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VACCINATION STATUS AND PERCEPTIONS OF THE IMPORTANCE OF VACCINES AT A MEDICAL SCHOOL IN MINAS GERAIS

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Abstract: The high rate of vaccination coverage, which has always been a feature of Brazil's immunization policy, has fallen in recent years. The issue is drawing the attention of scientists and health professionals. Associated with the drop in the vaccination rate, some pathologies, previously considered to be eradicated by vaccines, have once again become a concern for the health sector. In this scenario, it is necessary to understand the reasons that led to this change, but also to analyze how future professionals in the field connect with the vaccination situation in Brazil. To this end, this study surveyed 140 students at a medical school in Minas Gerais to understand and measure adherence and their perceptions on the subject. The aim is to highlight the importance of immunizing students to protect individual health, patient safety in hospital settings and public health in general, since adequate vaccination coverage is crucial to prevent students from becoming disease vectors.
Keywords: vaccination; medical students; immunization.

INTRODUCTION

TOPIC DESCRIPTION

The Brazilian National Immunization Program (PNI) is a world reference. Brazil was a pioneer in incorporating various vaccines into the Unified Health System (SUS) calendar and is one of the few countries in the world offer an extensive and comprehensive list of immunobiologicals universally. However, the high coverage rate, which has always been its main characteristic, has been falling in recent years, putting specialists and professionals in the field on alert.

Studies agree that there are several factors that explain the drop in vaccination coverage in the country. The most important of these is the prevailing health care model, which prioritizes acute health conditions and which, detached from Primary Health Care (PHC), fails to provide adequate follow-up for citizens. "Despite the undeniable advances and improved access to PHC, we cannot ignore the fact that there is still a lack of integration between it and surveillance, prevention and promotion actions. Unfortunately, the organization of services does not always give priority to continuity of care."

Many people, and even health professionals these days, are unaware of various diseases that have been extinguished thanks to the advent of vaccines in Brazil and around the world. Fortunately, understanding of the importance of vaccination prevails and, combined with scientific and technological development, the work carried out by managers and the sense of responsibility of citizens, reinforces the awareness that vaccinating a child means not only protecting them, but sustaining a condition of collective health achieved through hard work and effort.

JUSTIFICATION

Getting vaccinated according to the schedule defined by the Ministry of Health, based on the correct vaccination schedule that takes into account the number of doses and the appropriate ages for each vaccine, is fundamental for successful immunization. Every he vaccine has a defined schedule and an appropriate deadline. There's no point in getting to the end of the year, for example, and doing all three doses at once, as the vaccine will only remain highly effective if two or three doses are done, depending on the schedule and within the appropriate timeframe. Therefore, keeping your vaccination schedule up to date is essential for your health.

OBJECTIVES

The aim of this study is to evaluate vaccination records and to advise people who are behind on their vaccinations to go to the immunization service for the necessary measures.

HYPOTHESIS

Individuals with the vaccination schedule provided by the Ministry of Health has been falling in recent years.

RISKS AND DISCOMFORTS

The risks of this research would be related to stigmatization (disclosure of information), invasion of your privacy, interference in your life and routine, embarrassment when interacting with strangers, fear of possible repercussions and discrimination. Risk of breach of confidentiality through the disclosure of data and identification not authorized by you, which would result in psychological, moral and/or material damage to you or third parties. However, every care will be taken to ensure that your identity is not revealed. No form of identification will be allowed without your consent. To avoid such identification, information such as name, alias, initials, individual records, postal information, telephone numbers, e-mail addresses, photographs, figures, morphological characteristics, among others, will not be reported.

BENEFITS

The benefits obtained from this research will be the contribution to the scientific community and the individual participating in the research.

THEORETICAL FRAMEWORK

IMMUNIZERS - VACCINES

Vaccines are substances capable of stimulating the immune system, producing specific and functionally active antibodies to certain antigens order to protect the body from potential pathogens. These immunizers are produced from the offending organism itself, whether it is live and attenuated, inactivated, or even through its fragments (BALLALAI, 2020).

Vaccines induce the humoral response produced by B lymphocytes and immunological memory, as well as the cellular response, mediated by both CD8 T lymphocytes and CD4 T lymphocytes, which also help B lymphocytes to produce antibodies. The expected immune response should be similar to that produced by natural infection, but without worsening the disease, since the antigens present in the vaccine are not very virulent or even at all, as in the case of using inactivated organisms (BALLALAI, 2020).

The immune response produced changes with the type of vaccine used. Vaccines from live attenuated organisms are obtained from microorganisms which, after being subjected to culture media that are not very favorable to their survival, can be used as immunizing mechanisms. This is the most immunogenic of vaccines due to its ability to produce an immune response very similar to that of natural infection. In Brazil, the vaccines produced from attenuated organisms are the triple viral (measles, mumps and rubella); tetraviral (measles, mumps, rubella and chickenpox); yellow fever; chickenpox; ; oral polio; rotavirus, BCG and dengue (BALLALAI, 2020).

In the case of inactivated vaccines, the antigen can be obtained in different ways. You can find vaccines with the entire microorganism inactivated in their composition (inactivated polio vaccine), inactivated toxins (tetanus vaccine), subunit vaccines of microorganisms

(some types of influenza vaccine), as well as other immunizers such as inactivated polysaccharides that don't contain the antigen conjugates (23-valent pneumococcal) and protein-conjugated polysaccharides (meningococcal conjugate vaccines) (BALLALAI, 2020).

In general, inactivated vaccines require multiple doses to ensure the creation of memory cells and protective immunity, since their antigens are less immunogenic. Although this type of vaccine can cause adverse effects more frequently, due to the use of adjuvants in its composition, inactivated immunizers do not have the capacity to generate the disease. In addition, they can be used in pregnant women and immunosuppressed individuals because they do not cause infection (BALLALAI, 2020).

NATIONAL IMMUNIZATION PROGRAM (PNI)

In recent decades, immunization programs have become important in Brazil, especially the National Immunization Program (PNI) of the Ministry of Health (MS). Created in 1973 and regulated by Law No. 6.259, of October 30, 1975, and Decree No. 78.231, of August 12, 1976, the PNI is currently the program in force in Brazil and represents the country internationally in matters of public health and also as a world reference by the Pan American Health Organization (PAHO), an organ of the World Health Organization (WHO) (SANTOS *et al.*, 2010).

The PNI's mission is to control, eradicate and eliminate vaccine-preventable diseases (MS, 2014), as well as to achieve satisfactory levels of immunological protection of the population through vaccination coverage, preventing the population from communicable diseases through the immunization of the general population throughout the country (SANTOS *et al.*, 2010).

This program has had a major impact on reducing disease in recent decades and can therefore be considered one of the main and most relevant public health interventions in the country (MS, 2014).

Almost five decades ago, this program was formulated with the aim of coordinating immunization actions in the country, which had previously been organized into disease control programs. In 1977, Ordinance 452/77 published the first national vaccination calendar, standardizing the vaccination of the population.

