

Vaccines for all ages in Venezuela, 2020

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SUMMARY

Preventable immune diseases can occur throughout life and that is why during that time we must maintain the same motivation to comply with the different immunization schedules that exist according to age, to maintain better quality and expectation of life. In Venezuela, since 2016, we have observed a significant shortage of vaccines that are part of the immunization schedule; this has meant low vaccine coverage with the subsequent re-emergence of vaccine-preventable diseases such as Diphtheria and Measles. Vaccines are the most cost-effective drugs in the world, to prevent common and not so common diseases that could cause death to many people in all age groups. During the childhood of our children, we are particularly careful in complying with the immunization schedules, with time, this motivation seems to be diminishing and we are putting aside the enthusiasm to vaccinate as our child grows. There are numerous missed opportunities during the growth and formation of our children, adolescents, adults, and seniors. In our country, we do not have a culture for prevention and this is where we must emphasize contributing to improving the life expectancy of our population. In Venezuela, we have

the National Family Immunization Scheme, which ranges from children under one year of age to people 65 and over. Some vaccines are not in the schedule of MPPS immunizations even when they are included in the Expanded Program on Immunization (EPI) of the Americas by the Pan American Health Organization.

Key words: *Preventable diseases, vaccination, immunization schedule, prevention*

RESUMEN

Las enfermedades inmunes prevenibles pueden ocurrir a lo largo de la vida y es por eso que durante ese tiempo debemos mantener la misma motivación para cumplir con los diferentes esquemas de vacunación que existen según la edad, para mantener una mejor calidad y expectativa de vida. En Venezuela, desde 2016, hemos observado una escasez significativa de las vacunas que forman parte del calendario de inmunizaciones, esto ha significado una baja cobertura vacunal con el posterior resurgimiento de enfermedades prevenibles por vacunación como la difteria y el sarampión. Las vacunas son los medicamentos más rentables del mundo, para prevenir enfermedades comunes y no tan comunes que podrían causar la muerte a muchas personas en todos los grupos de edad. Durante la infancia de nuestros hijos, tenemos especial cuidado en cumplir con los calendarios de vacunación, con el tiempo esta motivación parece ir disminuyendo y estamos dejando de lado el entusiasmo por vacunar a medida que nuestro hijo crece. Hay numerosas oportunidades perdidas durante el crecimiento y la formación de nuestros niños, adolescentes, adultos y personas mayores. En nuestro país no tenemos una cultura de prevención y es aquí donde debemos enfatizar contribuir a mejorar la esperanza de

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vida de nuestra población. En Venezuela contamos con el Esquema Nacional de Inmunización Familiar, que abarca desde niños menores de un año hasta personas de 65 y más. Algunas vacunas no están en el calendario de inmunizaciones del Ministerio del Poder Popular para la Salud (MPPS) incluso cuando están incluidas en el Programa Ampliado de Inmunización (PAI) de las Américas de la Organización Panamericana de la Salud.

Palabras clave: *Enfermedades prevenibles, vacunación, calendario de vacunación, prevención.*

INTRODUCTION

Preventable immune diseases can occur throughout life and that is why during that time we must maintain the same motivation to comply with the different immunization schedules that exist according to age, to maintain better quality and expectation of life. In Venezuela, since 2016, we have observed a significant shortage of the vaccines that are part of the immunization schedule, this has meant a low vaccine coverage with the subsequent re-emergence of vaccine-preventable diseases such as Diphtheria and Measles, therefore, spreading these diseases across the borders through forced migration and putting at risk neighboring countries such as Colombia, Brazil, Peru, and Ecuador (1). After the advent of clean water, vaccines are the most cost-effective drugs in the world, to prevent common and not so common diseases that could cause death to many people in all age groups. However, it is striking that during the childhood of our children, we are particularly careful in complying with the immunization schedules, attending successive medical visits such as Healthy Child Consultations, with the sole purpose of rigorously completing all the vaccines established by the schedules of immunizations suggested by the Ministry of the Popular Power of Health (MPPS) and the Venezuelan Society of Childcare and Pediatrics (SVPP), following the guidelines of the World Health Organization (WHO) and the Pan American Health Organization (PAHO). With time, this motivation seems to be diminishing and we are putting aside the enthusiasm to vaccinate as our child grows. As is characteristic of the School and the adolescent, getting sick a little, and the visits

