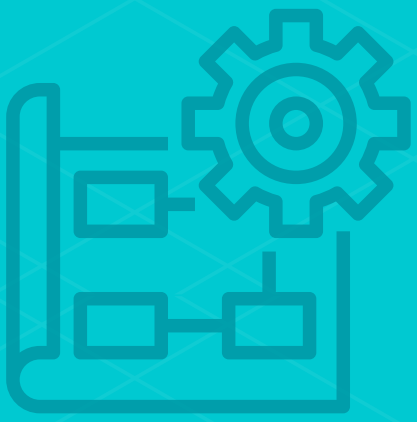
INITIAL STAGE FIVE TIMELINE

	PHASE 1	PHASE 2	PHASE 3
Comprehensive providers, more than 50,000 users	4 MONTHS	12 MONTHS	24 MONTHS
Comprehensive providers, fewer than 50,000 users	8 MONTHS	16 MONTHS	28 MONTHS
Comprehensive insurers	8 MONTHS	16 MONTHS	28 MONTHS
Public health services provided by public entities to their own employees and/or third parties	10 MONTHS	18 MONTHS	30 MONTHS
Partial private providers, more than 50,000 users	8 MONTHS	16 MONTHS	28 MONTHS
Emergency medical services, 15,000–50,000 users	10 MONTHS	18 MONTHS	30 MONTHS



APPENDIX IV - MAIN MODIFICATIONS TO THE ADOPTION PLAN


October 2017
Adoption plan begins
Main Modifications to the HCEN Adoption Plan
October 2018
Stage 3 requirement to meet the 30% target is revoked
December 2018
Institutions required to comply with Stage 4
March 2019
Institutions required to meet the Stage 3 milestone of 60% of users and 40% of clinical documents registered in the HCEN
April 2019
Any person may refuse access to their clinical information through the HCEN, barring exceptions provided for by law
August 2019
Stage 5 of the adoption plan is created; timelines are specific to each institution
Requirement that institutions meet the 90% and 100% targets for their records is revoked
Requirement for highly specialized medical institutions to comply with Stage 4 is revoked
October 2019
Institutions required to enter 80% of their electronic clinical documents into events log within 24 hours (30 days for digitized clinical documents)
February 2020
Institutions required to provide users with in-person channels to electronically set their HCEN permissions
April 2021
Have 90% of clinical documents registered in the HCEN events log – Stage 3
November 2021
MDS implementation plan ends – Stage 5



APPENDIX V - DOCUMENTS WITH MDS VARIABLES

MDS OF CENTRALIZED URGENCY/EMERGENCY CONSULTATION DOCUMENT[69]

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Centralized urgency/emergency consultation This document lists the variables of the MDS for urgent and emergency consultations in hospital and clinic settings, as well as secondary facilities where the consultation is considered a centralized urgent or emergency consultation.				
Data identifying the care event and document				
Date document was signed	Date	yyyy/mm/dd		✓
Date and time of consultation	Date	yyyy/mm/dd hh:mm:ss		✓
Responsible party	Coded	Registry of professionals (CJP)		✓
Data about the institution and patient				
This data will appear in all documents and will always be visible to physicians and other professionals accessing the clinical document during a patient's care. Reference: Implementation Guide for Minimum CDA Elements: CDA-R2 from HL7 V3, https://centrodeconocimiento.agesic.gub.uy/web/salud.uy/guías.				
Data about the care process				
Reason for consultation				
Description	Coded	SNOMED CT	List of the reason(s) that led patient to seek consultation. Main presenting symptom that led to consultation.	✓
End of consultation				
Description of the reason for end of consultation	Coded	* Medical discharge	List of details about the end of the consultation.	✓

