Residência RP Pediátrica
Publicação Oficial da Sociedade Brasileira de Pediatria
ISSN-Online: 2236-6814

Submitted on: 09/27/2024
Approved on: 10/07/2024

ORIGINAL ARTICLE

Vaccination card status of children and adolescents admitted to the wards of a paediatric university hospital

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Keywords:
Immunization programs,
Vaccines,
Child,
Adolescent,
Hospitalization.

Abstract

Introduction: Brazil provides all vaccines recommended by the World Health Organization and was a pioneer in incorporating various vaccines; however, the high vaccination coverage rate has dropped alarmingly. **Method:** A cross-sectional, descriptive, quantitative study was conducted. The caregivers of children and adolescents hospitalized in the wards of a paediatric university hospital were interviewed to identify their vaccination card status in relation to the recommendations of the Ministry of Health. Medical students administered questionnaires and checked vaccination cards. Direct questions characterized the patient profile and vaccination status. In cases of vaccine(s) delay, an open question was asked to identify the reason(s). **Results:** A total of 55 caregivers were interviewed, mostly mothers (81.8%). Among the patients, the predominant characteristics were boys (58.2%), infants (45.5%), hospitalization of less than 1 week (47.3%), and respiratory illnesses as the reason for admission (40.0%). Other health problems were reported in 58.1% of the patients. According to the caregivers perception, 49.1% had delayed vaccination shots. However, 74.5% had an overdue vaccination card, with the COVID-19 vaccine being the most common (61%). The most frequently cited reasons were prolonged or repeated hospitalizations (29.2%). All patients who were hospitalized for 1 month or more had their vaccine shots overdue. **Conclusion:** A significant percentage of hospitalized patients presented with vaccination delays, and the caregivers perception was much lower than what was found through the verification of the cards. Vaccination checks and updates need to be conducted during hospitalization (for long-term stays) or at discharge (for short-term stays).

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Resid Pediatr. 2025;15(3). DOI: 10.25060/residpediatr-2025.v15n3-1343

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INTRODUCTION

The National Immunization Program (PNI) of the Ministry of Health (MS) aims to coordinate immunization efforts and is a global benchmark. Brazil offers, through its Unified Health System (SUS), all vaccines recommended by the World Health Organization (WHO) and was a pioneer in incorporating several vaccines. By consolidating a nationwide strategy, the PNI has made considerable progress and achieved its goals. Polio, measles, and neonatal tetanus have been eradicated. Vaccine-preventable diseases such as diphtheria, whooping cough, accidental tetanus, hepatitis B, and meningitis have been controlled. Severe forms of tuberculosis and rubella have been prevented[1].

However, Brazil's high vaccination coverage rate has declined alarmingly, particularly since 2018, when it failed to meet any of the childhood vaccination targets, putting experts and health professionals on alert[2]. Until 2016, Brazil had been certified as having eliminated the circulation of the measles virus by the Pan American Health Organization (PAHO), but in 2018, new cases began to be recorded from Venezuela, spreading across various regions of the country. In 2019, according to the Ministry of Health, more than 18,000 cases of the disease were recorded[3].

With the coronavirus disease (COVID-19) pandemic, vaccination coverage in Brazil fell even further and was only 66.62% in 2020[3] . In 2021, Brazil ranked 7th among *the* 20 countries with the most unimmunized children in the world[4].

Several factors explain the decline in vaccination coverage in Brazil . The success of the National Immunization Program (PNI) itself may be one of the reasons for the decline. The program largely immunized the population currently between 30 and 50 years old, and since vaccine-preventable diseases have disappeared, these people have not experienced them and often do not realize the importance of immunizations for their children . The current healthcare model, prioritizing acute conditions, is another reason cited for the decline in vaccination coverage. Furthermore, in times of information overload and superficiality of content, a movement known as "anti-vaccine" has been growing. This movement, in addition to questioning the safety of vaccines, also disbelieves in children's susceptibility to diseases . The inevitable flow of people between countries, both for tourism and business, and the fact that some of them are not vaccinated, contributes to the return of extinct vaccine-preventable diseases and all the public health problems they entail[1].