It consists of four vaccines: the triple bacterial vaccine (DTP) against diphtheria, tetanus and pertussis; the Bacillus Calmette-Guerin BCG vaccine against tuberculosis; the monovalent measles vaccine; and the oral polio vaccine (OPV) (DOMINGUES; TEIXEIRA, 2013).

In 2004, a new ordinance regulated vaccination schedules by life cycle, i.e. children, adolescents, adults and the elderly. In addition to implementing the double bacterial vaccine (dT) for adolescents and adults, the hepatitis B vaccine for risk groups and the regulation of annual vaccination campaigns for the elderly with the influenza vaccine (DOMINGUES; TEIXEIRA, 2013).

The PNI currently recommends a vaccination schedule that starts newborns and covers all age groups, as well as pregnant women and indigenous peoples. Nineteen vaccines are available for more than 20 diseases. According the Ministry of Health, the program aims to achieve 100% vaccination coverage, homogeneously in all municipalities in the country, offering quality vaccines to all children born in the country (MS, 2021).

The progress made with the PNI can be seen in the elimination of some diseases in Brazil, such as measles and neonatal tetanus, and the control of vaccine-preventable diseases such as diphtheria, pertussis and accidental tetanus, hepatitis B, meningitis, yellow fever, severe forms of tuberculosis, rubella and mumps in some states, as well as the eradication of polio (MS, 2021).

IMMUNIZATION OF HEALTHCARE PROFESSIONALS

Since healthcare workers have direct or indirect contact with patients and/or organic samples from patients with various diseases, they are routinely exposed to infections and therefore need to be vaccinated. In order to guarantee the health of workers, immunization, especially of health professionals, is one of the first aspects to be analyzed, since these professionals, when they are not vaccinated, must be vaccinated immunized, they can become a source of pathogens and dissemination in the intra- and extra-hospital environment (SANTOS *et al.*, 2010) (MANCUZO *et al.*, 2016).

According to Regulatory Standard No. 32 (NR 32) of the Ministry of Labour and Employment, which is aimed at health service workers, the need for immunization of these professionals is clear. Vaccines must be offered to the potentially exposed group whenever the risk in question is related to microorganisms that can be prevented by immunization. In addition to protecting themselves, vaccinating these professionals also protects their patients (FLAVIA BRAVO, 2019) (MS, NR32, 2005).

Also according to NR 32, the employer must make available free of charge the vaccines registered in the country that may, according to the employee's risks, be in compliance and established in the Occupational Health Medical Control Program (PCMSO) (GOMES, 2007).

Although some of the vaccines to be administered to health professionals are available free of charge through the SUS, others are only available through the private network. However, the employer must take responsibility and implement immunization in establishments that are able to administer vaccines and are recognized by the Ministry of Health (GOMES, 2007).

The PNI stipulates that adults and the elderly should be immunized against tetanus and diphtheria (Td), measles, mumps and rubella (MMR) and yellow fever. For the over-60s, the flu vaccine, the 23-valent pneumococcal vaccine are added and the triple viral vaccine is removed. In the case of health professionals, the Ministry of Health also recommends vaccination against hepatitis B, chickenpox and influenza (flu) (GOMES, 2007).

The PCMSO aims to promote and preserve the health of all workers. It establishes, according to the activities and risks of the professionals, which vaccines are indicated and mandatory for them, thus being offered, free of charge, together with active immunization against tetanus, diphtheria and hepatitis B, also mentioned in NR 32 (BRAVO, 2019).

Managers and researchers also emphasize the need for health workers to adhere to vaccination, since they will present a minimized risk of infection by diseases that can be immunized. That they should receive guidance on immunizers and adhere to campaigns (SANTOS *et al.*, 2010).

The vaccination status of medical students and health professionals should be kept up to date, as it can reduce the susceptibility of patients and potential sources of infection, as well as that of other professionals. As medical students do not have an employment relationship, they are treated as the specific moral responsibility of the educational institution, and their vaccinations must therefore be maintained (MANCUZO *et al.*, 2016).

In addition, higher education institutions are also responsible for the prevention and control of vaccine-preventable diseases, since it is during this period that the concepts and knowledge about the importance of vaccination are established. It is also recommended that before students have direct contact with patients, in order to avoid unnecessary risks, they should have their vaccination cards updated, which is a fundamental strategy for the prevention and control of these vaccine-preventable diseases (NARDELLI *et al.*, 2016).

CALENDAR VACCINATION

The National Vaccination Calendar's prerogative is to optimize vaccination coverage in Brazil. As well as covering children, the current calendar also covers adolescents, adults, the elderly, pregnant women and indigenous peoples. The Brazilian Society of Immunization, a non-profit scientific entity, is responsible for drawing up the calendar covering the vaccines made available by the National Immunization Program (PNI) (MS, 2021) (SBIm, 2022).

FIG. 1 shows the calendar available for the year 2022 and corresponds to the set of vaccines that the population should take, taking into account the country's priority public health interest. It consists of 20 vaccines, covering all age groups, from birth to old age (SBIm, 2022).

In addition, the SBIm also draws up an Occupational Vaccination Calendar, which contains specific guidelines aimed at the health of workers exposed to risks. Below, in FIG. 2, is the current calendar.

MEDICAL MEDICAL IN PROCESS PROCESS PREVENTION WITH IMMUNIZING

Responsibility for immunizers begins during a doctor's academic training, when they start to build up their knowledge. The knowledge acquired during this period, as well as being applied to them, tends to be replicated in their patients when they enter the job market (SANTOS *et al.*, 2006).

While still at , future professionals must have built up their understanding of the theoretical and practical aspects of the prevention and control of diseases that can be immunized, which will lead to coherent professional practice (SANTOS *et al.*, 2006).

However, a study published in 2018, which involved doctors and medical students, revealed that a large part of the sample still presents doubts about the vaccination schedule, about the safety of immunizers and do not maintain a defined position on issues of vaccine refusal (SATO, 2018).

Many factors can be associated with this insecurity about the feasibility of using immunizers. Among these factors are fear of the adverse effects of the vaccine and ignorance of the lethality of vaccine-preventable diseases, such as measles, which has reached a new high since 2016 with the decline in vaccination coverage and which is causing an increase maternal and infant mortality rates (SATO, 2018).

Anti-vaccine movements have grown stronger in Brazil since the 2010s. The WHO points to the so-called "3Cs Model" as one of main reasons for this, which includes a lack of confidence in the efficacy and safety of vaccines, complacency in the lack of perception of the lethality of vaccine-preventable diseases, and finally, convenience, which covers the availability and accessibility of health information (MACDONALD, 2015).

In this context, it is the doctor's great responsibility to advise the population about the benefits of vaccination and its importance for society as a whole. As a health authority, the doctor must be able clarify any doubts about vaccination, as well as defend the use of immunizers (SATO, 2018).