69 https://www.impo.com.uy/bases/decretos-originales/122-2019/20

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Description of the reason for end of consultation	Coded	* Self-discharge without physician's knowledge * Self-discharge with physician's knowledge * Hospitalization * Home hospitalization * Transfer to other care facility * Death	List of details about the end of the consultation.	✓
Diagnoses				
Diagnosis(es), clinical hypothesis(es), or health problems of patient. The date of onset, status, and level of certainty can also be specified for each suggested diagnosis.				
Diagnosis				
Description of diagnosis	Coded	SNOMED-CT	Name of the diagnosis or health problem found in the patient.	✓
Date of onset	Date	yyyy/mm/dd	Exact or estimated date of health problem onset.	✓
Status	Coded	* Resolved * Unresolved	Classification of the health problem or diagnosis, based on whether it had been resolved as of the end of the consultation.	✗
Level of certainty	Coded	* Unconfirmed * Confirmed	Determination of the level of confidence in the diagnosis or identification of the health problem as of the end of the consultation.	✓

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Diagnosis of complication(s)				
Description of complication(s)	Coded	SNOMED-CT	Name of the complication found in the patient.	✓
Date of onset	Date	yyyy/mm/dd	Date of onset of the complication.	✓
Status	Coded	* Resolved * Unresolved	Classification of the complication, based on whether it had been resolved as of the end of the consultation.	✗
Level of certainty	Coded	* Unconfirmed * Confirmed	Determination of the level of confidence in identified complication at the end of the consultation.	✓
Information about patient's clinical progress				
Occurrence of adverse events	Coded	* Yes * No	Occurrence of adverse events during care, allergic reactions to medications, falls, bedsores, or any other situation that falls within the definition of an adverse event.	✓
Description of adverse event	Coded	SNOMED-CT	Description of adverse event	✓
Relevant procedures performed				
Description of procedure	Coded	SNOMED-CT	This includes both diagnostic procedures (lab tests, radiology) and therapeutic procedures (peripheral intravenous lines, catheterizations, oxygen therapy, endotracheal intubation, surgical procedures, etc.).	✗

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Date of procedure	Date	yyyy/mm/dd		✗
Result	Coded	* Normal * Abnormal		✗
Relevant observations	Text		Space for any comments following the study to highlight or indicate the aspect(s) that were abnormal.	✗
Information about treatments performed				
Non-pharmacological				
These are treatment recommendations that do not involve the use of medications (e.g., oxygen therapy, nutritional recommendations, rest or physical activity restrictions, etc.).				
Recommendation				
Description of recommendation	Text		Details about recommendation	✗
Pharmacological				
Medication	Coded	National Dictionary of Medicines and related products	Active ingredient(s) + potency and unit of measure + pharmaceutical dosage form	✓
Route of administration	Coded	National Dictionary of Medicines and related products	List of possible routes, depending on medication's method of administration	✓
Quantity	Number			✓
Frequency of administration	Text			✗
Start date	Date	yyyy/mm/dd	Prescribed medication start date	✗
End date	Date	yyyy/mm/dd	End date for acute care cases	✗
Duration	Number	Number of days		✓
Information about treatments indicated at the end of care				

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Medical recommendations at the end of the consultation to continue patient's treatment				
Non-pharmacological				
Description of recommendation	Text		Description or name of the non-pharmacological treatment recommended at the end of the patient's care.	✗
Pharmacological				
Medication	Coded	National Dictionary of Medicines and related products	Active ingredient(s) + potency and unit of measure + pharmaceutical dosage form	✓
Route of administration	Coded	National Dictionary of Medicines and related products	List of possible routes, depending on medication's method of administration	✓
Quantity	Number			✓
Frequency of administration	Text			✓
Time of administration	Text		Time of administration of medication according to recommendations. (Taken on an empty stomach, before lunch, etc.)	✓
Start date	Date	yyyy/mm/dd	Prescribed medication start date	✗
End date	Date	yyyy/mm/dd	End date for acute care cases	✗
Duration in days	Number			✓
Status of prescription	Coded	* Active * Inactive	This classification makes it possible to group patient's active prescriptions in electronic prescribing systems.	✗

