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COVID-19 pandemic in Uruguay: evolution, lessons learned and challenges

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SUMMARY

America has become a new epicenter of the COVID-19 pandemic but the epidemic in Uruguay has had an atypical behavior compared to the region, with positive results in the management and control of the health crisis. This article describes the socio-sanitary characteristics of the country, the evolution of the pandemic, and the sanitary policies implemented, as well as the challenges to face the next stages. Since the beginning of the pandemic, the national health emergency was declared, the national emergency system was launched and a Coronavirus Fund was created to finance the required interventions. An outbreak mitigation strategy was implemented by recommending non-mandatory physical distancing. Likewise, the increase in diagnostic testing capacity through national developments, the management of suspected cases at the household level, and the implementation of telemedicine stand out. There is currently little community circulation of the virus. The largest increases in the number of cases have occurred mainly in clusters, institutional agglomerations, and small cities. In all these situations, index cases and contacts were quickly identified. An important role is attributed to the participation of the academic scientific community and the epidemiological surveillance system of the Ministry of Health, which has made it possible to effectively manage the outbreaks through surveillance and active search for cases.

Keywords: *COVID-19, Uruguay, health policies, risk management, mitigation strategies.*

RESUMEN

América es un nuevo epicentro de la pandemia por COVID-19 en donde Uruguay ha tenido un comportamiento atípico para la región, obteniendo resultados positivos en el manejo y control de la crisis sanitaria. Este artículo describe la característica socio sanitarias del país, la evolución de la pandemia y las políticas de control implementadas, así como los retos a enfrentar en próximas etapas. Desde el inicio de la pandemia se declaró la emergencia sanitaria nacional, se puso en marcha el sistema nacional de emergencias y se creó el Fondo Coronavirus para el financiamiento de las intervenciones requeridas. Se implementó una estrategia de mitigación del brote mediante la recomendación del distanciamiento físico no obligatorio. Asimismo, se destaca el incremento de la capacidad de testeo diagnóstico a través de desarrollos nacionales, el manejo de los casos sospechosos a nivel domiciliario y la implementación de la telemedicina. Actualmente se observa una escasa circulación comunitaria del virus. Los mayores incrementos en el número de casos han ocurrido fundamentalmente a partir de aglomeraciones institucionales y en ciudades

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de pequeño porte. En todos los casos se ha podido identificar rápidamente los casos y los contactos. Se atribuye un papel fundamental a la participación de la comunidad científico académica y al sistema de vigilancia epidemiológica del Ministerio de Salud que ha permitido gestionar eficazmente el brote a través de la vigilancia y la búsqueda activa de casos.

Palabras clave*: COVID-19, Uruguay, políticas sanitarias, gestión de riesgo, estrategias de mitigación.*

INTRODUCTION

Latin America has become since June 2020 a new epicenter of the COVID-19 pandemic, in this context Uruguay has positioned itself as an atypical case in the region, obtaining very good results in the management and control of the health crisis (Figure 1).

The objective of this article is to describe the evolution of the COVID-19 epidemic in Uruguay, the strategies defined to control it, the lessons learned, and the challenges and perspectives for the next stages in the management of COVID-19 in the country. To achieve this objective, a review of official documents, websites, and scientific articles was carried out in relation to the subject. This section outlines some of the main aspects that make up the Uruguayan reality to date.

Characteristics of the country and evolution of the epidemic

Uruguay is a small country in the southern region that borders Argentina and Brazil and has a continental surface area of 176 215 square kilometers (1). The total population is 3 530 912 inhabitants, approximately 40 % live in the

