Ministerio de Salud Pública

URUGUAY E-HEALTH

ACCESSIBILITY AND INTEROPERABILITY

SUMMARY

INTRODUCTION

E-health is a key tool in the search for better quality, more efficient, and effective healthcare systems that must go hand in hand with regulations, guarantees regarding the use of information, and cybersecurity strategies, among other matters to be taken into account.

The use of digital solutions results in several benefits, such as shorter wait times; the systematization, selection, and analysis of information for subsequent decision-making; and the possibility of real-time monitoring of different aspects of management. But above all, digital tools allow the reduction of economic investment in the systems in which they are applied without reducing their efficiency, but on the contrary, improving it.

In 2019, 81% of Uruguayan households had connectivity; it is the country with the second highest connectivity in South America.

As a response to the arrival of the COVID-19 pandemic in the country, the Uruguayan government created the National Coronavirus Plan which, focusing on the individual and with the objective of implementing transparent management, involved the creation of new communication channels that integrated healthcare providers and laboratories on the same platform.

To carry out this multichannel strategy, several tools were created with different specific objectives that worked together to monitor the status of the pandemic in the country. The tools were both for internal management of the institutions for the purposes of interoperability between them, as well as for information for the general population.

BACKGROUND

As a way of making improvements in the quality of health services a possibility, as well as to ensure that it was included in the modernization of technological processes, Health was included by Decree No. 607/2011 in the "Agenda digital Uruguay 2011-2015" as a priority of the Presidency of the Republic, supported by the initiative of the Agency for Electronic Governance and Information and Knowledge Society (AGESIC).

To implement this strategy, with the aim of strengthening the technological [sic] of information (ICT) in the health sector, the Salud.uy program was created through an agreement between the Presidency of the Republic, AGESIC, the Ministry of Public Health (MSP), and the Ministry of Economy and Finance (MEF).

The governance of the Salud.uy program was defined by law and is embodied in an Advisory Council on Digital Health Policies made up of representatives of the MSP, the MEF, the Public Policy Monitoring and Evaluation Agency, AGESIC, and the Health Technology Evaluation Agency.

The main objective defined in the lines of work to support and strengthen health policies was the creation of a National Electronic Medical Record (HCEN).

The HCEN, which is an interoperability platform, had two differentiated objectives that it needed to achieve over time:

1. In the first stage, to promote continuity of service, quality of registration, and complementarity of services among providers.
2. The second, which is where Uruguay is today, is to advance in data analytics to support decision-making for the determination of public health policies, for the management of health service providers, and to evaluate the quality of the services provided to the users of the health system.

Uruguay's health system is made up of comprehensive public and private healthcare providers, as well as partial providers. Uruguay's population chooses some of these providers to receive the health care that is mandatory by law.

Each healthcare institution has management systems and electronic medical records to manage and record the provision of services to its users.

When the government decided to include healthcare in the country's digital strategy, most providers had already installed their Electronic Medical Record (HCE) systems or were in the process of doing so. In order to respect the work carried out and the investments made, it was assumed that each provider would maintain its own HCE, so it would not be compulsory for everyone in the country to install it.

In 2017, Decree No. 242/017 was enacted regarding the "mechanisms for the exchange of clinical information for care purposes through the National Electronic Medical Record (HCEN) system", which in its third provision makes it mandatory for public and private providers to keep an electronic medical record and authorizes the MSP to establish the conditions and deadlines for its implementation.

The aforementioned decree also made it mandatory for all healthcare providers to use the National Electronic Medical Record platform. In October of the same year, Ministerial

Order No. 1085/017 was issued, approving the plan for the adoption of the National Electronic Medical Record by all healthcare providers in the country.

DATA PROTECTION ACT

The incorporation of Health into Uruguay's Digital Agenda, as well as all the advances that this has led to, was made possible thanks to the 2008 enactment of the Personal Data Protection Act (Law No. 18,331).

Although the protection of personal data was already included in the Constitution of the Republic, in its article 72, this law, in particular, establishes that such protection must also be given in relation to "personal data recorded in any medium that makes the data susceptible to processing, and to any form of subsequent use of such data by the public or private sectors", except for databases maintained by individuals in the exercise of exclusively personal or domestic activities, those whose purpose is public security, defense, State security and its activities in criminal matters, investigation, and suppression of crime. In addition to those databases created and regulated by special laws.

HCEN INTEROPERABILITY PLATFORM: National Electronic Medical Record

The National Electronic Medical Record (HCEN) is an interoperability platform, it is not an Electronic Medical Record, nor is it a database.

The HCEN was created to ensure and improve the continuity of the healthcare process for users of the Uruguayan healthcare system by allowing accessibility and availability of citizens' medical information by the healthcare team in the event of a medical assistance event. This is done in a timely, secure, and online manner through a mechanism that allows unifying and making available all the medical information of the health system user, regardless of the geographic location and the health care provider where the user seeks medical care.

This approach respects the technological heterogeneity of the providers that make up the health system in which each one has its own Electronic Medical Record system. This promotes the improvement of each organization's information systems, adapting them to international interoperability standards and generating a central healthcare platform that orchestrates and audits the secure and controlled exchange of medical information for healthcare purposes.

The sum of each of an individual's medical documents will constitute the patient's HCE, available online for immediate consultation by the different healthcare providers and professionals, under the condition that they have the necessary permissions to access such information.

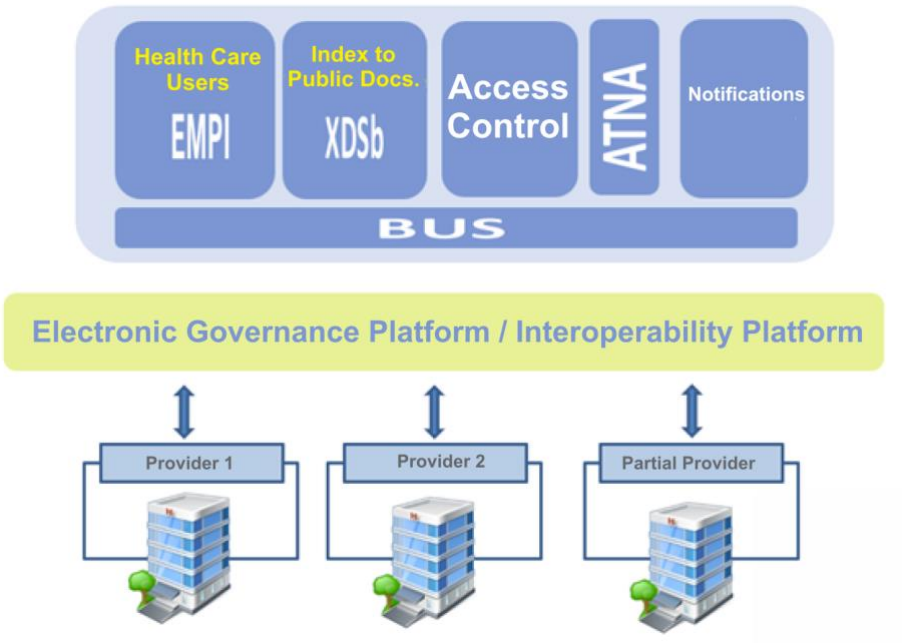
Guiding principles of the HCEN platform

- Rules for syntactic and semantic interoperability are defined.
- Standards are defined.
- Each healthcare provider maintains its own systems, HCEN is not software.
- Each healthcare provider is the legal custodian of the medical record and stores the medical documents of each user.
- Architecture with federated repositories and centralized registry.
- The HCEN health platform contains records of individuals and medical events (it does not store clinical information).
- Integrated by an infrastructure that is sustainable over time (health network, HCEN platform, Electronic Governance Platform).

Architecture of the HCEN platform

The architecture of the HCEN platform was defined jointly by the technical teams of Salud.uy and AGESIC.

HCEN is part of the Electronic Governance Platform (PGE), thus guaranteeing the security of the developments and components to be published.



- It allows health institutions and organizers to exchange clinical information through a private network. It keeps the user and clinical events records.
- It allows the healthcare team to have access to all clinical information at the time of consultation, regardless of where it was generated.
- Salud.uy provides the necessary technical support for institutions to comply with HCEN regulations.