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Follow-up instructions				
Date of next consultation	Date	yyyy/mm/dd	Date of the next confirmed consultation (where applicable).	✗
Days until next consultation	Number		The number of days the professional estimates should pass before the patient should return for another consultation or be seen by a physician for further monitoring or care.	✓
Discharge referral	Text		Specifies the area or service to which the patient has been referred for further monitoring or care.	✗

MDS OF OUT-OF-HOSPITAL URGENCY/EMERGENCY CONSULTATION DOCUMENT

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Out-of-hospital urgency/emergency consultation				
This document lists the variables of the MDS defined for urgent and emergency consultations in out-of-hospital settings, both for home visits and in public spaces.				
Data identifying the care event and document				
Date document was signed	Date	yyyy/mm/dd		✓
Date and time of consultation	Date	yyyy/mm/dd hh:mm:ss		✓
Responsible party	Coded	Registry of professionals (CJP)		✓
Data about the institution and patient				
This data will appear in all documents and will always be visible to physicians and other professionalsaccessing the clinical document during a patient's care. Reference: Implementation Guide for Minimum CDA Elements: CDA-R2 from HL7 V3, https://centrodeconocimiento.agesic.gub.uy/web/salud.uy/guías.				
Data about the care process				
Reason for consultation				
Description	Coded	SNOMED-CT	List of the reason(s) that led patient to seek consultation. Main presenting symptom that led to consultation.	✓
End of consultation				

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Description of the reason for end of consultation	Coded	* Medical discharge * Self-discharge without physician's knowledge * Self-discharge with physician's knowledge * Hospitalization * Transfer to centralized emergency department * Transfer by another provider * Death	List of details about the end of the consultation.	✓
Diagnoses				
Diagnosis(es), clinical hypothesis(es), or health problems of patient. The date of onset, status, and level of certainty can also be specified for each suggested diagnosis.				
Diagnosis				
Description of diagnosis	Coded	SNOMED-CT	Name of the diagnosis or health problem found in the patient.	✓
Date and time of onset	Date	yyyy/mm/dd hh:mm:ss	Exact or estimated date of health problem onset.	✓
Status	Coded	* Resolved * Unresolved	Classification of the health problem or diagnosis, according to whether it was resolved as of the end of the consultation.	✗
Level of certainty	Coded	* Unconfirmed * Confirmed	Determination of the level of confidence in the diagnosis or identification of the health problem as of the end of the consultation.	✓

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Diagnosis of complication(s)				
Description of complication(s)	Coded	SNOMED-CT	Name of the complication found in the patient.	✓
Date of onset	Date	yy/mm/dd	Date of onset of the complication.	✓
Status	Coded	* Resolved * Unresolved	Classification of the complication, according to whether it had been resolved as of the end of the consultation.	✗
Level of certainty	Coded	* Unconfirmed * Confirmed	Determination of the level of confidence in the identification of the complication as of the end of the consultation.	✓
Information about patient's clinical progress				
Occurrence of adverse events	Coded	* Yes * No	Occurrence of adverse events during care, allergic reactions to medications, falls, bedsores, or any other situation that falls within the definition of an adverse event.	✓
Description of adverse event	Coded	SNOMED-CT		✗
Relevant procedures performed				
Description of procedure	Coded	SNOMED-CT	This includes both diagnostic procedures (lab tests, radiology) and therapeutic procedures (peripheral intravenous lines, catheterizations, oxygen therapy, endotracheal intubation, surgical procedures, etc.).	✗
Date of procedure	Date	yyyy/mm/dd		✗