that are diminished are much more widely spaced, vaccines are hardly discussed in the pediatric consultation, at school, and in high school much less. According to the Atlanta Centers for Disease Control and Prevention (CDC), around half of the adolescents in the United States have not received the tetravalent Meningococcal Vaccine to avoid this serious disease (2), if that is in a first-world country, let's calculate what will be the coverage for Meningococcus in Venezuela, at this time? From time to time the immunization card is reviewed and reinforcements are placed on reinforcements of the few existing vaccines in the squalid immunization scheme of the MPPS of our country in the Public Schools. In Private Schools, the immunization card is requested only to see it, since there is no obligation to complete the Immunization Calendar corresponding to the age of the student in question and thus allow entry to the school year, only if they have complete vaccinations. The consequence of this action is to receive immunization cards with many boosters, sometimes more than necessary, of some same vaccines and no doses of other necessary vaccines.

Upon entering the university, it is customary in first world countries to review the immunization schedule again and apply the appropriate vaccines for early adulthood, that does not exist here, also at the end of university studies and entering the work area, they are very few companies are responsible for reviewing the immunological status of the applicant for the position by reviewing his immunization card and requiring him to complete them to enter the company. So if our vaccine coverage is one of the lowest in Latin America (below 50 % in some cases, although the official MPPS figures speak of 95 % for 2019, even though the presence of diphtheria and measles cases as well as other preventable immune diseases, they speak for themselves) and in the world during childhood and school-age, our adolescents and adults are far below what could be considered acceptable for a country with as many health problems as ours.

There are numerous missed opportunities during the growth and formation of our children, adolescents, adults, and seniors. In our country, we do not have a culture for prevention and this is where we must emphasize contributing to improving the life expectancy of our population. Vaccines are used to protect individuals of all

ages, and for the greater good, all vaccinated communities and regions, from diseases that are prevented through their use. That is why by maintaining appropriate vaccine coverage, that is, covering more than 98 % of the population, we can protect the community from these diseases, due to the effectiveness of herd immunity (3). Why should we vaccinate in adulthood? These are the reasons why we should vaccinate in adulthood:

1. Some vaccines do not offer protection throughout life or do not induce the production of permanent immune memory, requiring periodic reinforcements. An example of this is the case of diphtheria, tetanus, and pertussis vaccine (DTP vaccine), which requires five doses to create immunity and boosters every ten years. The first three doses in childhood (at the 2nd month to the 4th month, at the 6th month) two boosters (at 18 months, at 5 years) and thereafter at 10 years and then diphtheria, tetanus and pertussis acellular vaccine (Tdap vaccine) must comply within adolescence with reinforcement of Diphtheria, Tetanus dT, every ten years, practically for life.

In Venezuela, in the year 2016, when vaccination coverage for these diseases fell dramatically, the re-emergence of vaccine-preventable diseases began, giving rise to the diphtheria epidemic (1), having lost the work of epidemiologists for more than 50 years vaccinating.

The low vaccination coverage that has been maintained during the last four years is due to multiple negative factors that Venezuela is going through, immersed in an endless political-economic-social crisis that seems to find no end; we have lived in terrible hyperinflation since 2017. The progressive dismantling of the health system with flaws in epidemiological surveillance programs, the lowest minimum wage in the continent, forced migration in recent years were almost five million Venezuelans have left the country, the high levels of malnutrition of the entire population, extreme poverty, the escalation of violence and the deterioration of the quality of life due to the difficulty of having access to the minimum needs for the survival of the human being has brought us to critical levels (1).

The MPPS is using the dT5 vaccine to control the diphtheria epidemic by leaving an

epidemiological window open for pertussis. In this case, the use of the Tdpa vaccine would have given more extensive coverage covering these three diseases.

2. Some adults were not vaccinated in their childhood because many of these vaccines that today are offered by the immunization schedules did not exist, such is the case of the Hepatitis B vaccine that emerged in the mid-1980s, as well as most of the vaccines we use today, were created in the late last century and early this century.

We are waiting for the release on the market, very soon, of the vaccine created against the clock for COVID-19.