MATERIAL AND METHODS

The study was carried out after approval by the UNIFENAS human ethics committee and its start required the consent of the research participant or legal guardian by reading, understanding and signing the form.

This is a descriptive study with a qualitative methodology, carried out on students regularly enrolled in a medical course in Alfenas, MG.

SBIm VACCINAL CALENDAR 2022 / 2023

From birth to old age

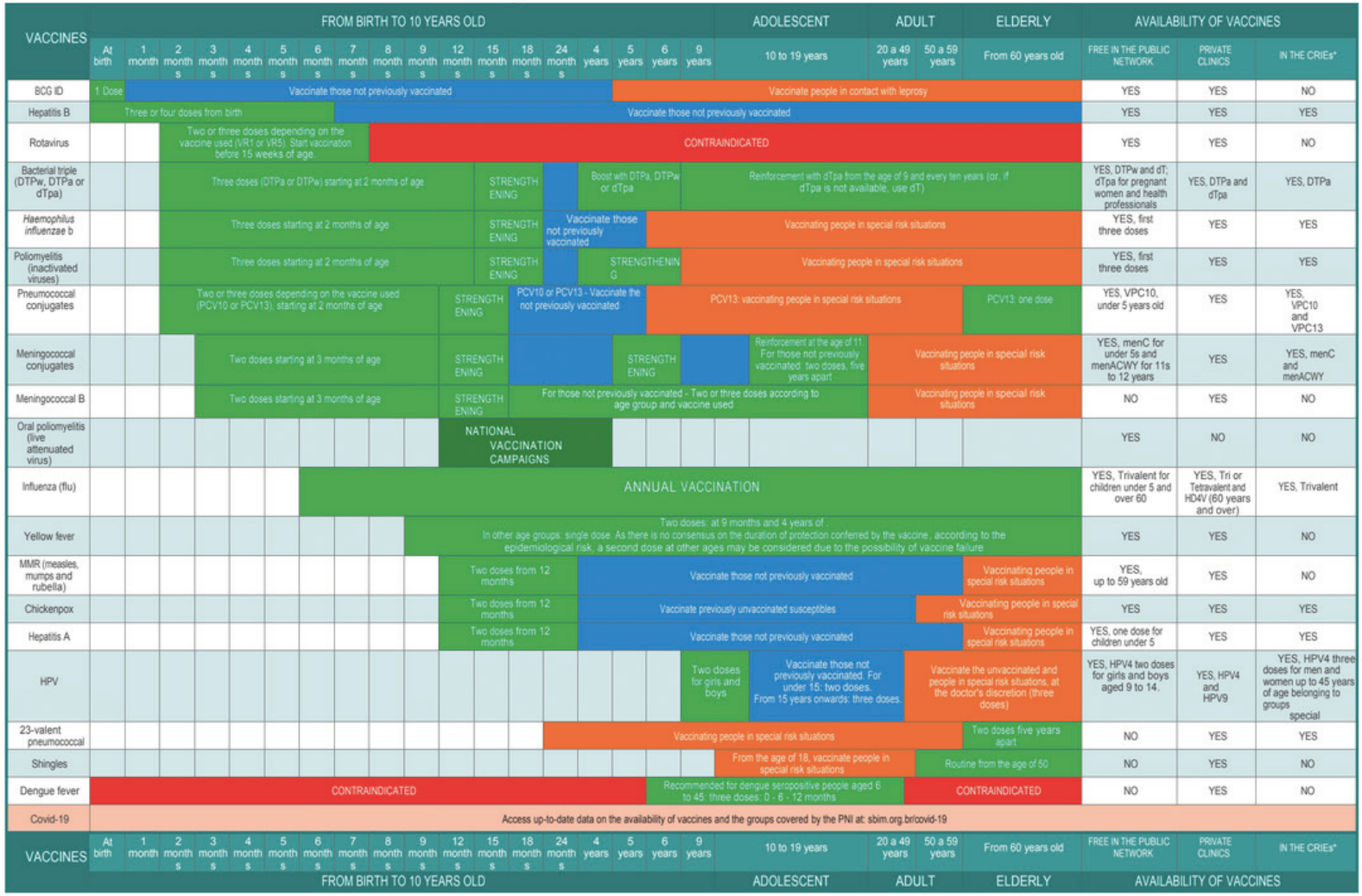
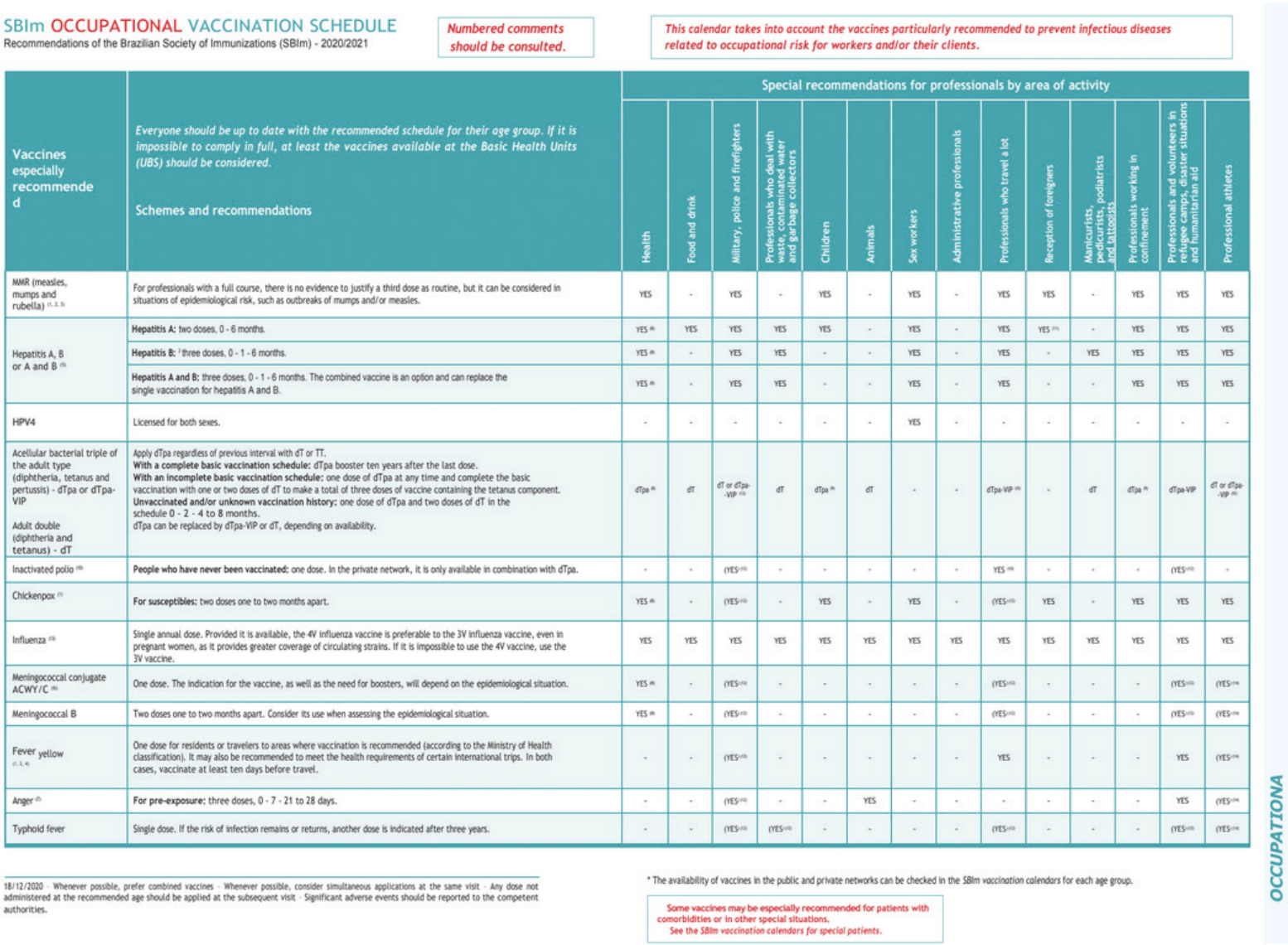