In February 2023, the Brazilian government launched the "National Vaccination Movement," aiming to restore public confidence in science, the Unified Health System (SUS), and vaccines[4]. That same year, it also launched the "Health with Science" program, an initiative in defense of vaccination, aimed at combating misinformation and the spread of *fake news*, factors that impacted public adherence to immunization campaigns. These strategies aim to restore Brazil's high vaccination coverage rate in the face of a setback[4].

A new report from the WHO and the United Nations Children's Fund (UNICEF), from July 2024, showed that Brazil made progress in childhood immunization and managed to leave the list of the 20 countries with the most unimmunized children in the world[4]. In 2023, 13 of the 16 main vaccines in the childhood calendar showed an increase in vaccination coverage, when compared to the same year. 2022. Brazil stood out positively, even after facing consecutive declines since 2016, while most countries failed to reach vaccination coverage targets[4].

Both the Child and Adolescent Statute (ECA) and the Resolution on the Rights of Hospitalized Children and Adolescents guarantee the right to access vaccines for all boys and girls aged 0 to 18 years[5,6]. Although both date from the 1990s, these rights are still not recognized or incorporated by the vast majority of institutions and health professionals, causing unnecessary suffering for children and adolescents. Furthermore, due to the profile of hospitalized patients (immunosuppressed, with chronic diseases, malnourished, undergoing invasive procedures, or on prolonged antimicrobial therapy), disease outbreaks occurring in hospitals are a major concern, increasing the morbidity and mortality of hospitalized children and adolescents. Up-to-date vaccination of patients is considered one of the measures to prevent and block outbreaks of vaccine-preventable diseases in hospitals[7]. This study aimed to identify the vaccination card situation of children and adolescents admitted to the wards of a pediatric university hospital in relation to what is recommended by the PNI.

METHOD

A cross-sectional, descriptive, quantitative study was conducted from November 2023 to June 2024. It interviewed guardians of children and adolescents admitted to the wards of a pediatric university hospital. Inclusion criteria: guardians who had a Child Health Record at the time of the interview and who agreed to participate in the study by signing the Informed

Consent Form. Guardians of patients admitted to the Hematology ward , those who did not have a Child Health Record at the time of the interview, and those who did not agree to participate were excluded. Undergraduate medical students, under supervision, completed a questionnaire with direct questions that characterized: the interviewee's relationship with the patient, age, sex, city of residence, reason for and length of hospitalization, the existence of another health problem besides the one that led to hospitalization, the guardian's view of the patient's vaccination status, and the vaccination status in relation to the schedule recommended by the National Immunization Program (PNI). In case of vaccination delay, an open-ended question was asked to identify the alleged reason(s) for the delay. The results were organized by simple frequency distribution. Responses to the open-ended questions were grouped. The project was approved by the institution 's Research Ethics Committee on November 21, 2023 (CAAE: 74168223.1.0000.5264).

RESULTS

Fifty-five guardians were interviewed, the majority of whom were mothers (81.8%, 45/55). The other guardians interviewed were the father, another family member or another type of non-family relationship, with an approximate frequency of 6.0% each.

Regarding patients, the most frequent were: male gender, infant age group, hospitalization time of less than 1 week and residence in the city of Rio de Janeiro (Table 1).

The reasons for hospitalizations were diverse, with respiratory conditions prevailing (Table 2).

Health conditions prior to hospitalization affected 58.1% (32/55) of patients, namely: respiratory 21.9% (7/32), nutritional and metabolic 18.7% (6/32), hematological 15.6% (5/32), neurological 12.5% (4/32), gastroenterological 9.4% (3/32), genetic 9.4% (3/32), nephrological 6.2% (2/32), rheumatological 3.1% (1/32) and allergic 3.1% (1/32).