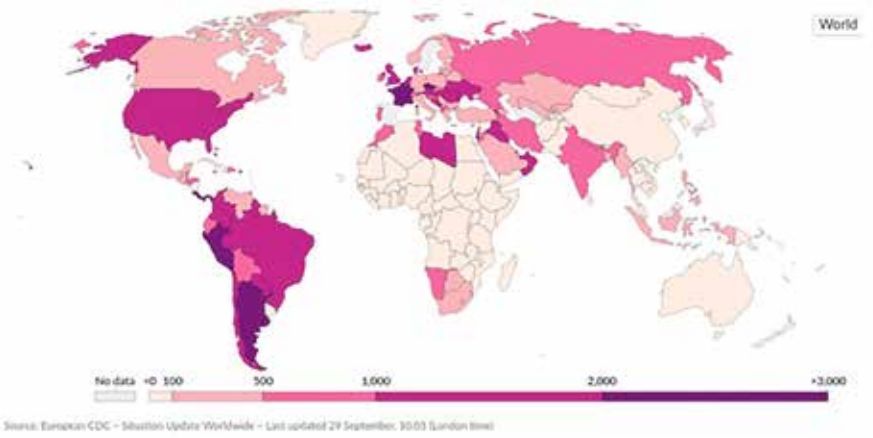

Figure 1. Biweekly (previous two weeks) cases of confirmed COVID-19 per million people (14 al 29/9/2020).

capital Montevideo and if we consider this city and its metropolitan area, the proportion of the population that lives in the region exceeds 60 % of the total. The global population density is 20 inhabitants per Km^2, given its condition as a macrocephalic country (a large part of its population is concentrated in the capital and metropolitan region), the population density presents a heterogeneous behavior in the territory: it is 6 662 inhabitants per Km^2 in Montevideo (a city with an area of 536 Km^2) and 12.2 in the rest of the country (1).

The first cases of COVID-19 in Uruguay were identified on March 13, 2020. The government almost immediately declared a health

emergency and implemented a mitigation strategy by recommending non-mandatory physical distancing. Likewise, it began the monitoring of travelers from risk areas, the closure of airports, educational centers, and large shopping centers, the prohibition of public shows, the promotion of teleworking, and the dissemination of the "Stay at home" strategy (2). In the package of more specific measures, the increase of the diagnostic testing capacity through national technology development, the management of suspected cases at the home level, and the implementation of telemedicine to avoid crowds in healthcare centers stand out. Uruguay has an Integrated National Health Care System that provides universal access to care to all residents of the country, with additional strength in this context, a good endowment of beds for intermediate and critical care.

From the time the first case of COVID-19 was identified in the country to the end of September, 197 days (28 weeks) has elapsed (3). In that period, 225 803 tests were carried out for the diagnosis of COVID-19 (one test per 15 inhabitants until 25th September), 1 967 cases were confirmed by laboratory techniques (cumulative incidence of 55.71 cases per 100 000 inhabitants), 210 are active cases, 1 710 are recovered cases and 47 have been deceased (case fatality rate is 2.4 %) (4).

Taking into account the number of PCR tests performed and the number of them being positive, it can be affirmed that the pandemic in Uruguay evolved with little community circulation. In fact, 66 % of the cases have contracted the SAR-CoV-2 viruses through contact with confirmed cases and 19 % were travelers from endemic areas (3).

In the country, the greatest increases in the number of cases have occurred from crowds in institutions or social events and small cities located in the interior of the country[1]. Timely tracking of cases and contacts by the system of health surveillance of the Ministry of Public Health has allowed each outbreak to be managed efficiently, making that the curve of confirmed accumulated cases never reached an exponential trend.

Preparation of the country to face the pandemic: the health system and the scientific-academic network

On March 1, 2020, the new authorities of the Ministry of Public Health (MPH) took office at the beginning of a new government administration in the country. Technical teams of the Epidemiology Division of the MPH had already begun developing some documents to define control measures considering the global context of the pandemic. On February 26, the first technical recommendations for case management were published in coordination with all health institutions (5). This document details an initial Epidemiological Surveillance Strategy, based on the increase of sentinel surveillance of severe acute respiratory infection (SARI) and influenza-like illness (ILI), to detect a possible unusual behavior of an important event for public health.

Once the health emergency in the country was declared, all actions were lead and supported by the Ministry of Public Health. The MPH's active epidemiological surveillance system, with great experience in managing outbreaks of other communicable diseases (the last one in 2019) was an enormous strength. This system made possible by contact tracing that there were no more than five generations of virus transmission in the country during the beginning of the epidemic (in most of the outbreaks, the chain was stopped in the second generation) (6). The Uruguayan State through the National Integrated Health System offers universal health care coverage based on the conception of Health as a right. This new paradigm began with the reform of the health system in 2007. Currently, the health sector represents more than 6.5 % of public spending as a percentage of GDP, compared to an average of less than 6 % in Latin America (7). Financing and governance of the system is the direct responsibility of the State and medical care is accessible to the population as a whole, including the most vulnerable (which does not contribute to the national health fund) (8).