Figure 1 - Vaccination schedule from birth to old age. 2022/2023.

Source: SBIm, 2022



SBIm OCCUPATIONAL VACCINATION SCHEDULE

Recommendations of the Brazilian Society of Immunizations (SBIm) - 2020/2021

Numbered comments should be consulted.

This calendar takes into account the vaccines particularly recommended to prevent infectious diseases related to occupational risk for workers and/or their clients.

Vaccines especially recommended	Everyone should be up to date with the recommended schedule for their age group. If it is impossible to comply in full, at least the vaccines available at the Basic Health Units (UBS) should be considered. Schemes and recommendations	Special recommendations for professionals by area of activity													
		Health	Food and drink	Military, police and firefighters	Professionals who deal with waste, contaminated water and garbage collectors	Children	Animals	Sex workers	Administrative professionals	Professionals who travel a lot	Reception of foreigners	Manicurists, pedicurists, podiatrists and tattooists	Professionals working in confinement	Professionals and volunteers in refugee camps, disaster situations and humanitarian aid	Professional athletes
MMR (measles, mumps and rubella) (1, 2, b)	For professionals with a full course, there is no evidence to justify a third dose as routine, but it can be considered in situations of epidemiological risk, such as outbreaks of mumps and/or measles.	YES	-	YES	-	YES	-	YES	-	YES	YES	-	YES	YES	YES
Hepatitis A, B or A and B (3c)	**Hepatitis A:** two doses, 0 - 6 months.	YES (a)	YES	YES	YES	YES	-	YES	-	YES	YES (f1)	-	YES	YES	YES
	Hepatitis B: [2] three doses, 0 - 1 - 6 months.	YES (a)	-	YES	YES	-	-	YES	-	YES	-	YES	YES	YES	YES
	Hepatitis A and B: three doses, 0 - 1 - 6 months. The combined vaccine is an option and can replace the single vaccination for hepatitis A and B.	YES (a)	-	YES	YES	-	-	YES	-	YES	-	-	YES	YES	YES
HPV4	Licensed for both sexes.	-	-	-	-	-	-	YES	-	-	-	-	-	-	-
Acellular bacterial triple of the adult type (diphtheria, tetanus and pertussis) - dTpa or dTpa-VIP Adult double (diphtheria and tetanus) - dT	Apply dTpa regardless of previous interval with dT or TT. **With a complete basic vaccination schedule:** dTpa booster ten years after the last dose. **With an incomplete basic vaccination schedule:** one dose of dTpa at any time and complete the basic vaccination with one or two doses of dT to make a total of three doses of vaccine containing the tetanus component. **Unvaccinated and/or unknown vaccination history:** one dose of dTpa and two doses of dT in the schedule 0 - 2 - 4 to 8 months. dTpa can be replaced by dTpa-VIP or dT, depending on availability.	dTpa (a)	dT	dT or dTpa-VIP (f2)	dT	dTpa (a)	dT	-	-	dTpa-VIP (d)	-	dT	dTpa (a)	dTpa-VIP	dT or dTpa-VIP (m)
Inactivated polio (3b)	**People who have never been vaccinated:** one dose. In the private network, it is only available in combination with dTpa.	-	-	(YES (f2))	-	-	-	-	-	YES (3b)	-	-	-	(YES (f2))	-
Chickenpox (5)	**For susceptibles:** two doses one to two months apart.	YES (a)	-	(YES (f2))	-	YES	-	YES	-	(YES (f2))	YES	-	YES	YES	YES
Influenza (3a)	Single annual dose. Provided it is available, the 4V influenza vaccine is preferable to the 3V influenza vaccine, even in pregnant women, as it provides greater coverage of circulating strains. If it is impossible to use the 4V vaccine, use the 3V vaccine.	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Meningococcal conjugate ACWY/C (4)	One dose. The indication for the vaccine, as well as the need for boosters, will depend on the epidemiological situation.	YES (a)	-	(YES (f2))	-	-	-	-	-	(YES (f2))	-	-	-	(YES (f2))	(YES (n4))
Meningococcal B	Two doses one to two months apart. Consider its use when assessing the epidemiological situation.	YES (a)	-	(YES (f2))	-	-	-	-	-	(YES (f2))	-	-	-	(YES (f2))	(YES (n4))
Fever yellow (1, 2, e)	One dose for residents or travelers to areas where vaccination is recommended (according to the Ministry of Health classification). It may also be recommended to meet the health requirements of certain international trips. In both cases, vaccinate at least ten days before travel.	-	-	(YES (f2))	-	-	-	-	-	YES	-	-	-	YES	(YES (n4))
Anger (f)	**For pre-exposure:** three doses, 0 - 7 - 21 to 28 days.	-	-	(YES (f2))	-	-	YES	-	-	-	-	-	-	YES	(YES (n4))
Typhoid fever	Single dose. If the risk of infection remains or returns, another dose is indicated after three years.	-	-	(YES (f2))	(YES (f2))	-	-	-	-	(YES (f2))	-	-	-	(YES (f2))	(YES (n4))

18/12/2020 · Whenever possible, prefer combined vaccines · Whenever possible, consider simultaneous applications at the same visit · Any dose not administered at the recommended age should be applied at the subsequent visit · Significant adverse events should be reported to the competent authorities.

* The availability of vaccines in the public and private networks can be checked in the *SBIm vaccination calendars* for each age group.

Some vaccines may be especially recommended for patients with comorbidities or in other special situations.
See the *SBIm vaccination calendars for special patients.*

OCCUPATIONAL

Figure 2 - Occupational vaccination calendar. 2020/2021

Source: SBIm, 2020.