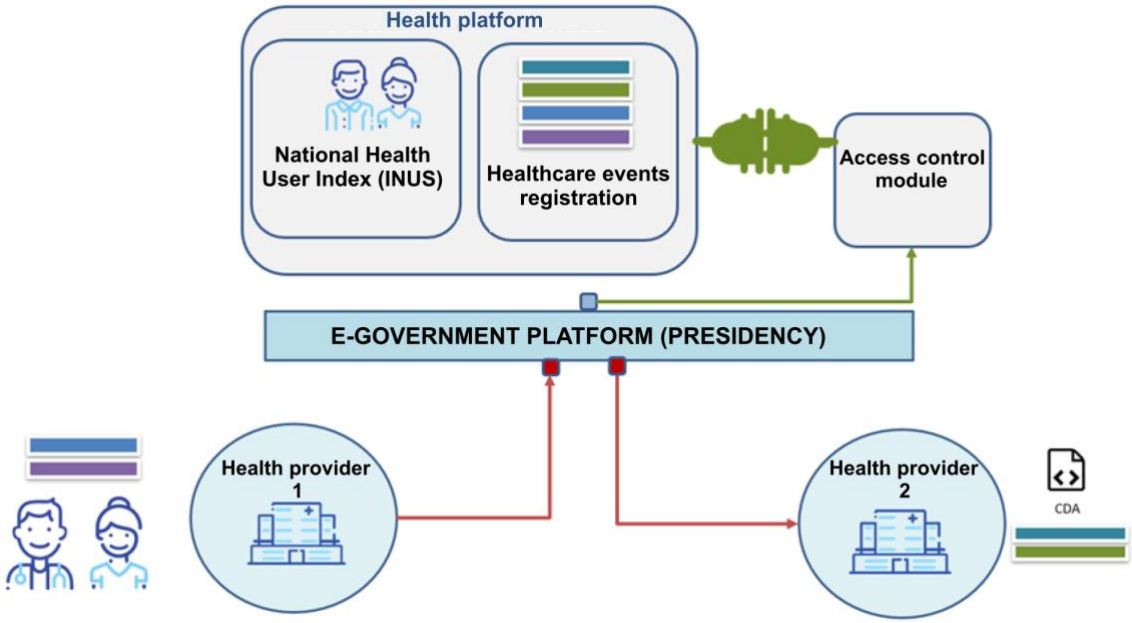
National event registration - National XDS

- As the word implies, the HCEN platform allows the secure exchange of information but does not store patient care data.
- HCEN contains an index of health events in the physical repositories where the data is stored within each health care provider. Data such as, for example, repository ID, event date, and document type are stored.
- The XDS implementation is based on the XDS.b profile of IHE.

EMPI (Enterprise Master Patient Index)

- Centralized registry of patronymic data of users of the National Integrated Health System.
- Its main objective is that the user is unequivocally identified regardless of the healthcare facility where such user has been assisted.
- Management of domains by the institution
- Applies phonetic algorithms to the data
- Applies algorithms based on weights on a person's data.
- Implements HL7 standards, HL7 standard, e.g.: ADT 04.
- Implements IHE ATNA, PIX/PDQ profiles.

How does HCEN work when going to the doctor?



1. The patient goes to the doctor at the health care provider 1.
2. By logging into the institution's Hospital Information System (HIS), the doctor accesses the patient's Electronic Health Record. Upon entering the medical record, the provider's HIS internally queries through the e-Government Platform whether that patient has other clinical events registered with other healthcare providers.
3. To access these events, the access control module is consulted, where each patient can indicate whether or not he/she allows all other healthcare providers to access his/her information.
4. With the patient's consent, through the HCEN platform, the doctor will be able to access all recorded medical records and thus be able to treat the patient, having access to all previous medical records. For example, in the case of the diagram above, the clinical events registered for that patient in healthcare provider 2, could be accessed from healthcare provider 1.

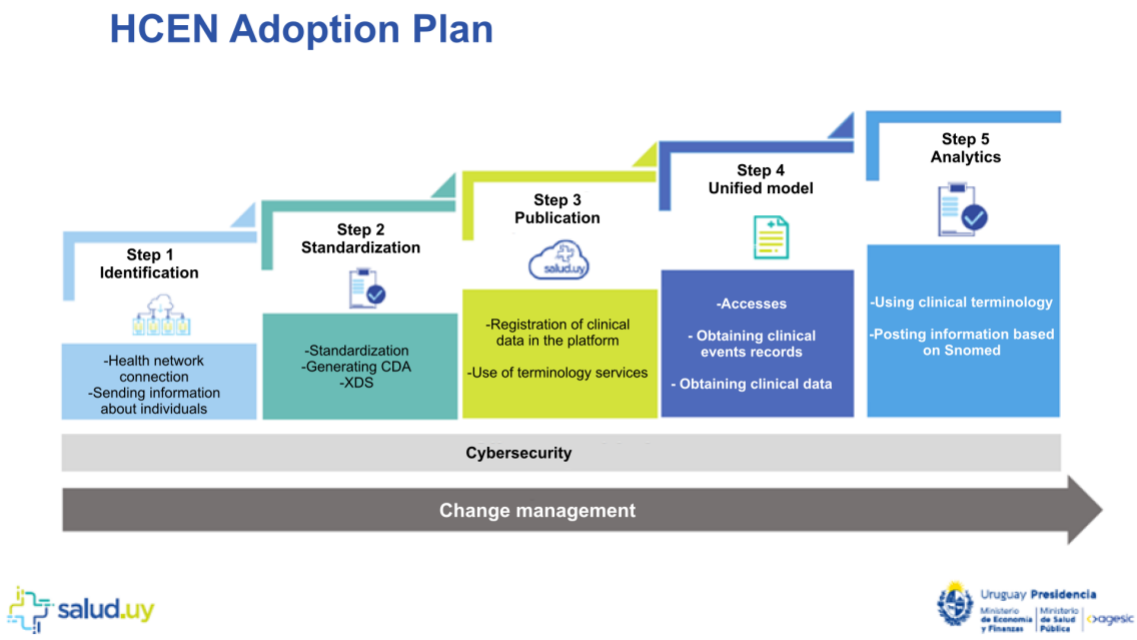
HCEN video: https://www.youtube.com/watch?v=IXP0FlzU69M

HCEN ADOPTION PLAN (PDA) and MINIMUM SET OF DATA (CMD)

To achieve interoperability through the exchange and use of clinical information handled by the different information systems, Salud.uy defined and implemented a strategic work plan called the HCEN Adoption Plan (PDA).

Through its implementation, the country's health care providers achieved the necessary technical, syntactic, and semantic interoperability, building a fundamental pillar to ensure continuity of care.

The HCEN PDA established the deadlines and objectives to be met by the public and private health ecosystem according to the categories of institutions to develop the four stages set out in the ordinance, following technical guidelines prepared by the Salud.uy program.



To date, progress continues to be made in the implementation of the HCEN adoption plan, supporting healthcare institutions and collaborating in the definition of adoption priorities and products associated with the National Electronic Medical Record (HCEN), aligning each case with its institutional strategic plan.

Currently, 95% of the population of Uruguay has some clinical documents in the HCEN. The platform has more than 65 million registered clinical documents and more than 17