Therefore, when facing the pandemic, the country had an institutionally strengthened health system and a decentralized health care network

[1]Among the affected cities, the border city of Rivera stands out. It is a city of approximately 80 thousand inhabitants that borders by land with a Brazilian city of Santana do Livramento with approximately 140 thousand inhabitants.

with adequate development of its infrastructure. The broad social protection system that operates in a context of relatively low informality in the labor market also stands out. These characteristics of the country, consolidated in the last decade, contributed to the mitigation of the socio-economic and health effects in the health emergency. Likewise, it can be affirmed that the extensive existing health infrastructure also contributed to the success that the country has been obtaining to date in controlling the epidemic (1,9). Uruguay has approximately 5 doctors per 1 000 inhabitants and the availability of hospital beds per inhabitant is among the highest in the continent: 8 940 moderate care beds (2.5 / 1 000 inhabitants) and 963 critical care beds (0.2 / 1 000 inhabitants) at the beginning of the epidemic in the country (9). This starting point allowed rapid action to be taken to increase the availability of intensive care beds, as well as the supply of ventilators.

In a comprehensive analysis of the Uruguay an case, the State is positioned as the main actor in the management of the crisis. A large part of the measures arose from a presidential decree that established all the measures already mentioned, which altogether and others included in Table 1, represented an alternative strategy to mandatory quarantine (10,11). Another very important aspect that contributed to the control of health crisis is the long civic tradition of the Uruguayan population, which has surely made it possible for awareness campaigns on good health practices and hygiene protocols to have both echo and level of compliance (10,11)

Another aspect to emphasize is the scientific development of the country and its academy. The University of the Republic (UDELAR), the Pasteur Institute, the Clemente Stable Institute, and other public institutions quickly became involved in the development of diagnostic tests, allowing early application on a large scale (12).

As a consequence, the systematic and timely testing of the identified contacts was possible and the consequent early isolation of the positive cases. The development of contact traceability technologies and the use of mobile applications[2]contributed to community monitoring of the infection in outbreak areas and prevention of the spread (13).

The broad consensus of the leading groups in giving relevance to the issue and in defining strategies is also highlighted. The alignment occurred in all spheres of national and municipal government and among all political parties with parliamentary representation. It was also possible to coordinate and take advantage of highly qualified human resources with the capacity to contribute to scientific development and detection and tracking tasks in a context of the limited expansion of the epidemic, an aspect that, according to the existing evidence, was not possible in other countries of the region. The Uruguayan government convened an advisory group of scientists headed by experts -medical and from other disciplines- of the first level (Honorary Scientific Advisory Group)[3] that provided recommendations for scaling up or de-scaling the control measures with some basic criteria: recommendations based on the best possible scientific evidence, step by step, monitored before and after scaling them and based in a transdisciplinary and intersectoral vision (14). The government also sought coordination with the private sector, including the industries involved in addressing the problem.

In Uruguay, an application for cell phones called "Coronavirus UY" was designed, with the aim of monitoring cases. The application made it possible to issue alerts in situations of close contact with cases detected as positive. This method has also been applied in other

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[3]Prior to the creation of this honorary scientific group and immediately after the first positive case of COVID-19 in Uruguay, the Epidemiology Division of the MPH called an advisory group to contribute in the design of inputs for the first measures adopted by the government. This group was made up of technical officials of the institution and experts in the field of epidemiology, infectology, geography and sociology, most of them from the University of the Republic.

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Control policies for COVID-19: implementation and lifting of measures

After the first cases of COVID-19, the national health emergency was declared, decrees were established defining control measures and the Coronavirus Fund was created to make it possible to finance in part some of the strategies deployed (Table 1) (10).