A study was carried out looking for information on biological variables such as gender, age, ethnicity and an analysis of their vaccination card by means of an interview, in a restricted area, to avoid further embarrassment and/or discomfort for the research subject. The Informed Consent Form (ICF) was signed by the participant who agreed to take part in the study.

Data such as the names and addresses of the participants were not of interest to this study, as they are confidential.

No intervention or intentional modification of the physiological or psychological and social variables of the research participants was carried out in this study. The confidentiality and privacy, image protection and non-stigmatization of the research participants was maintained, guaranteeing that the information would not be used to the detriment of individuals and/or communities, including in terms of self-esteem, prestige and/or economic and financial aspects.

No invasive procedures were carried out, such as the collection of biological material, audio/video recordings, ultrasound scans, weight and height measurements, etc.

INCLUSION CRITERIA

This study included medical students (1st to 6th period) from UNIFENAS, adults (over 18 years old), regardless of gender or ethnicity.

RESULTS AND DISCUSSION

The vaccination coverage of medical students when they start their internship is of paramount importance for public health, patient safety and the individual protection of future health professionals. Vaccination is an essential preventive measure to reduce the transmission of infectious diseases within the hospital environment and ensure that students can perform their duties without putting themselves, their colleagues or patients at risk.

When medical students start their internship, they come into direct contact with patients, some of whom may have compromised immune systems or be in a critical state of health. The lack of adequate immunization can turn students into vectors for disease transmission, putting patients' health at risk. Diseases such as hepatitis B, measles, mumps, rubella, influenza and chickenpox are highly contagious and can have serious consequences in vulnerable populations. By being vaccinated, students not only protect themselves against these infections, but also help to interrupt chains of transmission within healthcare institutions.

Hospitals and clinics are environments where exposure to infectious agents is constant. Vaccinating students beforehand is an essential measure to maintain a safe and healthy environment for everyone. Immunization contributes to the creation of an "immune shield" within the hospital, reducing the likelihood of outbreaks of diseases that can seriously affect both clinical staff and patients. This is particularly important in times of outbreaks or epidemics, where the presence of unimmunized healthcare workers can exacerbate the spread of disease.

Several health institutions and medical training programs require proof of immunization for certain diseases. This not only guarantees the safety of everyone involved, but also complies with standards and regulations set by health and education bodies. Adherence to these standards is crucial for the continuity of educational practices and to adequately prepare students to face the challenges of the hospital environment.

Finally, by getting vaccinated, medical students also assume a position of social and ethical responsibility. They become role models for the community, demonstrating the importance of vaccination as an essential public health tool. This attitude raises awareness of the importance of immunization and encourages the general population to join vaccination campaigns.

Therefore, it is understood that vaccination coverage of medical students before the start of their internship is an indispensable measure that protects the health of future professionals and patients, guarantees the safety of the hospital environment and promotes compliance with health and education standards. It also strengthens students' social responsibility, contributing to the promotion of public health.

DATABASE INFORMATION

The survey of medical students from the first to the seventh term covered a total of 140 students. Among these students, adherence to several essential vaccines for both personal health and safety in clinical settings was analyzed.

Total number of students

- Total number of students: 140

Students Who Have Stopped Taking Some Kind of Vaccine

Although the majority of students followed the vaccination recommendations, some did not take all the necessary vaccinations. The data shows that:

- Number of students who have not had all the recommended childhood vaccinations: 1
- Number of students who have not had the Tetanus and Diphtheria (dT) vaccine: 1
- Number of students who have not had the measles vaccine: 3
- Number of students who have not had the Mumps vaccine: 3
- Number of students who have not had the Rubella vaccine (TV): 3
- Number of students who have not had the Yellow Fever vaccine: 4
- Number of students who have not had the flu vaccine: 11
- Number of students who have not had the Hepatitis B vaccine: 1
- Number of students who have not had the chickenpox vaccine: 5
- Number of students who have not taken the influenza vaccine: 12
- Number of students who have not taken the COVID-19 vaccine: 5
- Number of students who did not take the necessary vaccine boosters: 10

The detailed analysis shows that while the majority of medical students maintain high vaccination coverage, there is still a significant proportion who are not completely immunized against some diseases. With 140 students analyzed, the gaps in vaccination adherence range from 1 to 12 students, depending on the type of vaccine. This scenario highlights the need for ongoing campaigns to raise awareness and facilitate access to vaccination, ensuring that all future health professionals are fully protected and prepared to face the challenges of their careers. GRAPH 1 below shows vaccination coverage separated by type of vaccine.

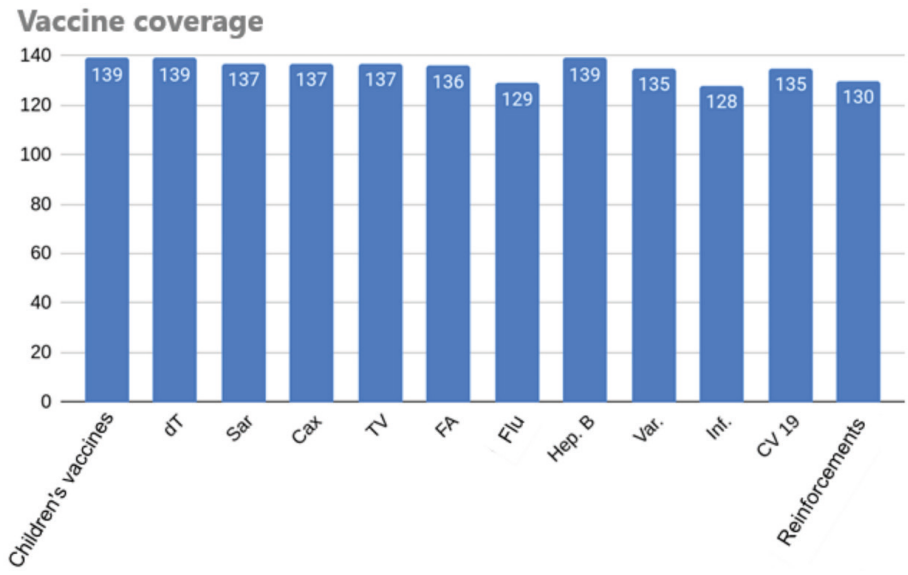
ANALYSIS BY PERIOD

The survey on the vaccination coverage of medical students covered seven different periods, with the aim of assessing the adherence and compliance of future health professionals to immunization recommendations before the start of their internship.