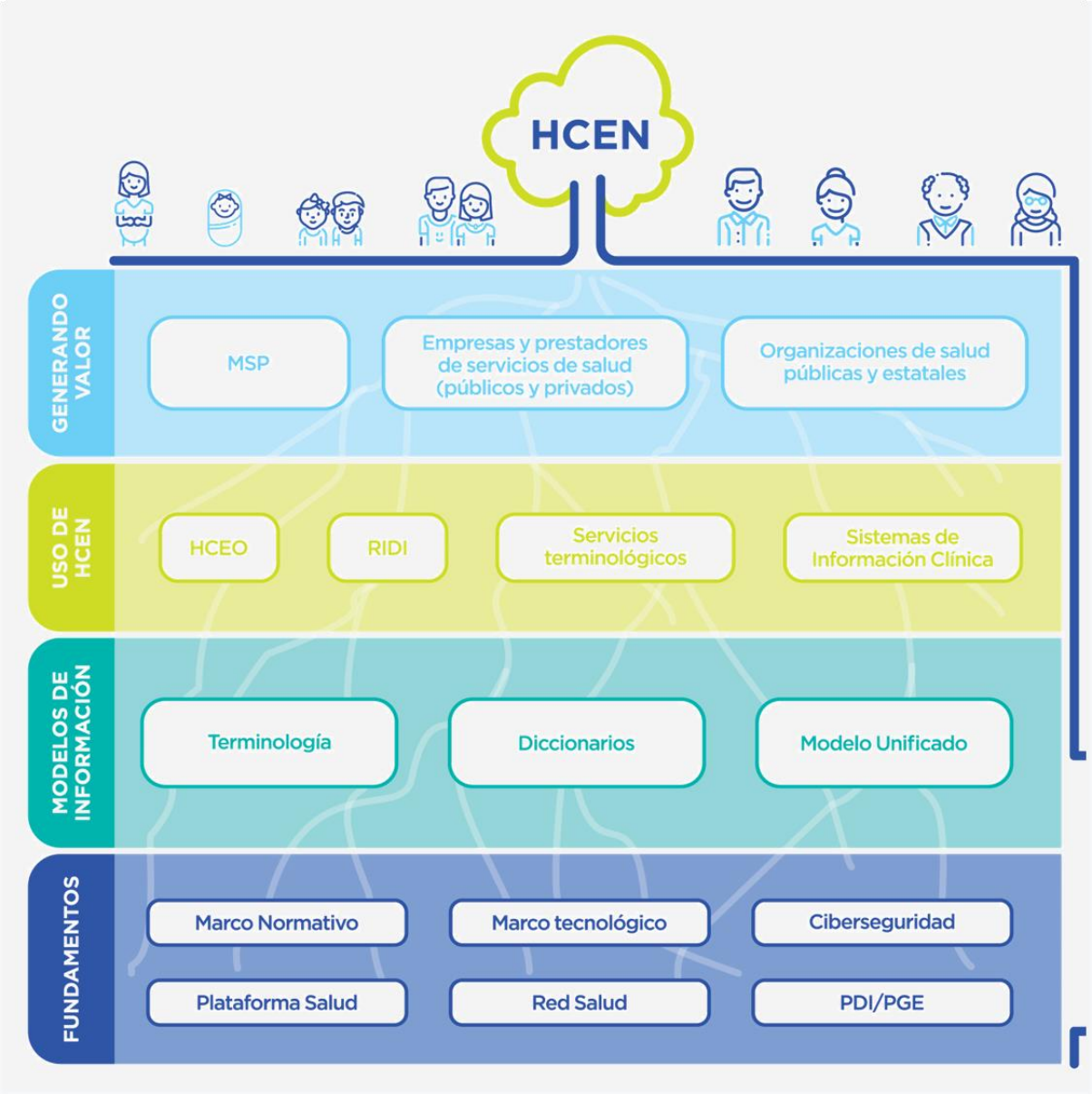
million event queries have been made to the platform and more than 600,000 documents have been effectively exchanged.

In the beginning, the data entered by healthcare providers in their patients' EHRs were not structured. Many of them were only entered as PDFs, which, although when read by the doctor allowed for the patient's continuity of care (HCEN's primary objective), did not allow for subsequent analysis.

To solve this situation and move forward, work continues being made on the fifth stage of the PDA (Decree 122/018 and its ordinances), which includes the standardization and structuring of clinical information through the implementation of **minimum data sets (hereinafter CMD).**

The content of all the CMDs is the result of a consensus between the government and healthcare providers and is materialized in a ministerial ordinance establishing the plan for their incorporation. To this end, Salud.uy provides a set of technical tools and instruments to facilitate the use of terminology and the generation of CDA level 3 documents: technical semantic guides, CDA implementation guides, and good practice guides, among others, defined based on international standards.

The structuring of the information that providers must register in the HCEN is carried out gradually. Technical guidelines were defined for the CMDs that refer to different health events: outpatient, urgent, centralized, and decentralized consultations, hospitalization discharges, etc. Currently, imaging and laboratory CMDs are about to be implemented.



TERMINOLOGY SERVICES

Terminology services (ST) are a very important component in the development of the National Electronic Medical Record (HCEN) since their implementation is aimed at strengthening the semantic quality of the data recorded during a healthcare event.

Through terminology services, clinical information is recorded in a structured manner using an international standard defined at the country level (SNOMED-CT) that guarantees, on the one hand, the necessary semantic interoperability and, on the other, that the information stored can be reused for other purposes (management, research) and even mapped with international classifications such as the International Classification of Diseases (ICD-10), procedures (ICD-9-MC) and drugs (ATC), among others.

Salud.uy decided to adopt the use of SNOMED CT for the semantic development of the HCEN given its wide capacity to represent different domains and hierarchies of the doctor's knowledge. The use of this standard was defined because it is the most widely used comprehensive, multilingual clinical terminology in the world, present in more than 50 countries, with validated scientific content and the flexibility to generate national extensions adapted to each reality. The content architecture of the SNOMED terminology core includes tables of concepts, descriptions, relationships, and history with cross-references to the ICD.

Salud.uy offers terminology services free of charge to the institutions of the National Integrated Health System that implemented it in the context of the development of the HCEN. In addition, permanent support is provided through the help desk to accompany the implementation and follow-up process of the different institutions.

CATALOGS AND CODIFICATION

To achieve semantic interoperability within the HCEN framework, it is essential to develop catalogs and dictionaries linked to the coding processes. Salud.uy, together with the MSP (Ministry of Public Health) and with the aim of reaching a consensus on different codifications for the local level based on SNOMED-CT, is permanently working on the standardization and updating of the different catalogs (for example catalog of health services, National Dictionary of Drugs and Related Products, National Index of Events and its ontology of electronic clinical documents.)

DISTRIBUTION AND TERMINOLOGY UPDATE

From the beginning, free licensing is provided to all the health institutions that wish and need to work based on the SNOMED-CT medical terminology. The strategy for distributing SNOMED-CT extensions and performing their maintenance continued to be implemented by Salud.uy through the online SNOMED-CT Licensing and Distribution service. This work was carried out through the National Release Center (NRC) of Uruguay. The purpose of the NRC is to manage the Uruguayan extension of SNOMED-CT, which allows it to have its own concepts and terminological descriptions. Uruguayan extension publications (releases) have been released with the corresponding new concepts.

NATIONAL DICTIONARY OF DRUGS AND RELATED PRODUCTS

Among the actions defined by the HCEN component of Salud.uy as substantive needs was the generation of single dictionaries that would enable the interoperability of information systems.

The "National Dictionary of Drugs and Related Products" was essential for the MSP, pharmaceutical laboratories, pharmacies, health care providers, and other related organizations, as well as health care personnel and patients, to identify the drugs and related products available uniquely and unequivocally in the country.

For the preparation of the catalog, it was considered essential to explore and research the different implementations existing at national and international levels that had experience in this area, to achieve a product that would adopt successful experiences and that would adapt efficiently to the needs and legal provisions in force as well as to the specific regulations of our country in drugs.

The developed DNMA application was based on the SNOMED CT framework.

Currently, all systems that use drugs for both prescribing and dispensing (healthcare providers, pharmacies, etc.) are in the process of adopting this dictionary.

ICT AND HEALTH MEASUREMENTS

Within the framework of the implementation of Salud.uy, the importance of having a periodic measurement system, every two years, to analyze the progress, evolution and adoption of technology policies applied to health was defined.

The general objective was and continues to be to have information on access, use and appropriation of ICTs in the health sector to measure progress in the health ecosystem, to analyze the progress of Salud.uy, and to provide information to achieve consistent, comparable, updated, and representative statistics.

It also aims to provide evidence, information, and inputs to advise on the development of strategic lines of action and contribute to the development of public policies in the digital transformation of health, contributing with information from the perspective of users, professionals, and health managers.

ICT measurements make it possible to monitor the situation of ICT incorporation in the health sector, the levels of maturity, the possible barriers, and processes that the segments studied present in the face of digital transformation, including the needs related to change management and the existence of an enabling regulatory framework.

In 2014, because of the intensive incorporation of ICTs by healthcare institutions, the first survey on ICTs and healthcare was carried out. It studied its appropriation by healthcare workers (doctors, nurses, and nursing assistants) in healthcare institutions.

Then, in 2016, a new measurement was carried out to contrast the data with the previous results. A new dimension was also incorporated on this occasion, which included the users of health care providers, obtaining a first approximation of their needs within the framework of the digital transformation of the sector.

