

The SARS-CoV-2 vaccination campaign in Brazil and the invisibility of science evidences

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Abstract *This paper reflects on the vaccination campaign against COVID-19 in Brazil in light of the consideration of scientific evidence in the decision-making process. Brazil has one of the largest and most complete vaccination programs in the world, the National Immunization Program (Programa Nacional de Imunizações or PNI). Unfortunately, in the current context, with the political interference of the federal government, the PNI lost its role in conducting the vaccination campaign against COVID-19. Despite being a vaccination campaign with a lot of potential and one of the most accepted by the population among countries in the world, it presented many problems and left several gaps in the Brazilian scenario. In this sense, it is essential that the quality scientific evidence produced during this period can guide a constant remodeling of the vaccination strategy. Four points deserve to be highlighted: 1) the interval between doses; 2) the interchangeability between vaccines; 3) vaccination in children and adolescents; and 4) the need for better evidence to define the vaccination strategy in certain groups and age groups.*

Key words COVID-19, Vaccine, Vaccination campaign, Brazil

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Introduction

The pandemic generated by SARS-CoV-2, decreed by the World Health Organization (WHO) on March 11, 2020, brought enormous needs for a speedy production of knowledge in the globalized world and in looking at health needs. Uncertainties regarding the transmission type, the spread rate speed, and the high fatality rates among the most vulnerable groups have become significant challenges in combating the pandemic.

Non-pharmacological measures have been established worldwide to contain the virus circulation and reduce its transmission while waiting for the development of safe and effective vaccines. Some non-pharmacological measures are the use of masks, social distancing, hand hygiene, room ventilation, extensive COVID-19 testing, lockdowns and border closures¹, and broad implementation of active Epidemiological Surveillance measures, such as active identification of infection sources, adequate testing, and contact control. All these measures are still encouraged by the WHO².

Faced with the health crisis in Brazil and the slow pace of the vaccination process throughout 2021 (less than 25% of the population immunized with two doses or a single dose in the first six months of the campaign)³, non-pharmacological measures, testing, and contact monitoring were crucial measures to contain the virus. While countries such as New Zealand and other European countries controlled the pandemic early by carrying out mass testing campaigns, tracking confirmed cases and their contacts, and using measures such as lockdown and border closure⁴, in Brazil, denialist beliefs disseminated by the Federal Government led to low adherence to isolation measures, devaluation of mask use, low testing and contact screening, resulting in one of the worst epidemiological curves in the world, with a high moving average of cases and deaths for an extended period, making the country the third in the absolute number of registered cases and the second in the ranking of deaths from the disease globally⁵. Thus, the denialist posture that permeated the more than twenty months of the virus in the country and the lack of incisive control and uniformity in addressing the pandemic resulted in the population's hesitation in adopting control measures, hindering the containment of contagion risk behaviors.

The health crisis setting persisted on the arrival of vaccines due to the lack of federal po-

litical support for this pharmaceutical measure, which promoted a disorganized vaccination strategy in the country at the national level⁶. Additional events were the exacerbated health crisis, the decreased adherence to non-pharmacological measures to contain and block transmission, and the delayed vaccination, with only 22.8% of the population vaccinated with two doses or a single dose of the vaccine and 52.9% with the first dose of vaccine³ in the first six months of the campaign. We should remember that, in November 2020, European countries with more than 80% of vaccinated people once again faced a significant elevation in cases, especially with the arrival of the Delta variant, which makes it essential to pay attention to vaccination against SARS-CoV-2.

From this setting, we present a descriptive situation about the vaccination campaign against COVID-19 in Brazil, pinpointing the principal errors of this process per the current scientific evidence.

The PNI and the first steps of the vaccination campaign against COVID-19 in Brazil

Brazil has one of the largest and most complete vaccination programs globally as an integral part of the Brazilian Unified Health System (*Sistema Único de Saúde* [SUS]). Since its creation in 1973, the National Immunization Program (*Programa Nacional de Imunizações* [PNI]) has been instrumental in significantly curbing cases and deaths from vaccine-preventable diseases.

Although the use of vaccines in the country dates back to 1804, with the introduction of the smallpox vaccine, the consolidation of the PNI, based on the legacy left by the Smallpox Eradication Campaign, was fundamental for eliminating poliomyelitis and urban yellow fever and reducing other infectious diseases and fighting against the H1N1 pandemic. Thus, the PNI contributes decisively to increasing life expectancy in the country⁷⁻⁹. Unfortunately, within the current government, with the lack of investments in the SUS and the neglect of fundamental public health policies, the PNI has lost its leading role in the vaccination campaign against COVID-19. While having a campaign with enormous potential and one of the best responses from the local population globally, the Brazilian strategy was ridden by several problems and left several gaps in the vaccination process against COVID-19.