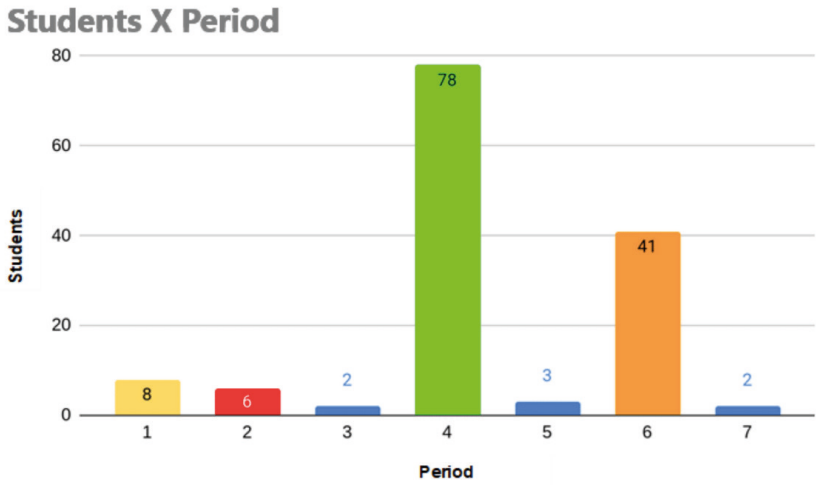
In the first term, 8 students were interviewed, while in the second term the number of interviewees was slightly lower, with 6 participants. The third term saw the lowest number of interviews, with only 2 students. However, there was a significant jump in the fourth term, where 78 students were interviewed, representing the largest group in the survey.

In the fifth term, the number of respondents was again low, with only 3 students. In the sixth term, the survey again captured a substantial number of participants, totaling 41 students. The seventh and final term, similar to the third, had 2 students interviewed.

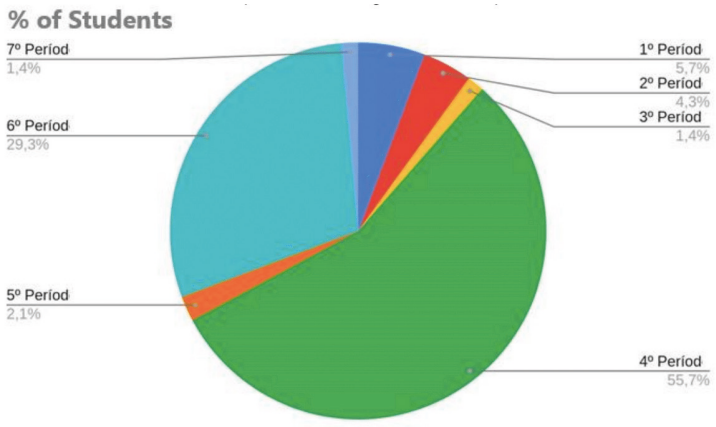
The distribution of the number of interviewees by period is illustrated in the graph below:



Graph 1 - Vaccination coverage by type of vaccine
Source: Own elaboration



Graph 2 - Interviewees x Period
Source: Own elaboration



Graph 3 - Percentage of students per term
Source: Own elaboration

This variation in the number of interviewees per term may reflect different stages of the medical course, the availability of students to take part in the survey or the fact that data collection was carried out at times of greater or lesser academic flow. Analyzing this data is crucial to understanding the extent of vaccination coverage among medical students and identifying possible gaps that require intervention to ensure the safety of future professionals and the patients with whom they will interact.

BREAKDOWN OF VACCINATION COVERAGE BY PERIOD

1st period

In the first period, all 8 students had complete vaccination coverage for the dT (diphtheria and tetanus), measles, mumps, triple viral (TV), yellow fever (YF), influenza, hepatitis B (Hep. B), varicella (Var.), infection Inf.) vaccines, and boosters. The only exception was the vaccine against COVID-19 (CV 19), with 7 out of 8 students immunized. This indicates strong adherence to vaccine recommendations, with a slight gap in vaccination against COVID-19.

2nd period

The second period, with 6 students, showed decent vaccination coverage, but with some drops compared to the first period. All the students were vaccinated against dT, measles, mumps, TV, and chickenpox, while 5 were vaccinated against AF, flu, Hep. B, and infection. Vaccination against COVID-19 and boosters showed coverage of 5 and 4 students, respectively, suggesting a slight reduction in total adherence.

3rd period

In the third term, the number of students interviewed was very low, with only 2 students. Vaccination coverage was complete for all vaccines and boosters, indicating total adherence and commitment by the students interviewed in this select group.

4th period

The fourth term had significantly more students, totaling 78. Vaccination coverage for dT was complete, but there were small drops for other vaccines: 77 students were vaccinated against measles, mumps, and TV, while 71 students received the vaccine against AF and influenza. Vaccination against Hep. B vaccination was complete, but 76 students were vaccinated against chickenpox, infection, and COVID-19. The number of students who received boosters was 72. Despite the small variations, this group shows a high overall vaccination coverage rate.

5th Period

In the fifth term, 3 students were interviewed. All had received full vaccinations for dT, measles, mumps, TV, AF, flu, Hep. B, and chickenpox. However, only 2 students were vaccinated against infection and COVID-19, and also only 2 received boosters, showing almost complete adherence, but with some occasional failures.

6th period

With 41 students, the sixth period shows almost complete vaccination coverage for dT (40 students) and a slight reduction for measles, mumps, TV, AF, flu, Hep. B, chickenpox, and infection (39 students each). Vaccination against COVID-19 was complete, but 40 students received boosters, which indicates fairly high adherence, but with small gaps.

7th Period

In the seventh and final term, the number of students interviewed was again low, with only 2 students. Both had received all their vaccinations and boosters, showing full vaccination coverage and complete commitment to the recommendations.

INSIGHTS INTO THE DATA

Analysis of the vaccination coverage of medical students over the seven periods reveals a strong general adherence to vaccination recommendations, with some variations between the periods.

1. **High General Adherence**: In periods with a significant number of students, such as the 4th and 6th periods, the majority of students were vaccinated, although some vaccines such as YF and flu showed slight drops. Vaccination against COVID-19, despite some variations, maintained high coverage in most periods.
2. **Reinforcements**: Adherence to reinforcements was consistent, but in some periods, such as the 2nd and 5th, coverage was lower, indicating the need for greater awareness of the importance of reinforcements.
3. **Small Groups with High Adherence**: In periods with few students, such as the 3rd and 7th, adherence was total, indicating that even with a small number of interviewees, the commitment to vaccination was strong.
4. **Variability and lapses**: Some variability, such as in the 5th period, where coverage for infection and COVID-19 was slightly lower, points to the the need for targeted interventions to ensure that all types vaccines are received by all students.

To ensure complete and uniform vaccination coverage, it is crucial to continue encouraging vaccination and reinforcing the importance of boosters. Ongoing education programs, awareness campaigns and constant monitoring are key to ensuring that all medical students are fully immunized before starting their internship, thus protecting , their colleagues and patients.

ANALYSIS OF VACCINATION COVERAGE BY VACCINE TYPE AMONG MEDICAL STUDENTS

The analysis of vaccination coverage among medical students from the first to the seventh term reveals a largely positive picture, with some areas that deserve special attention. Below is a detailed description by type of vaccine with the respective coverage percentages:

Childhood vaccinations

The majority of students (98%) reported having had all the recommended vaccinations in childhood. This reflects good initial adherence to the basic vaccination schedule, which is essential for preventing various diseases in adulthood.