Following the approval of Decree 242/017, which regulates the mechanisms for the exchange of clinical information for health care purposes through the National Electronic Medical Record (HCEN) system, some methodological aspects of ICT measurement were redefined to examine in greater depth certain health system issues related to provider institutions. The purpose was to ensure compliance with national regulations.

This measurement continues to be repeated on a biannual basis until the present, allowing us to observe the evolution of the digital transformation of the sector. This information is highly appreciated by different stakeholders of the healthcare ecosystem in our country and abroad.

DATA ANALYTICS

The first objective of the HCEN platform implementation was the uninterrupted care for citizens in the scenario of a healthcare event, regardless of the healthcare provider or where in the country it occurred.

Once the first had been achieved, the second objective was data analytics for public health decision-making for the management of healthcare providers as well as to provide information to all citizens and users of the National Integrated Health System.

Salud.uy began to work to provide the necessary data to carry out different types of analytics in a centralized, efficient, and secure way.

The processes for obtaining data are many and complex, so work is being done on a technological solution based on a strategic design for the extraction of data which will then be used as input in different projects.

Salud.uy reports a series of indicators related to the IDB loan assessments, such as platform and technological services supply indicators, indicators for promoting the use of data, and management, evaluation and monitoring indicators, as well as other more

specific indicators such as those of the Population Management System for certain clinical events of great importance for decision making at the epidemiological level of the MSP.

There are also different projects related to vaccine information, population coverage, and geo-referencing of vaccinated and unvaccinated people that extend the experience of what was developed for anti-COVID-19 vaccines.

At the country's healthcare providers level, monthly quantitative assessments are conducted in compliance with the different stages of the aforementioned Adoption Plan, as well as qualitative assessments of the data entered. For the latter, we are starting with personalized interviews with the teams of each provider to analyze their information, the support scope that can be provided by Salud.uy, and a review of the improvements obtained month by month. In addition, a monthly bulletin will be sent to the highest authorities of each provider with information about their institution.

MY DIGITAL MEDICAL RECORDS

My Digital Medical Records (MiHCD) is an application implemented on HCEN's technological platform. Through it, users of the National Integrated Health System over the age of 18 can see all their healthcare events recorded in HCEN and access the clinical information stored by the providers where they received healthcare.

The Digital Health Record is clearer, safer, and more reliable than the paper medical record and is available instantly, whenever the person needs it.

MiHCD can be accessed through the internet, by entering the site gub.uy/msp with a digital ID card or with a mobile digital identity:

- With the digital ID card and an ID card reader (a device that can be purchased on the market), access is possible from computers only.

- With the mobile digital identity, which is obtained through a free procedure at authorized providers, it can be accessed from computers, tablets, or cell phones.

Users can also configure the access policy to their clinical information. There are three privacy options:

1. Access enabled for healthcare personnel for care purposes only.

2. Selective and temporary access by health personnel partially enabled (for the selected providers and for a limited period of time) for healthcare purposes only.

3. Health personnel access is disabled except in health emergency situations covered by the regulations. When a healthcare event occurs at a provider to which you are not affiliated, your clinical information will be accessible to the healthcare personnel providing care to you for the duration of the event.

This configuration can be modified as many times as the person deems convenient. This is easily done by accessing the digital medical record and selecting the privacy settings you prefer.

MEDICAL CERTIFICATIONS

In the last months of the year 2022, a new system of labor medical certifications came into force in Uruguay. One of its main features is that the health professional who is going to perform a medical certification must do so by entering the patient's medical information in the HCEN. In other words, the clinical act performed by the doctor must be registered in the HCEN.

Within the framework of this law, the Social Security Bank (BPS) created the "National System of medical certifications", which according to the last Accountability Law, was to be implemented before the end of 2022. This new medical certification system is being implemented in all public and private healthcare providers in the country and allows coding of the diagnosis of the medical certification. If it is recorded in HCEN and coded in SNOMED (used in HCEN), there is a subsequent conversion process to ICD-10, which is the coding used by BPS.

This mechanism by which the clinical information of the patient to be certified is uploaded by the healthcare provider to HCEN and then analyzed by BPS is a very valuable tool for decision making, the possibility of statistical analysis of the approved certifications, auditing the system itself, and for achieving an efficient resource allocation.

NATIONAL CORONAVIRUS PLAN AND CORONAVIRUSUY APP

The main objectives and challenges faced by Uruguay at the onset of the pandemic were the following:

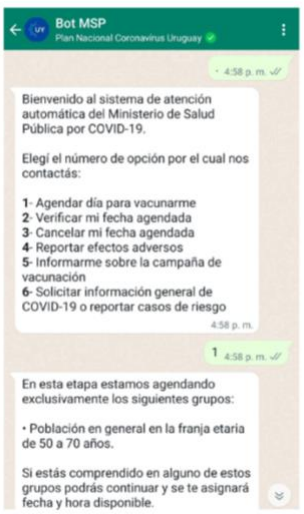
- Being able to build a secure and complex platform in the shortest possible time.
- The need for healthcare providers, government entities, and private companies that were working towards this end to do so closely and in sync.
- Critical information had to be obtained and recorded quickly.
- The information was very sensitive, so high levels of security had to be in place for any action to be taken.

- The collapse of the healthcare system had to be avoided.
- It had to be aligned with the rest of the world.

The timeline and Uruguay's achievements are detailed below.

The national digital strategy to address the COVID-19 pandemic was to gradually include different components and tools according to the evolution of the national epidemic, which were developed and implemented in very limited timeframes, based on a joint effort between the public and private sectors.

In the first place, and with the objectives of reaching more people, avoiding unnecessary face-to-face visits, decongesting the telephone communication channels, and keeping the population informed, various channels were developed with information on COVID-19 as well as multiple digital channels of communication between the population, the national health authority and health institutions.



In March 2020, a virtual assistant (chatbot) was developed, which contained information about the disease, prevention measures, and an epidemiological questionnaire that could be accessed through the websites of the government and health care providers. The same virtual assistant was adapted to the messaging platforms WhatsApp and Facebook Messenger to achieve a wider population coverage.

By September 2021, there had been 5,200,000 transactions. The vaccination schedule reported the highest usage. When it was only to obtain information, there were between 2,500 to 10,000 queries per month.

In addition, a single epidemiological information entry form was created, which was fed with information from public and private sector health care. The providers used the platform that had already been developed on the basis of digital medical records as a basis for interoperability; to maintain a fluid flow of information with the laboratories, virtual private networks (VPN) were chosen. Thus, the 43 integral health care providers and six laboratories shared information on the swabs performed and the positive results. From there, the Ministry of Public Health processed this data and forwarded it to the National Emergency System (SINAE), which prepared a daily report that was presented every day to the population.

A week after the first cases of COVID-19 in the country, the government and the private sector, which participated on an honorary basis, presented the CoronavirusUy app whose main objective was to reduce waiting and consultation times, while guaranteeing data privacy and avoiding crowding at the emergency services.

In addition to providing information and making the epidemiological questionnaire available to the population, the app helped guide users in their contact with health services. Through CoronavirusUy the user could declare having traveled to a country considered at risk, have symptoms, or have had contact with a positive case; this data was then forwarded to the health care provider who would contact the user and follow up on the case without having to wait for the citizen to make contact.

With this digital strategy, it was possible to have the information in a single database, which made it possible to provide adequate attention to clinically suspicious cases, as well as to organize the demand according to health criteria, optimizing the services provided to the population.

CoronavirusUy App: Chronology

Having declared a health emergency on March 13th, the first version of the CoronavirusUy app was launched on March 20th, 2020, which has evolved to date with several versions and several updates that have incorporated different functionalities or adjusted the existing ones to the requirements indicated by the authorities.