3. Some adults from other countries may not have received any vaccination; it is the example of a person who visits Venezuela, where Hepatitis A is endemic (4,5), must be vaccinated before traveling.
4. Vaccinate adults to protect those people who cannot be vaccinated, through group immunity. Using the chickenpox vaccine, for example, in the environment of an immunosuppressed patient.
5. Vaccinate in adulthood people whose work increases the risk of suffering diseases that endanger health, as is the current case of the COVID-19 Pandemic where approximately 15 % - 20 % of deaths in Venezuela, correspond to health workers. The high bill is for the health sector.
6. Vaccinate in adulthood travelers to countries where there are endemic diseases that pose a risk to health, such as, for example, we must vaccinate travelers who come to visit us with Yellow Fever, the presence of geographical outbreaks in Venezuela of Yellow Fever justifies its use.
7. Vaccinate patients at risk in adulthood to prevent infections that may complicate the health of this group of people.

To choose the vaccines that the adult may need, we must analyze the following factors:

- The age of the person to be vaccinated, depending on this, will need certain vaccines

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such as women of reproductive age or young adults, they need to be protected with certain vaccines such as Trivalent Viral or Measles, Rubella, and Mumps (MMR) up to fifty years and in older adults Varicella-zoster from the age of fifty (6).

- The type of work you do: if you are a doctor, you are exposed to many vaccine-preventable diseases, so you must protect yourself with the use of all the vaccines that the immunization schedules for these diseases suggest. Adults of other professions, workers in various areas who are susceptible to these diseases should also be vaccinated. If the work is carried out in endemic areas of any pathology, it must be taken into account to use the vaccine before exposing yourself.
- Your lifestyle. If you are a smoker, sedentary, or consume alcohol, drugs, homosexuality, etc., it should be taken into account for the use of these vaccines. If you are a frequent traveler to countries with endemic diseases, you must protect yourself with the use of vaccines.
- Previous immune status if the compromise is a strong indication for vaccine protection (4).

To decide what order we are going to follow in the vaccines we are going to use immunization schedules are establishing the use of these according to the ages, so we will review the National Family Vaccination Scheme of Venezuela proposed by the MPPS in the year 2019.

In Venezuela, we have the National Family Immunization Scheme, which ranges from children under one year of age to people 65 and over.

Immunizations for adolescents, adults, and older adults

Starting with the adolescent, adult, and elderly vaccines, we take the following diagram from the MPPS website to detail each of the vaccines to be used.

Anti Amaryllic Vaccine

Indicated from 12 months and in epidemic areas from 6 months. The doctor must take into account the risk of suffering the disease or the



Figure 1. Immunization scheme for children in Venezuela, 2020 (5).

possibility that exists in children between 4 month and 9 month of presenting encephalitis after the vaccine. As of 2013, the WHO declared the no need for reinforcement. The persistence of reactivated geographic foci confirms the need to vaccinate.

Diphtheria and Tetanus DT Vaccine

Indicated in Venezuela from the Epidemic of 2016 to all healthy children over five years of age, adolescents, adults, and older adults, with reinforcement every 10 years. If you have not received the full schedule of the pentavalent vaccine at 10 years, you should receive the five-dose schedule: one dose at 8-week intervals each, booster per year, second booster per year again, with a booster every 10 years. In the case of a pregnant woman, you should use all five doses (5).

Hepatitis B Vaccine in Adults

Indicated for all ages, from birth, in three doses. In schoolchildren or adolescents who have not received it, adults and older adults, pregnant women, and in those who were born before this vaccine was on the market, that is, before the 1980s (5,6,10).

Live inactivated virus tetravalent influenza vaccine

Indicated in our country by the WHO for this period 2019 - 2020, the routine annual administration from the year 2008 suggested by the SVPP vaccine commission to children from 6 month of age, adolescents, adults, and the elderly (5).

Anti Influenza Vaccine

This vaccine is distributed annually by the MPPS since 2016 is absent in the scheme, when it appears the doses are very limited. This is the vaccine for this year 2019-2020 administered by the MPPS only for health personnel and older adults.

Anti-flu vaccine

Fractionated inactivated > 15 pg HA / strain / one 0.5 mL dose. Owner and manufacturer EUEF IICVSSPAFMB of Russia. Filled and packaged by Institute Mechnikov, S.S., Nicaragua. Use: Over 6th Track IM. Store between 2 and 8 degrees. Strains 2019 - 2020. Registered in Cuba B-16-015-J07. Do not freeze (7).