According to those responsible, 49.1% (27/55) of patients were late in their vaccinations. However, when checking their vaccination records, 74.5% (41/55) of patients had one or more vaccine(s) late in relation to the recommendations of the Ministry of Health.

Children and adolescents with a hospital stay of less than 1 week had 65.4% (17/26) of their vaccination cards delayed. Those with a hospital stay of 1 week to less than 1 month had 77.3% (17/22) of their vaccination cards delayed. All patients (7/7) with a hospital stay of 1 month or more had delayed vaccinations.

We frequently found more than one vaccine delay in the same patient. The COVID-19 vaccine was the one with the most delays on the vaccination record (Table 3).

Those responsible gave different reasons for the vaccination delay, the most frequent being prolonged or repeated hospitalizations (Table 4).

The acute infections cited by the interviewed guardians as reasons for delayed vaccination were: respiratory (common cold, flu) and gastrointestinal (acute diarrhea).

The immunosuppressions alleged by the interviewed guardians as reasons for the vaccination

Table 1. Distribution of patients according to demographic characteristics and length of hospital stay.

VARIABLE	n	%
PATIENT SEX		
- Masculine	32	58,2
- Feminine	23	41,8
- Not identified	0	0,0
PATIENT AGE		
- Newborn	2	3.6
- Infant	25	45.5
- Preschool	13	23.6
- School	6	10.9
- Adolescent	9	16.4
HOSPITALIZATION TIME		
- Less than 1 week	26	47.3
- 1 week less than 1 month	22	40.0
- 1 month or more	7	12.7
MUNICIPALITY OF PATIENT'S RESIDENCE		
- Rio de Janeiro	45	81.8
- Others	10	18.2
TOTAL	**55**	**100**

Table 2. Distribution of patients according to the reasons that led to hospitalizations.

DISEASES	n	%
Respiratory	22	40.0
Gastroenterological	7	12.7
Infectious parasites	6	11.0
Neurological	5	9.1
Hematological	4	7.2
Nephrological	4	7.2
Rheumatological	2	3.6
Nutritional and metabolic	2	3.6
Genetics	2	3.6
Ophthalmological	1	1.8
TOTAL	**55**	**100**

Table 3. Distribution of delayed vaccines, according to the calendar recommended by the.

TYPE OF VACCINE OUT OF DATE	n	% (n/41)
COVID-19[1]	25	61
Polio (oral and injectable)	11	26.8
Influenza	8	19.5
Meningococcal C	8	19.5
Monovalent chickenpox	6	14.6
Triple viral (measles, mumps, rubella)	6	14.6
Yellow Fever	6	14.6
Pneumococcal 10-valent	5	12.2
Pentavalent (diphtheria, tetanus, whooping cough, hepatitis B, hemophilus B)	4	9.8
Triple bacterial (diphtheria, tetanus, whooping cough)	4	9.8
Viral tetravalent (measles, mumps, rubella, chickenpox)	4	9.8
Human Papilloma Virus	4	9.8
Rotavirus	3	7.3
Hepatitis A	3	7.3
Meningococcal ACWY	2	4.9
Hepatitis B	1	2.4
BCG [2]	1	2.4
Double (diphtheria, tetanus)	0	0

Ministry of Health. [1]COVID-19 - Coronavirus Disease. [2]BCG - Bacillus of Calmettè and Guerin.

Table 4. Distribution of reasons given for vaccination delay.

REASON	n	%
Prolonged or repeated hospitalizations	12	29.2
Refusal of the COVID -19 vaccine	9	21.9
I didn't know about the vaccine delay	9	21.9
Acute infection on the recommended date of vaccination	3	7.3
Immunosuppression on the recommended vaccination date	3	7.3
Vaccine contraindicated by the doctor	3	7.3
Lack of vaccine at the Basic Health Unit	1	2.4
There was no reason given	1	2.4

delay were: previous history of leukemia, bone marrow transplant and chronic use of corticosteroids.

There were several vaccines contraindicated by doctors, according to the people interviewed: yellow fever, meningococcal C, 10-valent pneumococcal, rotavirus, polio (injectable and oral) and pentavalent.