CoronavirusUy App: Versions

1. In the first version, citizens could access information about COVID-19, complete a questionnaire created by the Epidemiology team of the MSP and describe if they had symptoms.
2. The second version added medical follow-up: Users were connected to their healthcare providers and could even be referred for a consultation or a video consultation.
3. The third version added the possibility for each user to add another family member, such as a child or an elderly person.
4. In the fourth version, in June 2020, exposure alerts were implemented thanks to Bluetooth technology, which allowed users to be warned if they had been in contact with a case of COVID-19 and to take proactive action. Uruguay was the first country in Latin America and the third in the world to apply this innovation developed by Google and Apple which, by not using GPS, complied with the government's commitment not to establish a citizen surveillance State.
5. In the fifth version, released on December 23rd, 2020, it was added the possibility for users to receive a notification that they had been in contact with a case of COVID-19 with the indications of quarantine and free nasopharyngeal swabbing through a QR code, in authorized laboratories. This would be followed by an SMS notification that results were ready, thus improving access to diagnosis.
6. Subsequently, other versions have been released to meet the information needs of the moment.

At first, with 300 positive cases, 10,000 people were monitored. At the peak of the infection, 300,000 people were monitored. In order for this system to work, it was essential that infected citizens reported their status and gave their consent to trigger the alerts.

To make the digital application comprehensive and use the unified information from all the channels of care, a tracking tray for suspected and confirmed cases of COVID-19 was developed for all healthcare providers. In this way, the CoronavirusUy app and the case tracking tray connected citizens who presented symptoms according to COVID-19 symptomatology with their healthcare providers, reducing wait times for consultations and healthcare.

The application became a valuable tool for citizens, who could quickly find out if they were at risk of COVID-19 infection, and for health authorities to monitor and respond to the occurrence of specific outbreaks.

CoronavirusUy App: usability, access, privacy, and security

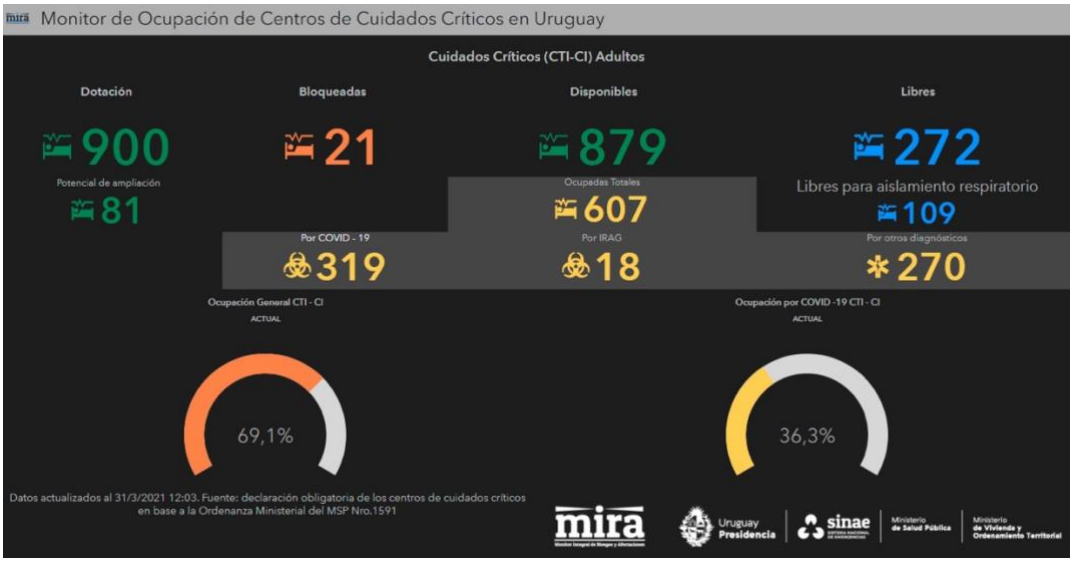
CoronavirusUy is a solution that has taken into account usability, access, privacy, and security criteria. Its exposure notification system is based on the decentralized alert technology provided by Apple and Google, which is the most widely used in the world, and it was designed with information privacy at its core. All the information collected in the app and in the monitoring system is protected as provided by Law No. 18,331 and as stated in the app's privacy policy.

The app and the tracking system have helped to manage clinical cases, which has avoided saturation and has been of use to avoid the overloading of the healthcare system, which never collapsed. Multiple versions of the tracking system have been released and dozens of coordination and training sessions were held for the staff of all integrated healthcare providers.

MIRA

The Comprehensive Monitor of Risks and Affectations (MIRA) is a management tool that gathers information on adverse effects and generates statistics and quality indicators. It is a geographic information system of national scope, which was redesigned during the COVID-19 pandemic. New modules were added with several layers of information such as, for instance, the real-time monitoring of infrastructure and health resources, both public and private, throughout the country.

During the COVID-19 pandemic, and based on the information collected by MIRA, it was possible to inform the population about the availability of ICU beds available in real-time. In this way, the concerned population was able to monitor the situation of health services at times of greatest stress. By ministerial decision, MIRA is the only mechanism authorized to report the daily census of authorized ICU beds.



TECHNOLOGICAL FOLLOW-UP

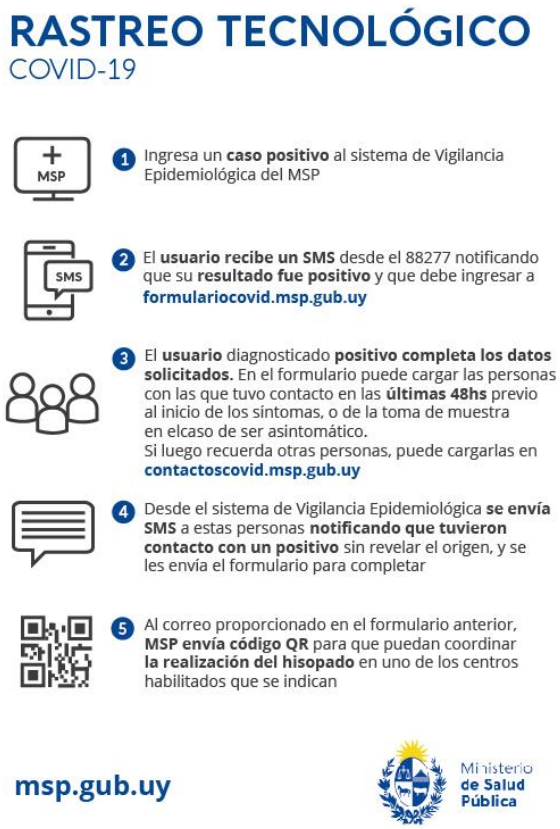
The Ministry of Public Health developed the TETRIS strategy for the follow-up of COVID-19 cases, which consisted of testing as many people as possible, tracing contacts, and isolating those infected. Each of these steps was essential to keep the pandemic under control.

To complement the usual monitoring strategy and the services offered by the *CoronavirusUy* application, a technological tracking system was put in place. This tool, which like all others complies with the basic requirement of confidentiality of information, made it possible to reduce the spread of the COVID-19 virus and could be applied to any other event of national importance that is defined once a case is confirmed.

The app works by associating a cell phone number with a positive COVID-19 result. From there, the phone number receives a message with a link that allows access to a virtual form from a number previously established as belonging to the Ministry of Public Health, to ensure that it is a real institutional message. By filling in this form, the health services can monitor the behavior of the disease and quickly identify contacts.

The cooperation of the population also plays a fundamental role in this tool. People must agree to answer the questions in the link, which only takes a few minutes.

Additionally, this tool allows to inform the health care provider that one of its users has been identified as a positive case or as a contact of a case. Also, it allows to inform the user about the testing sites, thus avoiding crowding and distributing the workload. It also favors the timely detection of outbreaks by optimizing contact detection times of positive cases.