The government had many setbacks and clashes related to the vaccine and the vaccina-

tion process. Since the onset of the pandemic, in mid-2020, the Federal Government created diplomatic crises with China and India, the largest global producers of active pharmaceutical ingredients, which impacted Brazil's ability to produce vaccines⁵. The two largest Brazilian vaccine-producing institutions, the Butantan Institute, responsible for the CoronaVac, and Fiocruz, for AstraZeneca, were deeply affected. In 2020, the Federal Government could have ordered 200 million doses from the COVAX facility, the World Vaccine Alliance formed by 165 countries that sought to ensure their vaccines, but it refused to be part of this coalition and, at the last minute, joined the group ordering only 42.5 million doses, not enough even for priority groups. Pfizer offered to sell 70 million doses of the vaccine, and the government never responded to the company's repeated queries¹⁰. In October 2020, the then Minister of Health, Eduardo Pazuello, announced the purchase of 46 million doses of CoronaVac but was disallowed by the President of the Republic and suspended the purchase¹¹. The Ministry of Health also did not sign a contract with Janssen in 2020, even with the company stating that Brazil would be a priority for the delivery of vaccines as it hosted phase 3 of the clinical trial¹⁰. As of December 2020, Brazil had only established an agreement with AstraZeneca to transfer technology to Fiocruz¹². Thus, the weakening process of the National Immunization Program during the COVID-19 pandemic in Brazil is evident in this context.

The advance of the vaccination campaign in Brazil and the use of scientific evidence

Making decisions in the management of health services is not a simple task. Faced with moments in which knowledge is lacking for decision-making, or there is sufficient knowledge, but decisions are not taken in due time, and those in which decisions are necessary even in the face of scarce evidence, the decision-making process in health issues is very complex¹³. From the 1970s onwards, the use of scientific knowledge began to inform decision-making in formulating and implementing public policies¹⁴. Since then, a growing interest in ensuring the development of scientific knowledge-informed policies¹⁵ has been observed in health, which is because evidence-based health policies improve the performance of the public health system and avoid inequalities arising from poorly formulated policies¹⁶.

We know from these premises that the National Immunization Program did not operate per its potential during the COVID-19 pandemic. In this sense, although the technical staff used quality scientific evidence in the decision-making process, the country's political actors took political decisions that disregarded all these aspects. Despite the setbacks, vaccination has currently escalated, and CoronaVac, AstraZeneca, Pfizer, and Jansen doses have been distributed and applied in the country, and Brazil exceeded the vaccination coverage in the United States. However, had the management of the pandemic been streamlined and the due priority given to vaccination, the nation could have started to face this pandemic in 2021 with 316 million doses sufficient to vaccinate 78% of the population, and 75% of Brazilian lives lost to the COVID-19 virus could have been saved¹⁷.

Besides the inefficient and incompetent purchase of vaccines, the lack of organization and political decision interfered with the frustrated purchases of vaccination campaign inputs, with no planned purchase of high-precision syringes, which avoids wasting vaccine doses. In the process of investigating the problems of federal management in dealing with the pandemic, the Senate Parliamentary Inquiry Commission on COVID-19 pointed out issues such as misguided choices and suspected vaccine purchase overpricing. Many mistakes were made since the onset of the vaccination campaign – and some persist today – associated with inertia and slow decision-making, the inability to correspond in real-time to information provided by emerging scientific evidence. It is crucial to look at this evidence to strengthen and step-up vaccination against COVID-19 in the country.

Some issues drew attention during the vaccination process. These include information to the press of priority groups with defined phases and, later, the withdrawal of phases and creating a large priority group consisting of almost 78 million people. Furthermore, the late vaccination of pregnant and postpartum women in a country with eight out of ten maternal deaths from COVID-19 globally was started and then stopped by a single case of severe side effects. Contrary to scientific evidence, this fact removed pregnant women from the groups to be vaccinated, including later only those with comorbidities, causing a delay of more than two months before the vaccination of this group was resumed. In a short space of time, these changes enabled states and municipalities to define their priorities and

ended up generating misalignment and lack of coordination between the Federal Government, states, and municipalities in the established vaccination strategy^{18,19}.