The monovalent chickenpox vaccine was the vaccine claimed by the person responsible to be missing from the Basic Health Unit.

DISCUSSION

In our study, we found a significant percentage (74.5%) of hospitalized children and adolescents with one or more vaccines delayed in relation to the Ministry of Health's recommendations. The most frequent reason given by guardians for the vaccination delay was prolonged or repeated hospitalizations. Currently, our institution does not have a vaccination routine for hospitalized patients. Since the objective of this study was not to verify patients' previous hospitalizations, the lack of vaccination updates may also have occurred during hospitalization in another healthcare institution . A study conducted in 2015 with 155 children aged 0 to 6 years admitted to the Pediatric ICU and Pediatrics of the Paraná University Hospital showed that 33% of the children had some form of vaccination delay[8]. The vaccines with the most delays were BCG and the pentavalent booster . Our study revealed a vaccination delay well above this, relative to vaccines against other diseases (COVID-19 and injectable and oral polio). probably due to the historic drop in vaccination coverage from 2018 onwards, described above, and the recent COVID-19 pandemic, which sparked great discussion about the effectiveness and side effects of vaccines, due to the way the issue was handled by the country's authorities.

Refusal to vaccinate against COVID-19 was the second most common reason given for vaccination delays in our work. In 2012, the WHO, through the SAGE (*Strategic Advisory Group) working group of Experts on Immunization*) proposed the concept of vaccine hesitancy such as delay in accepting or refusing to receive vaccines that are available in health services. Hesitant individuals fall between two extremes: those who accept all vaccines without hesitation and those who unquestioningly refuse them[9-13]. It is a very complex phenomenon. It involves cultural, social, and economic. It varies over time, location, and types of vaccines. Until 2020, few Brazilian studies studied the refusal or delay in administering vaccines available through the SUS (Unified Health System), and most did not use the term vaccine hesitancy . In 2021, a survey conducted in 23 countries, with 1,000 participants in each, showed that childhood vaccine hesitancy in Brazil increased by 56.3%[11]. That same year, an online study carried out with 173,178 participants from all Brazilian states , found 11.9% of caregivers with vaccine hesitancy. Fear of adverse reactions emerged as the main cause of insecurity, even among those who were in favor of traditionally administered vaccines. Approximately 7.7% of respondents expressed vaccine hesitancy regarding the COVID-19 vaccine[12].

Researchers from the Interdisciplinary Center on Public Health Emergencies (NIESP) at the Oswaldo Cruz Foundation conducted a study that analyzed childhood vaccine hesitancy and COVID-19 from the perspective of health professionals. Eighty-six primary health care professionals were interviewed. The responses were organized into three categories: fear , misinformation, and the role of health professionals. Fear was related to the vaccine still being perceived as experimental, the lack of long-term studies, the false perception of a reduced risk of COVID-19 in children, and the Federal Government's actions that generated uncertainty about the vaccine[13]. Fear justifying refusal to vaccinate against COVID-19 was found in our study and is described also in literature[14,15].

The perception of those responsible for children and adolescents hospitalized with delayed vaccinations was well below what was found through checking the vaccination cards. Thus, the lack of knowledge on the part of those responsible for the delayed vaccinations also appeared as the second most frequently cited reason for the delayed vaccinations. A study

conducted in the General Pediatrics Outpatient Clinic of the same pediatric university hospital, with children up to 6 years of age, found that 44.4% of vaccination cards were late with one or more vaccines, and the main reason given by those responsible for the vaccination was a lack of knowledge about the need to vaccinate the child at the recommended age. The study was conducted in 2021 and 2022, when there was a decline in routine medical care due to the COVID-19 pandemic . less guidance for families on the importance of vaccination, which may explain the results found[16].