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Result	Coded	* Normal * Abnormal		✗
Relevant observations	Text		Space for any comments following the study to highlight or indicate the aspect(s) that were abnormal.	✗
Information about treatments performed				
Non-pharmacological				
These are treatment recommendations that do not involve the use of medications (e.g., oxygen therapy, nutritional recommendations, rest or physical activity restrictions, etc.).				
Recommendation				
Description of recommendation	Text		Details about recommendation	✗
Pharmacological				
Prescribed medication	Coded	National Dictionary of Medicines and related products	Active ingredient(s) + potency and unit of measure + pharmaceutical dosage form	✓
Route of administration	Coded	National Dictionary of Medicines and related products	List of possible routes, depending on medication's method of administration	✓
Quantity	Number			✓
Frequency of administration	Text			✗
Start date	Date	yyyy/mm/dd	Prescribed medication start date	✗
End date	Date	yyyy/mm/dd	End date for acute care cases	✗
Duration	Number	Number of days		✓
Information about treatments indicated at the end of care				

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Medical recommendations at the end of the consultation to continue patient's treatment				
Non-pharmacological				
Description of recommendation	Text		Description or name of non-pharmacological treatment recommended at the end of the patient's care.	✗
Pharmacological				
Prescribed medication (generic)	Coded	National Dictionary of Medicines and related products	Active ingredient(s) + potency and unit of measure + pharmaceutical dosage form	✓
Route of administration	Coded	National Dictionary of Medicines and related products	List of possible routes, depending on medication's method of administration	✓
Quantity	Number			✓
Frequency of administration	Text			✗
Start date	Date	yyyy/mm/dd	Prescribed medication start date	✗
End date	Date	yyyy/mm/dd	End date for acute care cases	✗
Duration in days	Number			✓
Status of prescription	Coded	* Active * Inactive	This classification makes it possible to group patient's active prescriptions in electronic prescribing systems.	✗
Follow-up instructions				
Date of next consultation	Date	yyyy/mm/dd	Date of the next confirmed consultation (where applicable).	✗

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Days until next consultation	Number		The number of days the professional estimates should pass before the patient should return for another consultation or be seen by a physician for further monitoring or care.	✓
Discharge referral	Text		Specifies the area or service to which the patient has been referred for further monitoring or care.	✗

MDS OF NONURGENT CONSULTATION DOCUMENT

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
MDS for nonurgent consultations				
This is the MDS that should be entered for nonurgent consultations, both in institutional settings and in the patient's home.				
Data identifying the care event and document				
Date document was signed	Date	yyyy/mm/dd		✓
Date and time of consultation	Date	yyyy/mm/dd hh:mm:ss		✓
Responsible party	Coded	Registry of professionals (CJP)		✓
Data about the institution and patient				
This data will appear in all documents and will always be visible to physicians and other professionals accessing the clinical document during a patient's care. Reference: Implementation Guide for Minimum CDA Elements: CDA-R2 from HL7 V3, (https://centrodeconocimiento.agesic.gub.uy/web/salud.uy/guías)				
Data about the care process				
Reason for consultation				
Description	Coded	SNOMED-CT	List of the reason(s) that led patient to eek consultation. Main presenting symptom that led to consultation.	✓
Diagnoses				
Diagnosis(es), clinical hypothesis(es), or health problems of patient. The date of onset, status, and level of certainty can also be specified for each suggested diagnosis.				

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Diagnosis				
Description of diagnosis	Coded	SNOMED-CT	Name of the diagnosis or health problem found in the patient.	✓
Start date	Date	yyyy/mm/dd	Exact or estimated date of health problem onset.	✓
Status	Coded	* Resolved * Unresolved	Classification of the health problem or diagnosis, according to whether it was resolved as of the end of the consultation.	✗
Level of certainty	Coded	* Unconfirmed * Confirmed	Determination of the level of confidence in identified diagnosis or health problem.	✓
Relevant procedures performed				
Description of procedure	Coded	SNOMED-CT	This includes both diagnostic and therapeutic procedures performed during the consultation.	✗
Date of procedure	Date	yyyy/mm/dd	Date procedure performed.	✗
Result	Coded	* Normal * Abnormal		✗
Relevant observations	Text		Space for any comments following the study to highlight or indicate the aspect(s) that were abnormal.	✗
Information about treatments performed during care				
Non-pharmacological				
These are treatment recommendations that do not involve the use of medications (oxygen therapy, nutritional recommendations, rest or physical activity restrictions, etc.).				