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Table 1

Interventions implemented to control the COVID-19 epidemic in Uruguay 2020

Interventions	Date*
Global public health measures to prevent infection	
The exhortation of the population to voluntary physical distancing (two meters), especially the population at risk	13/3/2020
Appeal to the population to maintain environmental and hands hygiene	13/3/2020
Transparent reporting of information on cases and evolution of the epidemic through the Secretariat of the presidency and the National Emergency System	14/3/2020
Popular education on virus transmission and non-pharmacological measures to control the epidemic (National Coronavirus Plan) 15 minutes a day on TV.	19/3/2020
Mandatory use of face masks for the general population	24/4/2020
Surveillance measures	
Definition of case/quarantine and isolation for suspected cases and contacts	13/3/2020
Contact tracking system by phone and app (later)	13/3/2020
Quarantine of Uruguayans returning to the country	16/3/2020
Travel restrictions to specific sites	16/3/2020
Suspension of comercial flights	20/3/2020
Availability of diagnostic tests for extensive testing of the population (developed at the national level)	2/4/2020
Scaling up of sanitary controls at border crossings with Brazil	5/5/2020
Measures to promote physical distancing	
Closure of study centers (schools, high schools, universities, etc.), maintenance of distance education and telework	16/3/2020
Closure of bars, shopping centers, and shows with an audience representing crowds of people	17/3/2020
Parties, dances, religious celebrations, and in general social events of significant attendance of people are suspended	17/3/2020
Closure of game rooms and equestrian venues	19/3/2020
Authorization to stay at home, to all those 65 years of age or over, under cover of the sickness allowance, especially in public bodies. Telecommuting.	25/3/2020

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… continued from Table 1.

Interventions	Date*
Measures to optimize medical care	
Clinical management of suspected cases at home.	13/3/2020
Implementation of the use of telemedicine to give continuity to the medical care of the population as a whole	2/4/2020
Prevention and control of respiratory infections (all usual measures including flu vaccination)	13/4/2020
Reinforcement of third-level health services (suitable personnel and ventilator) and development of protocols for the use of personal protective equipment and care. Flexibility for the importation of necessary equipment.	20/3/2020
Mitigation measures for the socio-economic effects generated by the pandemic	
Authorization to suspend cuts for non-payment of electricity supply and telecommunications services provided by state companies during the first months of the epidemic.	4/4/2020
Expansion of subsidies from the Ministry of Social Development for poor households	4/4/2020
Percentage exemptions of personal and employer contributions during the period	16/4/2020
Extension of the unemployment insurance allowance	19/5/2020
Technical advisory measures	
Honorary Scientific Advisory Group	17/4/2020

*Approximate date
The measures implemented to promote physical distance and air connectivity are being lifted in stages (under sanitary protocol) since May 2020.

Successes and limitations in controlling the epidemic in Uruguay

The measures adopted were timely and based on guaranteeing the individual freedoms of all people without putting third parties at risk. The strategy was based on the trust of the population and the transparency of information on the evolution of the epidemic.

Self-responsibility, symptom reporting, notification of contacts, and voluntary quarantine in case of self-perceived risk were promoted, as well as immediate consultation, prioritizing telephone contact, and encouraging non-attendance at health centers in cases considered of low severity.

The socio-demographic characteristics of Uruguay are also an aspect to take into account when analyzing the good results obtained so far. The magnitude and intensity of social interactions are considered risk factors for the transmission of the virus; therefore, the low population density of the country favors the control of outbreaks. Although Montevideo (where approximately half of Uruguayans live) is a city of 1.3 million inhabitants, its structure maintains a balance in terms of the distribution of green areas and public spaces that makes it possible to keep a physical distance from the population.

The country has only one large port and one large airport; this facilitates the control of Uruguay's interaction with other countries in the world (except for Argentina and Brazil, with which the land border is shared).

Another aspect to highlight is that the virus has hardly affected the low-income population and the most socially vulnerable. The initial spread has been restricted to the upper and middle classes of the city of Montevideo.

The epidemic had its initiation milestone in a conglomerate (grouping of cases in a defined space, in a greater quantity than could be expected by chance). This first outbreak arose as a result of

one of the first four cases entering the country and became a superspreading event. Although these types of events are difficult to predict and prevent, once detected, the speed of response is essential and rapid deployment of case identification and follow-up of contacts is critical (15). The speed with which this situation was addressed has been the constant in all other outbreaks subsequently generated in the country (Figure 2).