Tetanus and Diphtheria (dT)

Vaccination coverage against Tetanus and Diphtheria is consistently high all terms, with 99% of students having had this vaccine. The importance of these vaccinations, due to the ongoing risk of exposure to these diseases, is clearly recognized by the majority of students.

Measles, Mumps and Rubella (TV)

Vaccination against Measles, Mumps and Rubella also shows high uptake, with 97% of students reporting having received this vaccine. Vaccination against these diseases is crucial, given the potential for epidemic outbreaks.

Yellow Fever (YF)

Vaccination against Yellow Fever is almost universal among medical students, with 96% reporting having received this vaccine. Only a few students, mainly in the intermediate periods, reported not having received this vaccine.

Hepatitis B

Vaccination against Hepatitis B has a high adherence rate, with 98% of students in all periods reporting being vaccinated. This vaccine is essential for health professionals due to the risk of occupational exposure to the hepatitis B virus.

Chickenpox

Varicella vaccination coverage is also high among students, with 95% reporting having received the vaccine, which is important for preventing outbreaks in densely populated environments such as universities.

Influenza

Influenza vaccination shows good uptake, with 90% of students reporting being vaccinated, but with some notable gaps, especially in later periods. The flu vaccine is crucial for preventing respiratory infections that can have a significant impact on students' health and ability to study.

COVID-19

Vaccination against COVID-19 shows a good coverage rate, with 92% of students vaccinated, although there is lower adherence to boosters, with only 85% reporting having received all the recommended booster doses. Some students in the intermediate and advanced periods did not take the vaccine or did not receive the recommended booster doses. Given the pandemic nature COVID-19, it is vital to maintain high vaccination coverage and adhere to boosters to ensure continued protection.

Reinforcements

Adherence to vaccine boosters varies, but is generally high, with 89% of students reporting having received all the necessary boosters. The importance of boosters for maintaining immunity over time is clear, but some students still don't consistently follow these recommendations, especially in relation to newer vaccines such as COVID-19.

In general, vaccination coverage among medical students is high, reflecting a good understanding of the importance of vaccines. However, there are areas that need attention, especially in relation to vaccine boosters and COVID-19 vaccination. Improving adherence to these vaccines and boosters is crucial to maintaining student health and preventing the spread of infectious diseases in academic and professional settings.

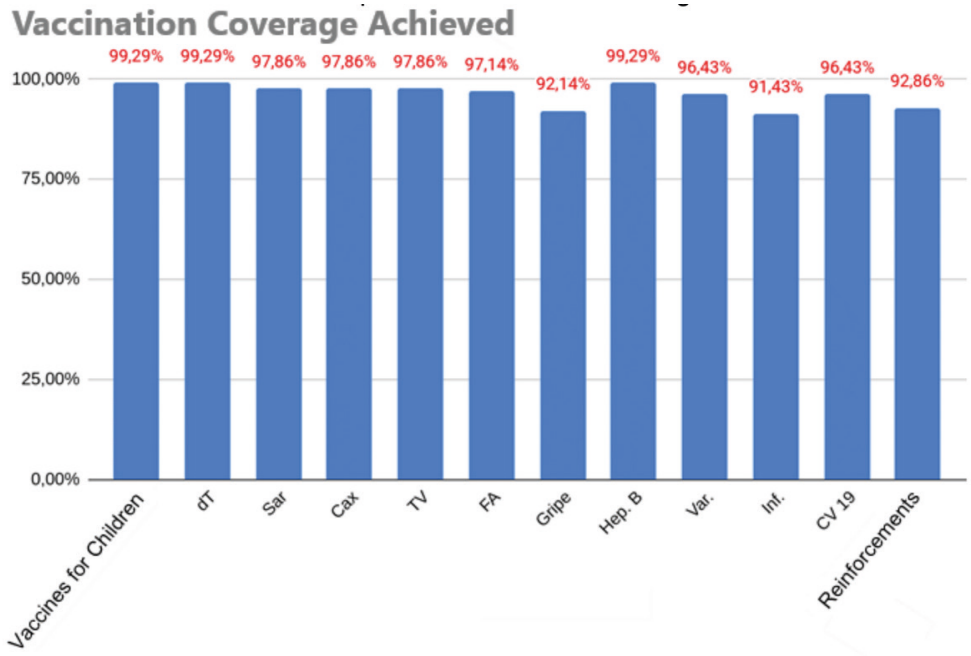
Detailed Analysis of Vaccination Coverage

1st period

- Number of students: 8
- **Complete Vaccination Coverage:** dT, Measles, Mumps, TV, AF, Flu, Hep. B, Chickenpox, Infection.
- **Gap:** CV 19 (7 of 8).
- **Observation:** High adherence, except for a small failure to vaccinate against COVID-19.

2nd period

- Number of students: 6
- **Complete Vaccination Coverage:** dT, Measles, Mumps, TV, Chickenpox.
- **Gaps:** YF and Flu (5 out of 6), Hep. B and Infection (5 out of 6), CV 19 (5 out of 6), Boosters (4 out of 6).
- **Note:** Good coverage overall, but reinforcements e some vaccines showed lower adherence.



Graph 4 - Vaccination Coverage Achieved

Source: Own elaboration

3rd period

- Number of students: 2
- **Complete Vaccination Coverage:** All vaccines and boosters.
- **Note:** Full vaccination coverage, indicating a strong commitment, despite the small number of respondents.

4th period

- Number of students: 78
- **Full vaccination coverage:** dT.
- **Gaps:** Measles, Mumps, TV (77 out of 78); FMD and Flu (71 out of 78); Chickenpox and CV 19 (76 out of 78); Infection (71 out of 78); Boosters (72 out of 78).
- **Note:** High vaccination rate, but with small gaps in several vaccines, possibly due to the large number of students.

5th Period

- Number of students: 3
- **Complete Vaccination Coverage:** dT, Measles, Mumps, TV, FA, Flu, Hep. B, Chickenpox.
- **Gaps:** Infection and VC 19 (2 out of 3); Reinforcements (2 out of 3).
- **Observation:** High overall adherence, but some occasional failures.

6th period

- Number of students: 41
- **Complete Vaccination Coverage:** CV 19.
- **Gaps:** dT (40 of 41); Measles, Mumps, TV, AF, Flu, Hep. B, Varicella, Infection (39 out of 41); Boosters (40 out of 41).
- **Note:** Good vaccination coverage with some minor especially for YF, Influenza and Infection.

7th Period

- Number of students: 2
- **Complete Vaccination Coverage:** All vaccines and boosters.
- **Observation:** Total vaccination coverage, similar to the 3rd period, with a strong commitment from the few students interviewed.

CONCLUSION

Vaccination is a fundamental tool in the prevention of infectious diseases, especially in healthcare environments where exposure to pathogens is constant and patients are often vulnerable. Immunizing medical students before they start their internship is essential to ensure the safety of everyone in the hospital environment - including the students themselves, their co-workers and the patients with whom they will interact. The protection provided by vaccines not only prevents disease outbreaks within healthcare institutions, but also contributes to public health in general.