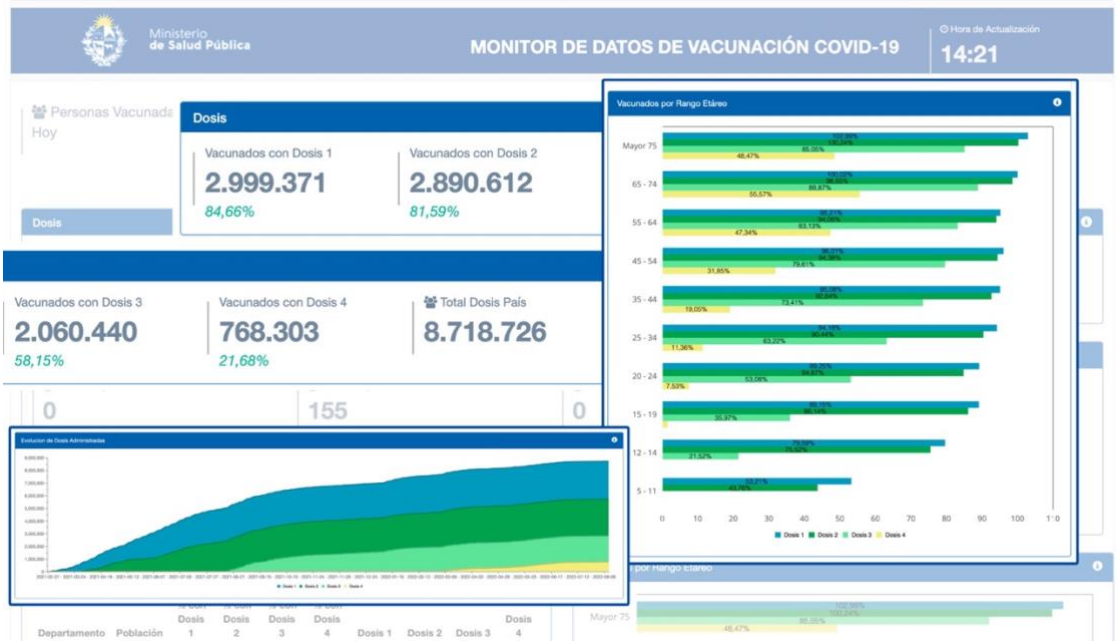
NATIONAL COVID-19 VACCINATION CAMPAIGN

The COVID-19 vaccination campaign for the general population began on March 1, 2021. The digital response advanced with this campaign, adapting some of the existing tools to obtain quality information on the progress of the campaign in real-time, as other tools were developed.

Vaccination was carried out in progressive and staggered stages, prioritizing population groups by analyzing their risk of developing severe cases of COVID-19. The vaccination platforms adopted in the country involve the administration of several doses to achieve the necessary immunization. First of all, it was decided to organize the campaign through a national schedule centralized in the MSP.

For the internal management of information in the MSP, a system to check and register vaccinations and schedules by identity card number was created. This allows to check the situation of citizens with regard to the vaccination schedule and their registration. This tool makes it possible to view the date of birth entered in the vaccination system and the date of birth entered for the schedule registration, the historical record of the vaccination schedule, the number of vaccines registered, and the vaccination group defined for that person, as well as the planning date for the next doses, if applicable.

Some panels were developed to visualize information on the vaccination schedule waitlist, absenteeism in the schedule, vaccinated people according to the target population, a daily publication of open data on the vaccines used, and a public monitor that reports on the progress of vaccination to the population. They also made it possible to manage payments the health authorities made to laboratories for performing COVID-19 diagnostic tests.



Information structures and automatic processes were also generated for sending data to different actors involved in the vaccination campaign. In addition, some adjustments were made to register codified vaccination acts in the HCEN (National Electronic Health Record) so that the necessary interoperability for the generation of digital certificates of vaccination against COVID-19 could be achieved.

The External Reception and Information Control System (RCIE) made it possible to centralize information from health care providers about people with pathologies in order to prioritize the different population groups in the campaign and the information on the surgical waitlist in health institutions.

Regarding communication with the population, the scheduling system was designed to suit this vaccination campaign, and an application was developed to send a message with a reminder of the vaccination date and/or changes in the schedule, and vaccination centers, among other data.

ADDITIONAL TOOLS DEVELOPED

1. An application was developed to survey Long-stay Facilities for the Elderly (ELEPEM) throughout the country, taking into account the elderly population at risk, and contributing to the comprehensiveness of the digital strategy. This allowed each ELEPEM to upload and update the patronymic data, list of residents, and health coverage, and also to monitor relevant health events of the elderly, and include the list of the staff working there to carry out a strict follow-up.

2. A digital system was implemented to streamline and optimize the process of arrival and entry of passengers to Uruguay. This tool made it possible to complete the online health declaration that had to be made in advance for entering the country.

3. The "Guide for the coding of COVID-19 in the Electronic Health Record for the minimum data set" was prepared. This document contains the Salud.uy - AGESIC program, whose main objective was to inform public and private health institutions about the coding of COVID-19 in the SNOMED CT and Logical Observation Identifiers Names and Codes (LOINC) terminology. This guide includes coding related to the reason for consultation, diagnosis, and laboratory study.

4. In addition, the Health Economics area of the MSP decided to include a new ambulatory care table in the National Health Care Information System (SINADI) spreadsheet, including the new non-face-to-face care modalities (telephone counseling and scheduled

consultations via telemedicine), in order to evaluate them and reflect the change of care modality in the SINADI Health Care production indicators. Salud.uy provided the corresponding document ontology to be used by all public and private providers for their univocal identification.

5. A system was developed for uploading PCR antigen tests so that providers who were not part of the Salud.uy network, laboratories, and pharmacies could report the results of the COVID-19 tests they performed online, thus uploading the information to the same site.

6. Many arrangements were made so that the following procedures could be carried out online: Complaints for non-compliance with quarantine, requests for approval of COVID-19 vaccination schedules issued abroad, registration of migrants or refugee applicants without identity cards for the COVID-19 vaccination plan, post-vaccination serological survey for health personnel, the request for personnel training for SARS-CoV-2 antigen testing, the request for authorization for antigen testing by laboratories and/or pharmacies, the authorization to enter Uruguay during a pandemic, the affidavit of entry to Uruguay for foreigners (immunized or minors.)

All components, applications, and tools of the digital strategy were synchronized with the National Coronavirus Plan allowing constant monitoring of the evolution of the virus and its transmission in the country. All information was available and monitored by the National Emergency System (SINAE), providing a comprehensive digital strategy to fight against COVID-19.

NATIONAL COMPREHENSIVE AND INTEGRATED PLATFORM FOR PUBLIC HEALTH SURVEILLANCE

At present, the MSP has multiple computer systems whose purpose is to support health surveillance processes. Their fragmentation makes it difficult to integrate data to meet information needs.

In this context, the MSP, with the support of the PAHO, has begun the development of a new computer system to manage data associated with health surveillance in the country with the objective of providing timely and systematic information to support decision-making.

The computer system, which will be ready by mid-2023, consists of a web platform that provides functionalities for the registration of notifiable diseases and healthcare-associated infections, the follow-up of cases derived from notifications, the generation of

reports to support decision-making by the Public Health Surveillance department and the Population Health Surveillance area of the MSP, among others. The platform is integrated with the MSP systems to complement existing information, adding data on vaccines, vital statistics, and health coverage, with the possibility of extending this set to more data from other sources in the future.

SURGICAL WAITLIST INFORMATION SYSTEM

Background: surgical waitlist assistance goal

The "Transitional Goal for the Normalization of Medical Care" was intended to evaluate the results of the recovery process of the healthcare activity, at the starting point of its affectation due to the COVID-19 pandemic. This goal was part of the pay-for-performance mechanisms applied in Uruguay to healthcare providers who comply with the objectives set.

This standardization process is part of the successive regulations aimed at regularizing the system's performance adopted by the MSP. In particular, section 4 of the Resolution No. 17/21 of the General Directorate of the National Health System incorporates the monitoring of a set of indicators of healthcare production and accessibility as a transitional and exceptional goal. This aims to achieve performance levels comparable to those observed prior to the pandemic by December 2021.

The period of application of the transitional target took place in September, October, November, and December 2021 and its fulfillment was associated with payments in the months of May and June 2022.

Within this framework, compliance with a combined indicator aimed at increasing the number of coordinated surgical interventions and reducing the "surgical waitlist exceeded" (more than 180 days of wait time, as established by current regulations) was evaluated, among different healthcare indicators.

The incorporation of an assistance goal associated with the surgical waitlist was made possible by Ministerial Ordinance No. 874 of June 29, 2021, which urged all public and private institutions, comprehensive providers of the National Health System, to submit the wait list for coordinated surgeries on a monthly basis as an affidavit.

Such list was presented in a nominalized spreadsheet where users -those who, on the last day of the month prior to the presentation, had a registered indication for

coordination surgeries, indicating the type of surgery and date of admission to the surgical coordination- should be entered.

The monthly affidavit of the waitlist for coordination surgeries carried out within the framework of Ordinance No. 874/2021 was terminated in March 2002, as established therein.