It is the first time since the creation of the PNI that an information campaign is not preceding an extensive vaccination campaign on vaccines, the need to vaccinate priority groups, and vaccination-linked adverse events. Also, problems in the organization of the work process and logistics of the vaccination campaign, including lack of team training and coordinated and transparent communication, are notorious and negatively influenced the population's vaccination process and the quality of work of the responsible health professionals. We have vaccines with different intervals and possible adverse events. There was no clear training and guidance for health professionals in a centralized and coordinated way, which led to vaccine administration errors, sometimes making the population feel insecure about getting vaccinated.

Moreover, even with the large amount of quality evidence produced in the period since the onset of the Brazilian vaccination campaign, this information was not used timely, which would have been fundamental to reshaping our vaccination strategy, accelerating campaign benefits, and better informing and protecting citizens. Four points deserve to be highlighted among the remodeling actions: dose intervals, vaccine interchangeability, adolescent vaccination, and the need for better evidence to define vaccination strategy in specific age ranges and groups.

As for the intervals between doses, we point out that the evidence regarding the impact of new variants on existing vaccines increased throughout 2021. In a UK study, investigators showed that the Delta variant decreases the vaccine's efficacy mainly in people who received only one dose²⁰. Furthermore, the efficacy against symptomatic disease decreased to approximately 33% for people with only one dose, with high efficacy of around 88% with both doses. Therefore, extending the interval from the one approved by the vaccine manufacturer leaves people vaccinated with only one dose more susceptible. Also, the fewer people vaccinated with the second dose, the greater the probability of keeping high viral circulation and, thus, the greater the likelihood of variants emerging that could bypass the vaccines. Due to scientific evidence, some countries, including Portugal and the United Kingdom, have reduced the AstraZeneca (AZ) vaccine interval to eight weeks. Most of the most advanced coun-

tries in the vaccination campaign throughout the first half of 2021 administered the Pfizer vaccine as recommended by the manufacturer, with an interval of 21 days between doses.

Countries including Canada, England, and other European nations have used heterologous vaccination schedules as a public health program regarding vaccine interchangeability²¹. Evidence indicates that such mixed or combined COVID-19 vaccination regimens can trigger immune responses more robust than two doses of a single vaccine²², while simplifying immunization efforts for countries facing fluctuating stocks of multiple vaccines²³. Studies have been published on the efficacy of homogeneous versus heterogeneous regimens. In Germany, boosting heterologous vector-mRNA induced a strong humoral and cellular response with an acceptable reactogenicity profile²⁴. In Spain, in a study with 676 individuals, researchers showed that a second dose of Pfizer in people vaccinated with AZ induced a robust immune response with an acceptable and manageable reactogenicity profile²⁵.

Brazilian researchers should conduct population studies with the vaccines used in the country, including CoronaVac, to define the safety, infection rate, hospitalization, and death of each combination and, to this end, the Science and Technology Secretariat of the Ministry of Health and the Ministry of Science, Technology, Innovations, and Communications should open public notices for research funding in these areas.

We should also turn our attention to the vaccination of children and adolescents. An essential point in this discussion was the approval by ANVISA of the Pfizer vaccine for adolescents aged 12 years and over and, recently, of the vaccination of children aged 5 to 11 years by the same company. Although vaccination of children and adolescents has become imperative due to the significant number of deaths and hospitalizations in this last age group, the government has acted promptly in favor of denialist groups. Vaccination in these two groups is vital to protect them and help reduce viral transmission and contribute to collective immunity, ensuring a safer return to face-to-face classes²⁶.

Conclusion

Vaccination is a group strategy, and better organization based on the best available scientific evidence will be required to continue curbing cases and deaths and avoid the possible transmission

of new strains in the country. In this sense, the Brazilian vaccination strategy needs to join with science. We should also be aware of how other vaccination programs worldwide are organizing their campaigns according to the specifics of each vaccine available. In this sense, the PNI must urgently evaluate new paradigms for the vaccination campaign with the newly generated scientific evidence and, mainly, communicate updated changes to society, establishing greater vaccine confidence.

The Brazilian PNI has always been a leader in the Americas, introducing vaccines into the Vaccination Calendar to address public health problems regarding vaccine-preventable diseases, especially in a pandemic, when the population is at imminent risk of illness and death. In this sense, we should seriously continue to assist the Ministry of Health's immobility in decision-making timely and, often, acting in a way that confuses the population. We should strategically strengthen the PNI to protect the population until COVID-19 is effectively controlled in our country.

Collaborations

EL Maciel, M Fernandez, and KC Batista participated in the conception and design of the manuscript and drafting the paper. D Garrett, C Domingues, L Kerr, and M Dalcomo participated in drafting the paper and approved the version to be published.

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