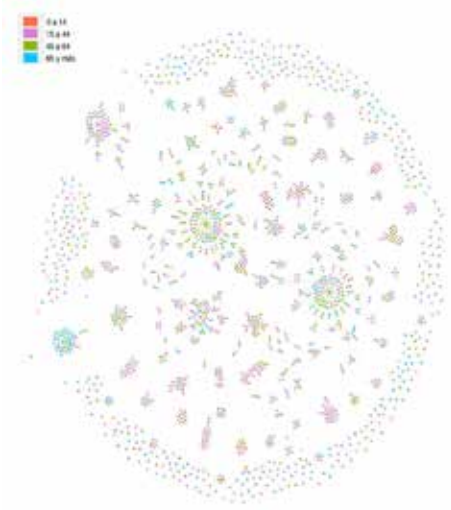

Figure 2. Identified transmission chains of COVID-19 cases by age group. Uruguay, 2020 (09/18/2020). Elaborated by the department of surveillance of the Ministry of Public health, 2020.

From the beginning, events that could lead to super spread were prohibited, that is, events that take place in closed, poorly ventilated environments, with many people meeting for a long time (weddings, churches, choirs, gyms, funerals, etc.) especially when speaking or singing and not wearing face masks. Taking into account the evidence that indicates that the spread of the disease probably presents a 20/80 pattern (20 % of patients are responsible for 80 % of infections) through superspreading events, it is reasonable to infer that the measures adopted by the country in this regard contributed to the reduction of infections and the low community circulation of the virus (15-17).

The circulation of the virus can be verified by observing the value of the reproductive number (Rt). This remained low in our country throughout the entire process until the latest available data, being greater than one only with the appearance of rapidly controlled outbreaks[4] (Figure 3).

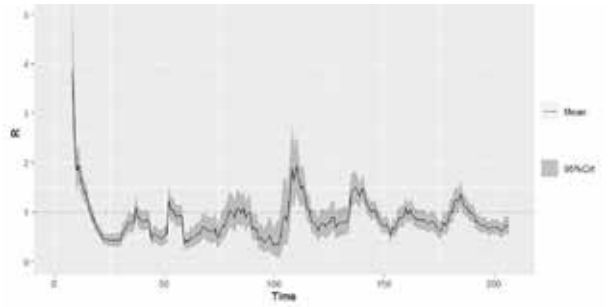

Figure 3. Estimation of the reproductive number (Rt) of COVID-19 in Uruguay. 03/03/2020 - -09/25/2020. Source: (2).

The Rt value is an average value that does not always fully represent reality (since it often does not represent well the evolution by clusters or outbreaks), but it is a widely used indicator and valued as positive when it is below one (18).

The Department of Health Surveillance of the MPH has a data recording system used for the analysis of epidemiological situations in almost real-time. Decisions of lifting some control measures were based on evidence obtained from this rigorous national data, centralized by the MPH and analyzed by the Health Surveillance team and by the Scientific Advisory Group. Having access to these databases (even though it was not always complete and timing) was a strength in the management of this epidemic. As an example, the decision to reopen schools was influenced by the fact that the chains of contacts analyzed had their last link in the children (according to transmission maps generated with the surveillance team of MPH), making it unlikely that there would be a greater spread of the disease

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due to in-person educational activities (Figure 1 developed by Health Surveillance Department).

The role of academic scientific participation not only had to do with making recommendations through the Scientific Advisory Group but also to the creation of a consortium of laboratories (Pasteur Institute of Montevideo, Faculty of Sciences, Clemente Stable Institute) that were able to develop national diagnostic tests that were quickly available at an appropriate cost (19). Viral sequencing techniques were also carried out in this context, allowing us to know more about circulating viruses and their spread. The University of the Republic, through several of its services, also worked to generate knowledge in real-time to better understand this epidemic (20,21).

The government promulgated decrees that allowed a proportion of the people employed in the orbit of the State to go to telework; the same happened in the private sector, where many companies adopted similar measures. In cases where it was not possible, the State relaxed the criteria for access to unemployment and sickness insurance subsidies, as well as reinforced non-contributory transfers aimed at the most vulnerable population (who are over-represented among informal workers). These measures promoted the permanence of employed persons in their homes during the first months without losing their jobs (10). The evolution of the incidence of effective teleworking in employed persons was 19.3 % in April and 11.8 % in July 2020 (22).

Social impact of the COVID-19 sanitary emergency

Although epidemic control has been successful so far, it has had collateral effects on other areas of health and people's lives, affecting different sectors of the population differentially.