The process carried out in this framework taught lessons that turned out to be fundamental input for the design of a new information system on the surgical waitlist, an unavoidable component in the quality assessment of our health system.

Surgical waitlist information system

Once the work related to the Healthcare Goals was completed, the process of creating an information system that would give continuity to the control of waitlists and wait times for coordinated surgeries performed in the surgical block was started.

In order to have uniform and comparable data for the whole health system, a set of minimum data necessary to obtain the indicators that allow the measurement of these dimensions was proposed. Monthly, the institutions must report all users on the waitlist and those who have left the list since the previous report to the surgical waitlist information system.

For each case, a series of variables are collected: institution, identification and patronymic data of the user, surgical specialty, type of surgery, date of admission to surgical coordination, and date and reason for leaving the waitlist. The latter may be coordinated surgery (expected result) or other reasons: emergency surgery, termination of medical indication, user's withdrawal, user's death, change of provider, non-functional suspension (situations that cause the suspension or postponement of surgery not attributable to the institution.)

The successive monthly reports are accumulated in a global record, where each record, corresponding to a coordinated procedure for a patient, will be received once for each month such patient remains on the waitlist until finally reported with the exit data.

Definition of surgical wait time

Surgical wait time is that which elapses from the date the surgeon indicates surgery to the time it is performed. Experience suggests that although this definition is theoretically correct, in practice it is difficult to implement, as it depends on an explicit record of the

surgeon's indication, which is not always done. Furthermore, as it is not structured data, it can be difficult to locate it in the medical record and would entail an ongoing review to see which patient has been indicated for surgery.

Given these difficulties, it was proposed to consider the time elapsed from patient admission to surgical coordination, which is much easier to obtain. However, it is known that such data underestimates the actual time as it does not include the time required for the preoperative evaluation requested when surgery is indicated.
So, given these limitations, and to establish consistent criteria and allow the data from the different institutions to be comparable, the surgical-wait-time system considers the time elapsed from admission to surgical coordination.

Dimensions and analysis indicators

Waitlist indicators

- Users on the waitlist at the beginning of the period.
- Users on the waitlist at the end of the period.
- Admissions - removals from the list balance: the difference between users who are admitted and those who are removed from the waitlist. A negative balance indicates that the waitlist is decreasing; a zero balance indicates that it is stable or balanced; and a positive balance indicates that the waitlist is increasing.
- Users on the waitlist at the end of the period per thousand users: the ratio between the number of users on the waitlist and the total population of the institution.
- Surgical wait time: for each record, the time from the admission date to the waitlist until the last day of the considered period (partial wait time) or until the date of removal from the list, if it occurred during the period (actual wait time), is calculated.

The average and maximum are calculated for every wait time type.

Efficiency indicators

- Users who underwent a coordinated surgery during the period: users who were on the waitlist and underwent a coordinated surgery during the period (reason for removal = 1).
- Percentage of users who underwent a coordinated surgery during the period: proportion of users who were removed from the list due to coordinated surgery (No. of removals from the list during the period due to reason 1 / total number of removals from the list, due to any reason).

● Percentage of users who underwent surgery during the period, whose wait time exceeded the regulatory time limits (according to specialty, year of admission to the waitlist, etc.).
● Percentage of users on the waitlist whose wait time by the last day of the period exceeds the regulatory deadlines (according to specialty, year of admission to the waitlist, etc.)

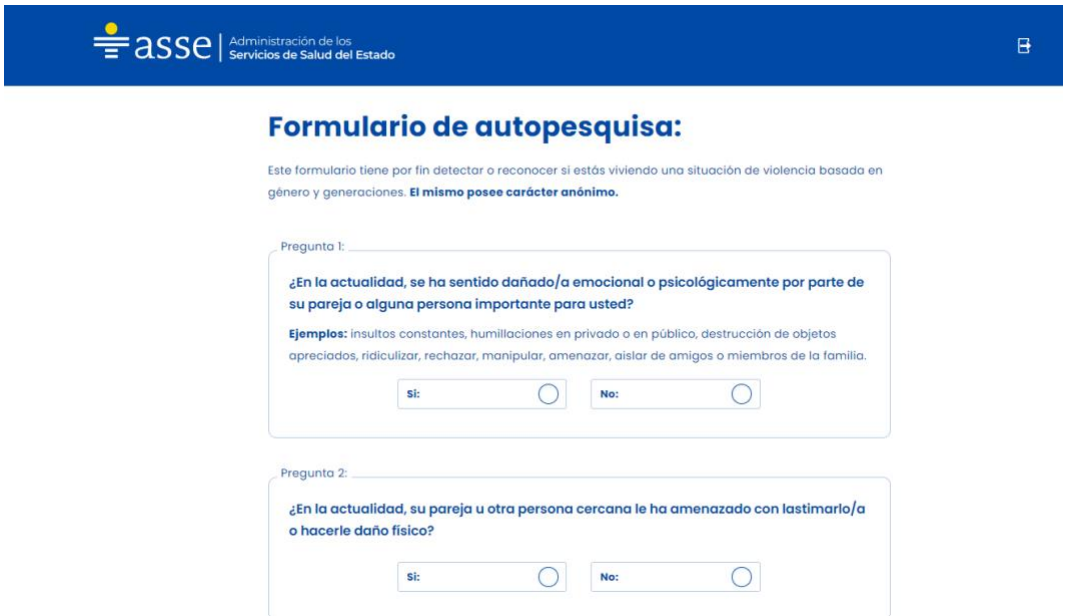
VIOLENCE SELF-SURVEY

Digital solutions can be applied to several health areas. Regarding gender and age-based violence, a current and growing problem, a tool consisting of a self-administered and completely anonymous online form has been developed. This form allows users, by answering a series of specific questions, to determine whether they are involved in a situation of gender and age-based violence.

Once the self-survey has been completed, and in line with the results, the user is sent a message with guidelines on possible actions to be taken, including the contact details of the health care provider's violence referral team.

All healthcare services have, at an easily accessible and visible place on their websites, social networks, and apps, the contact details and opening hours of their domestic violence and sexual violence referral teams at the central level and secondary locations; they can also be seen on the waiting room screens where available.

By way of example, we have attached the access link to the State Health Services Administration, the largest public health care provider in the country, which has approximately 1,300,000 users: https://formulariomsp.asse.uy/formulario/.



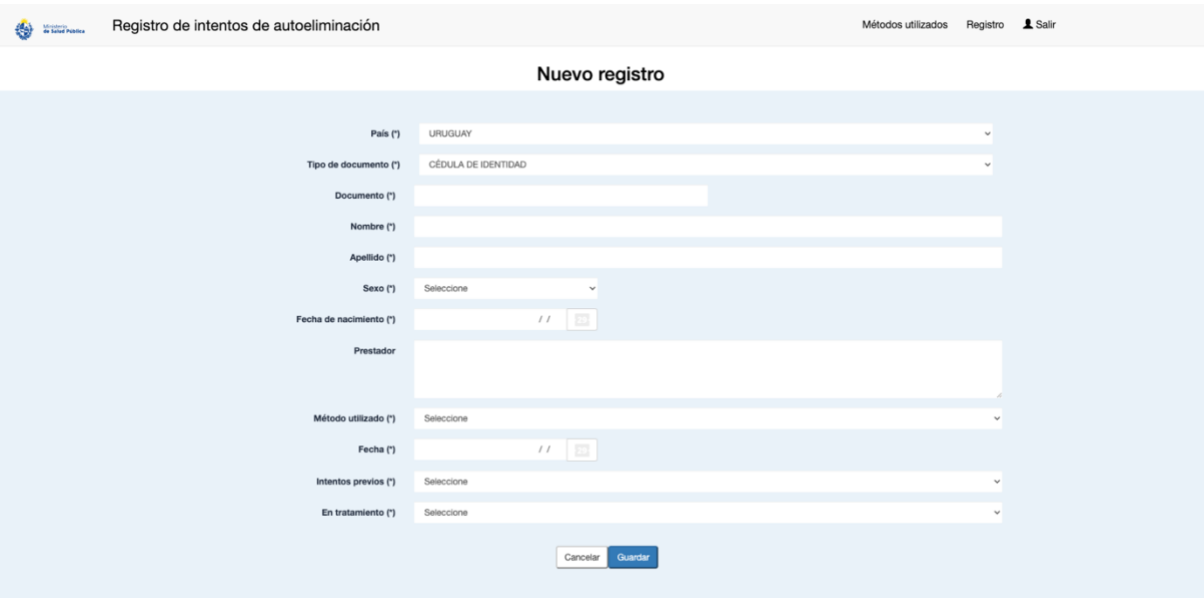
DIGITAL REGISTRY OF SUICIDE ATTEMPTS

Suicide is one of the main public health problems in Uruguay due to the high rates that have prevailed for years. The registration of suicide attempts (IAE) used to be done on paper, but following Ministerial Decree No. 1323/022, it is now mandatory to do it through a digital form that must be filled out at the emergency rooms of public and private health care providers in the country.