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Recommendation				
Description of recommendation	Text		Description of the type of non-pharmacological treatment performed during the consultation.	✗
Pharmacological				
Medication	Coded	National Dictionary of Medicines and related products	Active ingredient(s) + potency and unit of measure + pharma-ceutical dosage form	✓
Route of administration	Coded	National Dictionary of Medicines and related products	List of possible routes, depending on medication's method of administration.	✓
Quantity	Number			✓
Frequency of administration	Text			✗
Start date	Date	yyyy/mm/dd	Prescribed medication start date	✗
End date	Date	yyyy/mm/dd	End date for acute care cases	✗
Duration in days	Number			✓
Status of prescription	Coded	* Active * Inactive	This classification makes it possible to group patient's active prescriptions in electronic prescribing systems.	✗
Information about treatments indicated at the end of care				
Medical recommendations at the end of the consultation to continue patients' treatment				
Non-pharmacological				
Description of recommendation	Text		Description or name of non-pharmacological treatment recommended at the end of the patient's care.	✗
Pharmacological				

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Medication	Coded	National Dictionary of Medicines and related products	Active ingredient(s) + potency and unit of measure + pharma-ceutical dosage form	✓
Route of administration	Coded	National Dictionary of Medicines and related products	List of possible routes, depending on medication's method of administration.	✓
Frequency of administration	Text			✓
Time of administration	Text		Time of administration of medication according to recommendations. (Taken on an empty stomach, before lunch, etc.)	✓
Start date	Date	yyyy/mm/dd	Prescribed medication start date	✗
End date	Date	yyyy/mm/dd	End date for acute care cases	✗
Duration in days	Number			✓
Status of prescription	Coded	* Active * Inactive	This classification makes it possible to group patient's active prescriptions in electronic prescribing systems.	✗
Follow-up instructions				
Date of next consultation	Date	yyyy/mm/dd	Date of the next confirmed consultation (where applicable).	✗
Days until next consultation	Number		The number of days the professional esti-mates should pass be-fore the patient should return for another consultation or be seen by a physician for further monitoring or care.	
Discharge referral	Text		Specifies the area or service to which the patient has been referred for further monitoring or care.	✗

MDS OF HOSPITAL DISCHARGE DOCUMENT

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Hospital discharge				
This document lists the variables of the MDS for patient discharges in hospital and clinic settings, as well as discharges from home hospitalization. It also includes nursing data.				
Data identifying the care event and document				
Date document was signed	Date	yyyy/mm/dd		✓
Date of admission	Date	yyyy/mm/dd		✓
Date of discharge	Date	yyyy/mm/dd		✓
Readmission	Coded	* Yes * No	Readmission is defined as the admission of a patient within 30 days of being discharged for a medical problem related to the diagnostic code used during the previous admission.	✓
Attending physician	Coded	Registry of professionals (CJP)		✓
Area of specialty	Coded	Registry of specialties	Function or specialty of the attending physician signing the patient's discharge form.	✗
Attending nurse	Coded	Registry of professionals (CJP)	Registered nurse responsible for the care of the patient being discharged.	✓
Data about the institution and patient				
This data will appear in all documents and will always be visible to physicians and other professionals accessing the clinical document during a patient's care. Reference: Implementation Guide for Minimum CDA Elements: CDA-R2 from HL7 V3, (https://centrodeconocimiento.agesic.gub.uy/web/salud.uy/guías)				