23V Pneumococcal Vaccine

Indicated only in children over the age of two, adolescents, and adults of all ages. Recommended in special cases of sickle cell anemia, functional or anatomic asplenia, immunocompromised HIV and non-HIV; A mixed schedule with conjugate pneumococcal vaccines must be followed (complete previous schedules VCP10 VCP13) the minimum interval is eight weeks. As of 2013, the Committee on Immunization Practices (ACPI) recommends revaccination up to two doses before 65 years of age with VPS23, five years after the first dose. This practice applies to children and adolescents. If VPS23 is administered first, a year must wait before VCP13 is applied. There are more complete immunization schedules that are ideal since they include other very useful vaccines that should and can be applied at all ages, we attach the Atlanta CDC Immunization Schedule for this year 2020 showing what we should use since adolescence, in adults and older adults (5,6,8).

Diphtheria-Tetanus and Pertusi acellular Tdpa vaccine

Indicated as a single booster dose in children 7 to 10 years of age, this vaccine contains a lower concentration of the components of diphtheria and pertussis. With an incomplete scheme, use one dose of Tdpa and the others with dT. Non-immunized patients should receive a series of three doses, one of them Tdpa and the other two dT.

Especially, in the case of pregnant women and mothers, where the five doses must be applied, this is undoubtedly the best option for the fifth dose at the end of the pregnancy; it can be used in each pregnancy. Also in adults and adults over 65

years of age without the previous or incomplete scheme, any of the doses should be Tdpa (5,6).

Trivalent Viral Vaccine

Indicated from one year of age, adult adolescents up to 50 years. As of 2017, it is recommended to control the outbreak of Measles from 6 months to 11 months, without taking into account the two doses that must be applied in the routine scheme, one at 12 months and the second dose between 18 and 24 months. If they have not received a dose by age 10, vaccinate adolescents with two doses, the interval between doses should be at least three months (5,6).

Chickenpox vaccine

Indicated to all healthy children from one year of age and the second dose between 4 to 6 years. It can be applied to adolescents with an interval of three months and adults, up to 40 years of age with a minimum of four weeks between each dose (5,6).

Anti Herpes Zoster Vaccine

Indicated in adults over 50 years of age for the prevention of shingles and related complications, whether they have had shingles or not. You can get the Shingrix vaccine even if you have already had shingles. You should get the Shingrix vaccine if the Zostavax vaccine was used or if you do not know if you have had chickenpox (4-6).

Anti Human Papilloma Virus Vaccine

Indicated in children and adolescents from 9 years to 12 years receive two doses (one dose and the second at 6 months) from 12 years onwards receive three doses depending on age. The HPV vaccine that we use in Venezuela has four serotypes. In adults, it is used from 27 years to 45 years. There are three types of vaccines approved in the United States and Europe for routine use against human papillomavirus in both sexes:

- Quadrivalent vaccine against HPV serotypes: 6, 11, 16, and 18 (Gardasil®, Merck).

- Bivalent vaccine against serotypes 16 and 18 (Cervarix®, Glaxo Smith Kline).
- Monovalent vaccine against 9 HPV serotypes 6, 11, 16, 18, 31, 33, 45, 52 and 58 (Gardasil® 9, Merck). This vaccine is not included in the MPPS schedule nor was it offered for use in private practice (5,6,11).

13V Anti Pneumococcal Conjugate Vaccine

Indicated in adolescents, adults, and older adults up to 65 years of age. Its use is recommended even before using the Pneumo 23V vaccine (5,6,11,13).

Hepatitis A vaccine

Indicated in adolescents, adults, and the elderly in areas where this disease is endemic.

Depending on the vaccine there are two or three doses (5-7).

Conjugated Meningococcal Vaccine

Indicated in adolescents, adults, and older adults in one or two doses, depending on its indication and the existence of additional risk factors. In health sector workers and travelers to areas of high endemicity, one dose up to 55 years of age (2,5,6).

Conjugated Meningococcal Vaccine

Indicated in adolescents, adults, and older adults, in one or two doses, depending on its indication and the existence of additional risk factors. In health sector workers and travelers to areas of high endemicity, one dose up to 55 years of age (2,5,6).

Anti-Meningococcal B-C Vaccine

Indicated in adolescents, adults, and older adults who reside in endemic-epidemic areas or move to them and in those who live in closed communities exposed to the risk of acquiring

the disease. Prepared by the Finley Institute, Cuba (8).

Anti Haemophilus influenzae vaccine

Indicated in adults from 19 years of age to older than 65 years depending on risk factors that suggest it (6,11).

Inactivated Anti Influenza Vaccine or Recombinant Vaccine (4,11).