This new registration method and the obligation to report suicide attempts to the MSP within 24 hours, through an online system that can be accessed through a password that identifies the provider and the health worker, allows real-time monitoring of compliance with the "IAE Care and Follow-up Protocol" established by Decree No. 384/017 of the Ministry of Public Health.

The Epidemiological Surveillance Department, together with the MSP's programmatic area for Mental Health Care, follows up on suicide-attempt cases via phone with each provider to ensure compliance with the aforementioned protocol.

This real-time information also allows us to have a full picture of the current suicide situation in the country.



MENTAL HEALTH CARE LINE

The President of the Republic was the one who, to explain to citizens the decision of not placing the country under mandatory quarantine nor lockdown, coined the expression

"responsible freedom" which ended up being a slogan that summarized the spirit that guided all the decisions made by the government: each person would decide what to do based on their personal circumstances and considering their fellow beings' best interest and, consequently, that of society as a whole. The government then appealed to citizens to stay at home voluntarily under that premise. At that time, the Vice President of the Republic worked together with the First Lady to improve the provision of mental health care, taking into account the consequences that voluntary confinement would entail. Thus, together with the MSP, Salud.uy, the State Health Services Administration (ASSE) and *Hey Now Bots* from the Isbel group, which had already worked on the service provided via WhatsApp and SMS, developed a free telephone helpline staffed with 150 volunteer psychologists and five contracted psychologists, which still operates 24 hours a day, every day of the week.

It is free of charge and confidential, available throughout the country, and was initially provided by telephone, but was later expanded to include video calls. After two months of operation, 8,100 calls had been registered, 14 per hour, throughout the country. By June 2021, 270 psychologists had worked on this line and had answered 29,400 queries; by 2022 the number of calls had doubled to 82,000.

INTERNATIONAL ORGANIZATIONS OF WHICH *SALUDUY* IS A MEMBER AND RECENT INTERNATIONAL TECHNICAL EVENTS IN WHICH IT HAS PARTICIPATED

- Pan American Health Organization (PAHO) - TELEMEDICINE

Salud.uy worked together with the Medical School and PAHO to define the framework of the Specific Interinstitutional Cooperation Agreement between the University of the Republic-Medical School and the Agency for Electronic Governance and Information and Knowledge Society (AGESIC) for the development of public policies on telemedicine in Uruguay.

Salud.uy also wrote and included in a PAHO scientific publication a chapter on the " Maturity index in telemedicine projects". Link available in January 2023.

In November 2022, Salud.uy and the MSP participated in the event "Digital transformation of the health sector: telehealth, digital documentation, and artificial intelligence", organized by the PAHO/WHO Department of Evidence and Intelligence for Action in Health in Panama City. They made a presentation that dealt with: "Development, challenges, and lessons learned in the process of implementing digital vaccine certificates in the context of the pandemic."

- GLOBAL DIGITAL PARTNERSHIP (GDHP)

In October 2022, as part of the work done with the GDHP executive secretariat, groups were formed and they virtually participated in the GDHP SUMMIT. The topics worked on by the groups were: interoperability, policy development, patient summary, and evaluation and measurement.

Regarding evaluation and measurement, Uruguay introduced its experience with the PAHO/IDB tool used for the maturity index survey for telemedicine services. This tool was introduced and proposed as a way to move forward on telemedicine measurement issues in the member countries of the GDHP initiative.

- Technical cooperation mission PAHO-Ministry of Health of El Salvador- Agesic Salud.uy. Visit to Uruguay

In the framework of technical cooperation, Uruguay was chosen by PAHO to share experiences, transfer skills, and support countries in the region that are working on the implementation of digital health processes at a national level. This initiative is framed within the roadmap for the digital transformation of the health sector, approved by Member States at PAHO's 59th Directing Council. In 2022, two face-to-face technical cooperation missions were carried out with PAHO.

The topics addressed were digital health governance, interoperability in health (SnomedNRC), ICT and health measurement, and the roadmap for implementing national digital health initiatives.

- Technical cooperation mission PAHO-Ministry of Health of Dominica - AgesicSalud.uy Program. Salud.uy Program. Visit to Uruguay.

The topics covered were digital health policies, identification of individuals (National Health Users Index), and standards related to the implementation of Electronic Medical Records.

- Collaboration with Peru

During the second half of 2022, Salud.uy and Agesic carried out remote technical cooperation with the Ministry of Health of Peru, at the latter's request. The topics covered were: semantic and syntactic interoperability and the establishment of the Snomed CT service center at the national level.

- SNOMED CT

Participation in the SNOMED CT general assembly and the SNOMED Member Forum for the monitoring and follow-up of the technical-political definitions linked to the use of Snomed CT, to align the work at the national level and the coordination between countries at the International level.

- American Cooperation Network for Electronic Health-Conectatón LACPass

The American Cooperation Network for Electronic Health (RACSEL) seeks to make progress in the regional digital transformation and, to this end, follows the WHO guidelines about COVID-19 digital documentation and PAHO's strategic plans in the Americas, the roadmap approved by the regional countries in September 2021. The LACPass initiative, created within the framework of RACSEL and sponsored by the Inter-American Development Bank, is aimed at forging links for the health care of all people in the Latin American and Caribbean region.

Conectatón LACPass was a hybrid event that took place in Santiago de Chile in May 2022 with the sponsorship of PAHO, in the scope of the implementation of the "Regional public good: digital transformation in health to mitigate the effects of COVID-19 in Latin America and the Caribbean" project.

The purpose of the event was to validate both the issuance and verification of digital COVID-19 certificates (vaccine, test, recovered).

Through interoperability mechanisms, Uruguay was able to make its COVID-19 pass valid for all countries in the region and successfully generated and validated its QR codes with the rest of the participating countries.

The Conectaton LACPass was a technical milestone in which the eight participating countries of the process managed to issue and validate the COVID-19 certificates according to the EU DCC (European Union Digital Covid Certificates) standard. This was the first time in Latin America and the Caribbean that it was possible to carry out a cross-border interoperability test in health and to establish common ground and a roadmap for mutual-technical understanding as well as the use of standards in digital health.

Alongside the technical event, the regional countries met at the RACSEL General Assembly where they agreed to strengthen the network by formalizing the governance aspects of health interoperability in the region.

- INDONESIA G20 Projectathon

This event took place in December 2022 and was organized by WHO with the support of IHE.
Twenty-one countries and three organizations participated.

There are currently five COVID-19 vaccine registration formats:
● DDCC: Digital documentation of COVID-19 certificates.
● EU DCC: European Union digital COVID certificate.
● SHC: SMART Health Cards
● DIVOC
● ICAO: International Civil Aviation Organization.

The purpose of this Projectathon was to generate the certificate in DDCC format and exchange its reading with other countries.

Through the Salud.uy team, Uruguay's participation was successful; the COVID vaccination certificate, the diagnostic tests, and the recovered cases in WHO's defined format were developed. Salud.uy managed to publish Uruguay's QRs and have them correctly validated, in addition to being able to read the QRs generated by the other participating countries.

- ITALIAN HOSPITAL OF BUENOS AIRES

In November 2022 Salud.uy participated in the Italian Hospital of Buenos Aires' *JIS Go Live* conferences. The virtual presentation dealt with the progress and challenges of the SNOMED CT National Release Center (NRC) and the "progress and challenges towards a digital strategy in the use of Information and lessons learned in the incorporation of new minimum data sets and semantic blocks."

Salud.uy made an in-person presentation on the new work scenario, the stages of analytics for decision-making, the development of intelligent health maps, and the clinical monitoring of population groups of public health interest, emphasizing data quality.