In the sanitary field, the implemented measures may have contributed to the decrease in mortality from respiratory infectious diseases due to isolation in the early stages of the epidemic and possibly have also impacted on mortality from external causes, especially due to traffic accidents given the low traffic activity in the first months of the pandemic (23). Likewise, there was a record coverage of influenza vaccination in the context of the pandemic (in Uruguay influenza vaccination is voluntary) (24).

The health emergency has also had a high impact on the living conditions of the most vulnerable segments of society. Although there is not yet enough information to show the magnitude of these effects, it is reasonable to consider that the incidence of poverty and indigence has increased in the country and it can be pointed out with certainty that household income at the global level has dropped and so did the employment rate (Figure 4 and 5).

Figure 4. Evolution of average per capita household income ($ U). January - July 2020.
Source: Authors elaboration based on INE's Technical Report on household income. Available at http://www.ine.gub.uy/inicio

Figure 5. Evolution of the employment rate. Total, Country (%) January - July 2020.
Source: Authors elaboration based on INE's Technical Report on household income. Available at http://www.ine.gub.uy/inicio

Teleworking has been an option for some people and has prevented a further drop in employment; however, the experience has surely been uneven taking into account, for example, existing gender inequalities. In general, women are the ones who are overloaded with domestic and care work, and it is possible that in our country this aspect has been aggravated in the context of a health emergency. So far there have been no signals from the government accounting for this situation.

On the other hand, during the health emergency, it was not possible to fully account for the worsening of situations of intrafamily violence and domestic violence against children, women, and the elderly in a context of massive confinement.

In relation to the school-age population, the degree to which students remained linked to their educational centers during the suspension of face-to-face classes and the degree to which they participated in the different educational proposals developed by their teachers during this period is one of the most relevant unknowns for monitoring the educational situation in the context of the health emergency. According to studies that have been carried out, in general terms, a non-majority, but important group of students, in all education cycles and all modalities, did not manage to maintain regular contact with the educational system and to participate in teaching proposals developed by his teachers.

Likewise, it has not been measured yet the effects of the health emergency on food insecurity, on mental health eventually deteriorated by isolation, on the adequate continuity of medical care through telemedicine, and the weakening of health care and care of dependents networks.

Prospects and challenges for the next stages in the control of the epidemic

The main challenge for the future is to continue scaling the main activities at the population level (work, education, recreation), keeping the country in a green zone of sanitary risk and attending not only to the needs related to the COVID-19 epidemic but also responding to the situations that the control measures have generated in other socio-economic and health aspects.

There is special concern about the exhaustion that the maintenance of sanitary measures has generated on the population.

The massive return to face-to-face classes imposes some of the most important challenges such as maintaining the physical distance between students, hygiene in the centers, and the availability of elements such as alcohol gel and masks.

Measures are being gradually descaled with continuous monitoring of the consequences, balancing the risks and benefits, in an environment in which the health system has managed to generate a certain shield for the care of critical cases.

The reactivation of ports and airports, and the movement of people and cargo, is also a challenge that must be carried out under protocols and in permanent surveillance and must be accompanied by the implementation of international health regulations, currently under review by the WHO. In this sense, regional diplomatic work with the governments of the region is critical since the greatest mobility of people entering and leaving the country is to and from neighboring countries, which are in a different epidemiologic situation from that of Uruguay

The approach of the summer season and the need to reactivate tourism, an important source of income for the country, is also a challenge. The study of lessons learned by other countries concerning tourism is an important basis to take into account when defining a strategy in Uruguay. The development of predictive models of different opening scenarios is an important input in this regard. Criteria for recommendations should take into account the progressivity of measures, regulation, and monitoring.

Summarizing, the great perspective to take into account for the future management of the epidemic in Uruguay is to manage the risk that lifting control measures imposes, balancing the different consequences on the general well-being of the population.

Finally, the decision to be made regarding the use of the COVID-19 vaccine and its application strategy (reduction of the burden of disease or protection of the population at risk) should be taken into account in future perspectives. We

also see as challenges: the surveillance of vaccine safety in a marketing framework with abbreviated studies, costs, and the possibilities of vaccine acquisition for the countries in the region, in a world, struggling to obtain a solution to the problem of COVID-19.

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