Indicated in an annual dose in all special cases:

- In pregnant women, immunocompromised Non-HIV and immunocompromised HIV; in cases of asplenia or complement deficiency.
- Kidney disease, hemodialysis, heart disease, lung disease or alcoholism, chronic liver disease, and diabetes.
- Recommended in health workers and homosexuals.

Live attenuated influenza vaccine (11)

It is not indicated in pregnant women, immunocompromised Non-HIV and immunocompromised HIV; in cases of asplenia or complement deficiency.

Recommended with caution in cases of kidney disease, hemodialysis, heart disease, lung disease or alcoholism, chronic liver disease, and diabetes. Recommended in health workers and homosexuals.

Triple acellular vaccine Tdpa (11)

One dose is indicated in each pregnancy or all these risk conditions with double acellular boosters or dT every ten years: immunocompromised Non-HIV and immunocompromised HIV; in cases of asplenia or complement deficiency; Kidney disease, hemodialysis, heart disease, lung disease or alcoholism, chronic liver disease, and diabetes. Recommended in health workers and homosexuals.

Trivalent Viral RPS and Varicella Vaccine (11)

It is not recommended in pregnant women, in immunocompromised Non-HIV, and immunocompromised HIV with CD4 <200.

Indicated in one or two doses depending on the other special conditions: HIV patient with CD4 > 200, patients with cases of asplenia or complement deficiency, kidney disease, hemodialysis, heart disease, lung, or alcoholism, chronic liver disease, and diabetes. Recommended in health workers and homosexuals.

Anti Herpes Zoster Vaccine. (Shingrix) Inactivated virus vaccine (11)

Its use in pregnant women is delayed until after pregnancy, it does not apply in immunocompromised Non-HIV and immunocompromised HIV. Indicated in patients over 50 years of age in two doses in patients with cases of asplenia or complement deficiency, in kidney disease, hemodialysis, heart disease, lung disease or alcoholism, chronic liver disease, and diabetes. Recommended in health workers and homosexuals.

(Zostavax) Live virus vaccine (11)

It is not recommended for use in pregnant women, non-HIV immunocompromised, and HIV immunocompromised. Indicated in patients over 60 years of age in a single dose and with cases of asplenia or complement deficiency, in kidney disease, hemodialysis, heart disease, lung disease or alcoholism, chronic liver disease, and diabetes. Recommended in health workers and homosexuals.

HPV vaccine (11)

Delayed its use in pregnant women. Indicated in immunocompromised Non-HIV and immunocompromised HIV with CD4 <200 and CD4 > 200. Three doses are used until age 26. It is indicated in two or three doses up to 26 years of age in patients with cases of asplenia or complement deficiency, in kidney disease, hemodialysis, heart disease, lung disease or alcoholism, chronic liver

disease, and diabetes. Recommended in health workers and homosexuals.

Anti Pneumococcal Vaccine 13V (11)

Not indicated in pregnant women. Indicated in immunocompromised non-HIV and immunocompromised HIV patients with CD4 <200 and CD4> 200, in cases of asplenia or complement deficiency, in kidney disease, hemodialysis. Indicated if there are additional risk factors in heart disease, lung or alcoholism, chronic liver disease, and diabetes. Recommended in health workers and homosexuals.

Anti Pneumo Vaccine 23V (11)

Indicated in pregnant women, health personnel, and homosexuals if there is an additional risk factor, in immunocompromised non-HIV and immunocompromised HIV with CD4 <200 and CD4> 200, in patients with cases of asplenia or complement deficiency, in kidney disease, hemodialysis, heart disease, lung disease or alcoholism, chronic liver disease, and diabetes. As of 2013, the Committee on Immunization Practices (ACPI) recommends revaccination up to two doses before 65 years of age with VPS23, five years after the first dose.

Hepatitis A Vaccine (11)

Indicated according to whether there is additional risk in pregnant women, immunocompromised Non-HIV, and immunocompromised HIV with CD4> 200, in patients with cases of asplenia or complement deficiency, in kidney disease, hemodialysis, heart disease, lung disease or alcoholism, diabetes, and health workers. Indicated in immunocompromised HIV with CD4 <200, chronic liver disease, and homosexuals. Two or three doses are used depending on the vaccine.

Hepatitis B Vaccine (10,11)

Indicated according to the existence of additional risk in pregnant women, non-HIV

immunocompromised and HIV immunocompromised with CD4> 200, in patients with cases of asplenia or complement deficiency, heart disease, lung disease or alcoholism, diabetes, and health workers. In immunocompromised HIV with CD4 <200, in kidney disease, hemodialysis, chronic liver disease, and homosexuals. Two or three doses are used depending on the vaccine.