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Data about the care process				
Reason for admission				
Description	Coded	SNOMED-CT	List of the reason(s) that the patient was admitted.	✓
Type of admission				
Description	Coded	* Emergency * Planned	Description of the conditions under which the patient was admitted.	✓
Patient's discharge condition				
Description of the reason for end of medical care	Coded	* Medical discharge * Self-discharge without physician's knowledge * Self-discharge with physician's knowledge * Hospitalization in other facility * Home hospitalization * Transfer to other care facility * Death	List of details about the end of the patient's care at the institution.	✓
Diagnoses				
Diagnosis(es), clinical hypothesis(es), or health problems of patient. The date of onset, status, and level of certainty can also be specified for each suggested diagnosis.				
Primary diagnosis				
Description of primary diagnosis	Coded	SNOMED-CT	Name of the nosological diagnosis or health problem found in the patient.	✓

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Date of onset	Date	yyyy/mm/dd	Exact or estimated date of health problem onset.	✗
Status	Coded	* Resolved * Unresolved	Classification of the health problem or diagnosis, based on whether it had been resolved as of the time of discharge.	✗
Level of certainty	Coded	* Unconfirmed * Confirmed	Determination of the level of confidence in the diagnosis or identification of the health problem as of time of discharge.	✓
Secondary diagnosis(es)				
Description of secondary diagnosis	Coded	SNOMED-CT	Name of the secondary diagnosis or health problem found in the patient.	✓
Date of onset	Date	yyyy/mm/dd	Exact or estimated date of health problem onset.	✗
Status	Coded	* Resolved * Unresolved	Classification of the health problem or diagnosis, according to whether it had been resolved as of the time of discharge.	✗
Level of certainty	Coded	* Unconfirmed * Confirmed	Determination of the level of confidence in the diagnosis or identification of the health problem as of time of discharge.	✓
Diagnosis of complication(s)				
Description of complication(s)	Coded	SNOMED-CT	Name of the complication found in the patient.	✓
Date of onset	Date	yyyy/mm/dd	Date of onset of the complication.	✗
Status	Coded	* Resolved * Unresolved	Classification of the health problem or diagnosis, according to whether it had been resolved as of the time of discharge.	✗

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Level of certainty	Coded	* Unconfirmed * Confirmed	Determination of the level of confidence in the diagnosis or identification of the health problem as of time of discharge.	✓
Comorbidity(ies)	Coded		List of the patient's comorbidities (independent of the admitting diagnosis).	
Description of identified comorbidities	Coded	SNOMED-CT	List of the patient's additional condition(s), independent of the primary diagnosis.	✓
Date of onset	Date	yyyy/mm/dd	Exact or estimated date of health problem onset.	✗
Status	Coded	* Resolved * Unresolved	Classification of the health problem or diagnosis, according to whether it had been resolved as of time of discharge.	✗
Level of certainty	Coded	* Unconfirmed * Confirmed	Determination of the level of confidence in the diagnosis or identification of the health problem as of time of discharge.	✓
Nursing diagnoses				
Nursing need level	Coded	* Minimal Care * Medium Care * Frequent Care * Total Care	Patient classification by level of nursing need, based on Virginia Henderson's Nursing Need Theory. Classification models are available for both adult care and pediatrics.	✓
Nursing diagnosis	Text	ICNP-SNOMED CT and NANDA codes are also supported.	The nursing diagnosis follows the comprehensive nursing assessment, where the nurse gathers information about the patient's health status. It contains the diagnoses or problems present at the time of hospital discharge.	✓

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Information about patient's clinical progress				
Occurrence of adverse events	Coded	* Yes * No	Occurrence of adverse events during care, allergic reactions to medications, falls, bedsores, or any other situation that falls within the definition of an adverse event.	✗
Description of adverse event	Coded	SNOMED-CT	List of adverse events.	✗
Entry into restricted access area	Coded	* Yes * No	This section indicates whether the patient was admitted to restricted access areas during their hospitalization. Includes admission to hospitals' intensive care unit, intermediate care unit, immunocompromised area, burn unit, transplant unit, isolation rooms, and similar areas.	✓
Type of restricted access area	Coded	* Intensive care unit * Solid organ transplant recipients * Bone marrow transplant recipients * Coronary care units * Stroke Units (neurocritical care units for stroke patients) * Burn center		✗
Relevant procedures performed				