This study showed that students at this educational institution adhered to the vaccination schedule during the period prior to boarding school. There are small and variable gaps between the periods studied. Periods with a large number of students, such as the 4th and 6th, showed slight drops in some vaccinations, indicating areas that could benefit from greater attention and reinforcement. In periods with few students, coverage was generally complete, suggesting that smaller groups can facilitate the administration and monitoring of vaccination. However, adherence to boosters and vaccination against influenza and yellow fever need continuous reinforcement in all periods.

Complete vaccination and adherence to protocols is crucial to protect the health of future doctors and the patients who depend on a safe hospital environment. Educational campaigns, strict monitoring and institutional support are essential to ensure that all students are properly immunized before starting their clinical activities. In this way, we will be promoting not only individual health, but also collective safety within healthcare institutions.

REFERENCES

NATIONAL ASSOCIATION OCCUPATIONAL MEDICINE (ANAMT) AND BRAZILIAN SOCIETY OF IMMUNIZATIONS (SBIM). **Update on Occupational Vaccination.** Belo Horizonte: National Association of Occupational Medicine - Anamt, 2007. 34 p. Available at: http://www.anamt.org.br/site/upload_arquivos/sugestoes_de_leitura_171220131126567055475.pdf. Accessed on: 03 Mar. 2022.

BRAZIL. Ministry of Health. Federal Government. **National Vaccination Calendar**. São Paulo: 2021. Available at: https://www.gov.br/saude/pt-br/assuntos/saude-de-a-a-z-1/c/calendario-de-vacinaca o. Accessed on: 08 Mar. 2022.

BRAZIL. Ministry of Labor and Employment. **Norma Regulamentadora no 32 - NR 32 - Safety and health at work in health services.** Brasília: Ministry of Labor and Employment; 2005.

BRAVO, Flávia (Brazil). Brazilian Society of Immunizations (Sbim) and National Association of Occupational Medicine (ANAMT). **SBIm/Anamt Immunization Guide - Occupational Medicine 2018/2019**. 2. ed. São Paulo: Magic Rm, 2019. 74 p. Available at: https://sbim.org.br/images/files/guia-sbim-anamt-medicina-trabalho-2018-2019-1807 30b-web.pdf. Accessed on: 03 Mar. 2022.

DOMINGUES, Carla Magda Allan S.; TEIXEIRA, Antônia Maria da Silva. **Vaccination coverage and vaccine-preventable diseases in Brazil in the period 1982-2012: advances and challenges of the National Immunization Program.** Epidemiol Serv Saúde. 2013; 22(1):9-27. Available at: http://scielo.iec.gov.br/scielo.php?script=sci_arttext&pid=S1679-4974201300010000 2. Accessed on: 03 Mar. 2022.

FIOCRUZ. **Vaccines: the origins, importance and new debates on their use**. 2016. Available at: https://www.bio.fiocruz.br/index.php/br/noticias/1263-vacinas-as-origens-a-importanc ia-e-os-novos-debates-sobre-seu-uso?showall=1&limitstart=. Accessed on: 15 Apr. 2022.

MACDONALD, Noni E.. **Vaccine hesitancy: definition, scope and determinants.** Vaccine, [S.L.], v. 33, n. 34, p. 4161-4164, Aug. 2015. Elsevier BV. Available at: http://dx.doi.org/10.1016/j.vaccine.2015.04.036. .Accessed on: 25 Feb. 2022

MANCUZO, Eliane Viana *et al*. Immunization status and exposure to biological risk medical students at UFMG. **Revista Médica de Minas Gerais**, Belo Horizonte, v. 26, 15 Sep. 2016. Weekly. GN1 Genesis Network. http://dx.doi.org/10.5935/2238-3182.20160097. Available at: http://www.rmmg.org/artigo/detalhes/2078. Accessed on: Feb. 25, 2022.

NARDELLI, Giovanna Gaudenci *et al*. Vaccination status of new health students at a public university. **Revista Família, Ciclos de Vida e Saúde no Contexto Social**, [S.L.], v. 4, n. 2, p. 145, 4 May 2016. Federal University of the Triângulo Mineiro. Available at: http://dx.doi.org/10.18554/refacs.v4i2.1645. Accessed on: March 10, 2022.

SANTOS, Silvana de Lima Vieira dos; SOUZA, Adenícia Custódia Silva e; TIPPLE, Anaclara Ferreira Veiga; SOUZA, Joaquim Tomé de. THE ROLE OF HIGHER EDUCATION INSTITUTIONS IN THE PREVENTION OF VACCINE-PREVENTABLE DISEASES. **Revista Eletrônica de Enfermagem,** v. 08, n. 01, p. 91- 98, 2006. Available at http://www.revistas.ufg.br/index.php/fen. Accessed on 15 Mar. 2022.

SANTOS, Silvana de Lima Vieira dos *et al*. THE IMMUNIZATION OF HEALTH PROFESSIONALS: A NECESSARY REFLECTION. **Reme: Revista Mineira de Enfermagem**, Belo Horizonte, v. 14, n. 4, p. 595-601, dec. 2010. Quarterly. Available at: https://cdn.publisher.gn1.link/reme.org.br/pdf/v14n4a19.pdf. Accessed on: Feb. 21, 2022.

SATO, Ana Paula Sayuri. What is the importance of vaccine hesitancy in the drop of vaccination coverage in Brazil? **Revista de Saúde Pública**, São Paulo, v. 52, p. 96, 22 Nov. 2018. University of São Paulo Integrated Library System - SIBiUSP. Disponível em: http://dx.doi.org/10.11606/s1518-8787.2018052001199. Accessed on: 15 Mar. 2022.

SECRETARIAT OF HEALTH SURVEILLANCE. SURVEILLANCE DEPARTMENT COMMUNICABLE DISEASES. **Manual of Standards and Procedures for Vaccination.** Brasília: Ministry of Health, 2014. 176 p. Available at: http://biblioteca.cofen.gov.br/wp-content/uploads/2017/02/Manual-de-Normas-e-Proc edimentos-para-Vacina%C3%A7%C3%A3o.pdf. Accessed on: 21 Feb. 2022.

BRAZILIAN SOCIETY OF IMMUNIZATIONS. **Vaccination Calendars. Recommendations of the Brazilian Society of Immunizations - SBIm 2022/2023.** São Paulo, 2022. Available at: https://sbim.org.br/calendarios-de-vacinacao. Accessed on April 28, 2022.

BRAZILIAN SOCIETY OF IMMUNIZATIONS. **SBIm/ASBAI Immunization Guide - Asthma, allergies and immunodeficiencies 2020-2021.** São Paulo, 2nd ed., p. 03-64, Jan. 2020. Available at: https://sbim.org.br/images/guias/guia-sbim-asbai-miolo-201013b-web.pdf. Accessed on: Apr. 18, 2022.