Even with proven efficacy in preventing various diseases, vaccines are sometimes contraindicated in situations where they should not be administered. Clinical conditions that simply require postponement (e.g., patients with acute febrile illnesses or those taking immunosuppressants) are more common than true contraindications to vaccination[17,18] . Acute respiratory and gastrointestinal infections, presented by the patients in our study on the recommended vaccination date, could justify postponement, but do not contraindicate vaccination. A study conducted in Rio Grande do Sul in 2015 with hospitalized children aged 6 months to 2 years evaluated the frequency of vaccination against Influenza A H1N1 and the reasons for non-vaccination. The main reasons for non-vaccination were influenza (31.4%) and misinformation (22.5%), and the annual vaccination campaign (69%)[19] was the main incentive for vaccination. Unfortunately, we still observe acute febrile illnesses as a factor justifying the non-administration of vaccines in annual campaigns, both by those responsible and by professionals at vaccination centers, which reinforces the need to improve guidance on this topic.

Patients taking immunosuppressants or who have undergone bone marrow transplants should postpone vaccination with attenuated bacteria and viruses, as they may develop severe forms of the diseases after receiving the components of some of these vaccines[18]. In our study, the alleged immunosuppression for the vaccination delay in two patients did not justify or was not temporally related to the delayed vaccine. The patient with a history of leukemia was overdue for the 10-valent pneumococcal vaccine . The patient with a history of bone marrow transplant was a schoolchild with sickle cell anemia, whose transplant had been performed two years before the interview, and the overdue polio vaccines (injectable and oral) should have already been administered in the age range stipulated in the National Immunization Program (PNI). Only one patient taking immunosuppressants due to an autoimmune disease had a valid justification for the postponement, as the vaccines were delayed for MMR, MMR, and monovalent varicella. However, this patient had also not received a COVID-19 vaccination. Considering that both caregivers and primary care providers may feel insecure about vaccinating children and adolescents with chronic or complex conditions, it is crucial that healthcare providers provide written information about the vaccines that would be available or refer the patients to a Special Immunobiological Reference Center (CRIE).

In our patients, when the guardian reported that vaccination was contraindicated by the physician, there was no true contraindication in all cases. One patient over 6 months of age with neurological symptoms due to perinatal asphyxia was contraindicated for the yellow fever vaccine. In this patient, the yellow fever vaccine was only contraindicated if there was a previous history of anaphylaxis to substances present in the vaccine or if the neurological condition was related to immunosuppression, autoimmune disease, or demyelinating disease within 6 weeks of the previous dose[18]. The patient who, according to the guardian, was contraindicated for receiving vaccines with live virus components was in fact overdue for meningococcal C and 10-valent pneumococcal vaccines. One patient, in the infant age group, was contraindicated for the rotavirus, injectable and oral polio, 10-valent pneumococcal , and pentavalent vaccines because he was undergoing diagnostic investigation. These results point to the need for ongoing education of health professionals regarding the true contraindications to vaccines.

The study's main limitation is the small number of guardians interviewed, primarily due to the lack of a Child Health Record at the time of the interview. This fact highlights the need for healthcare teams to request this document during hospitalization in the institution's wards, as is the case during outpatient appointments.

Another limitation was that we did not assess whether children and adolescents admitted to the wards had an indication of having been referred to CRIE to receive additional doses of vaccines, since we found more than half of the children and adolescents had other health conditions prior to admission that could indicate referral.

Hospitalization should be considered a time to check and update vaccination records, either upon discharge (for short-term hospitalizations) or during hospitalization (for long-term hospitalizations, after the patient's clinical stabilization). Establishing an institutional routine for updating vaccination records is extremely important and a right of hospitalized children and adolescents.

We also emphasize the importance of ongoing education for healthcare professionals regarding vaccines, ensuring they are fully up-to-date. The continuous contact that hospitalization provides (between healthcare professionals and those responsible for children and adolescents) is a great opportunity to raise family awareness about their child's vaccination status, understand the reasons for vaccine hesitancy, address concerns, improve guidance, raise awareness, and reinforce the importance of up-to-date vaccinations. Only in this way will we be contributing to increased vaccination coverage in our country.

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