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Description of procedure	Coded	SNOMED-CT	This includes both diagnostic procedures (lab tests, radiology) and therapeutic procedures (peripheral intravenous lines, catheterizations, oxygen therapy, endotracheal intubation, surgical procedures, etc.).	✗
Date of procedure	Date	yyyy/mm/dd	Date procedure was performed.	✗
Outcome	Coded	* Normal * Abnormal		
Relevant observations	Text		Space for any comments following the study to highlight or indicate the aspect(s) that were abnormal.	✗
Summary of information about relevant complementary tests				
Laboratory				
Test	Coded	SNOMED-CT		✓
Date of test	Date	yyyy/mm/dd		✓
Result of test	Coded	* Normal * Abnormal		✗
Relevant observations	Text			✗
Imaging study				
Test	Coded	SNOMED-CT		✓
Date of test	Date	yyyy/mm/dd		✓
Relevant observations	Text			✗
Other tests				
Test	Coded	SNOMED-CT		✓
Date of test	Date	yyyy/mm/dd		✓
Relevant observations	Text			✓

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Information about relevant treatments performed				
Non-pharmacological				
These are treatment recommendations that do not involve the use of medications (e.g., oxygen therapy, nutritional recommendations, rest or physical activity restrictions, etc.).				
Recommendation				
Description of recommendation	Text			✗
Pharmacological				
Prescribed medication (generic)	Coded	National Dictionary of Medicines and related products	Active ingredient(s) + potency and unit of measure + pharma-ceutical dosage form	✓
Route of administration	Coded	National Dictionary of Medicines and related products	List of possible routes, depending on medication's method of administration.	✓
Quantity	Number			✓
Frequency of administration	Text			✗
Start date	Date	yyyy/dd/mm	Prescribed medication start date	✗
End date	Date	yyyy/dd/mm	End date for acute care cases	✗
Duration in days	Number			✓
Information about treatments indicated at the end of care				
Medical recommendations at the end of the consultation to continue patients' treatment				
Non-pharmacological				
Description of recommendation	Text		Description or name of non-pharmacological treatment recommended at the end of the patient's care.	✗
Pharmacological				
Prescribed medication (generic)	Coded	National Dictionary of Medicines and related products	Active ingredient(s) + potency and unit of measure + pharma-ceutical dosage form	✓

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Route of administration	Coded	National Dictionary of Medicines and related products	List of possible routes, depending on medication's method of administration.	✓
Quantity	Number			✓
Frequency of administration	Text			✓
Time of administration	Text		Time of administration of medication according to recommendations. (Taken on an empty stomach, before lunch, etc.)	✓
Start date	Date	yyyy/mm/dd	Prescribed medication start date	✗
End date	Date	yyyy/mm/dd	End date for acute care cases	✗
Duration in days	Number			✓
Status of prescription	Coded	* Active * Inactive	This classification makes it possible to group patient's active prescriptions in electronic prescribing s ystems.	✗
Follow-up instructions				
Date of next consultation	Date	yyyy/mm/dd	Date of the next confirmed consultation (where applicable).	✓
Days until next consultation	Number		Days until next unconfirmed consultation (where applicable).	✗
Discharge referral	Text		Specifies the area or service to which the patient has been referred for further monitoring or care.	✗
Nursing instructions	Text		Education or instructions given at the time of discharge.	✓
Primary caregiver	Text		Identification of primary caregiver	✓
Relationship with patient	Text		Caregiver's relationship with the patient	✓

FIELD	FORMAT	RANGE OF VALUES	EXPLANATION	REQUIRED?
Caregiver's phone number	Number		Primary caregiver's phone number	✓
Additional information / notes	Text		Assessment of personal, family, and/or environmental factors or events that may negatively influence the patient's health situation. Should include all necessary information regarding medical devices (e.g., prosthetics, surgical drains, others).	✓

IDB