Quadrivalent Meningococcal Vaccine (ACWY) (11)

Indicated according to there is additional risk in pregnant women, immunocompromised Non-HIV, in kidney disease, hemodialysis, in heart disease, lung or alcoholism, chronic liver disease, diabetes, health workers, and homosexuals. In immunocompromised HIV with CD4 <200 and CD4> 200 and patients with cases of asplenia or complement deficiency.

Anti Meningococcal Vaccine B (8,11)

Precaution in pregnant women, which means that it is only vaccinated if the benefit of it outweighs the risk of suffering the disease. Indicated if there are additional risk factors in the case of non-HIV immunocompromised and HIV immunocompromised with CD4> 200, kidney disease, hemodialysis, heart disease, lung disease, or alcoholism, chronic liver disease, diabetes, health workers, and homosexuals.

Anti Hemophilus influenzae type b vaccine (11)

It is not used in pregnant women. Indicated in three doses in immunocompromised non-HIV patients, one dose is used in cases of asplenia and complement deficiency. Indicated according to the existence of risk factors in immunocompromised HIV with CD4 <200 and CD4> 200, kidney disease, hemodialysis, heart disease, lung disease or alcoholism, chronic liver disease, diabetes, health workers, and homosexuals.

Vaccines in Children and Adolescents

To study the vaccines that we will use in children and adolescents, we will review the ideal immunization schedule of the SVPP 2020, prepared and reviewed by a group of experts who form the Vaccine Commission, who meet periodically to update the vaccination guidelines in children and adolescents and thus keep them up to date according to the best schemes for these age groups (5).

The MPPS immunization schedule for children under one year of age and from one year to nine years is included in this ideal immunization schedule for children and adolescents of the SVPP of the year 2020. Some vaccines are not in the schedule of MPPS immunizations even when they are included in the Expanded Program on Immunization (EPI) of the Americas by the Pan American Health Organization (PAHO) (5,8). The MPPS currently has a limited number of vaccines available: Bacillus Calmette–Guérin (*BCG*) vaccine, Hepatitis B (HB), Pentavalent, Inactivated Polio vaccine (IPV), OV, RPS, RS, Tetanus vaccine bivalent combination with diphtheria toxoid (DT), Tetanus vaccine monovalent tetanus toxoid (TT), and FA (5).

Vaccines whose availability is scarce, the release of them for use is intermittently in health facilities (the pentavalent lacking in the last three months, the *BCG*, the Trivalent Viral and the IPV are often in failure in the posts of primary care), who have been working since before the COVID-19 Pandemic for only half a working day, not every day due to the serious fuel crisis that Venezuela is going through, with major failures in electricity and drinking water (4,5).

The MPPS does not administer conjugate vaccines against pneumococcus 13V, pneumococcal polysaccharide vaccine 23V, rotavirus vaccine, influenza vaccine since 2016 (5). This has been reflected in the re-emergence of diseases preventable by immunizations in our country as of July 2016 with the appearance of the diphtheria epidemic which had not occurred for twenty-four years before 2016 in 1992 (4,5,10,11). Likewise, the presence of measles cases, which stopped in the country in 2007, after an intense vaccination campaign between 2001-2006 (15,19) in the national territory.

Current situation 2020: the Pan American Health Organization (PAHO) reported

“From July 2016 to December 2019: the diphtheria outbreak has caused 291 deaths in the country, 20 of them in 2019”. “Since 2016, Venezuela has no influenza vaccine within the MPPS and vital statistics figures are unknown by the medical union and the community”. “Despite having new vaccines incorporated into schemes in countries of the region, Venezuela appears to be on the sidelines of these benefits”.

Recommendations for the current situation 2020 of the SVPP vaccine commission

- Maintain the promotion within the community of the importance of being up-to-date with the vaccines prescribed for each age.
- Insist on the information that the MPPS is the one who has the availability in a small number of vaccines: *BCG*, HB, Pentavalent, IPV, Oral polio vaccine (OPV), DT, TT, SRP, SR, FA.
- MPPS does not administer conjugate vaccines against *Pneumococcus*, *Pneumo* 23V, Rotavirus, and Influenza since 2016 (5).

The Expanded Program on Immunization (EPI) in Venezuela for the year 2017 reported a shortage of 83,8 % of the total of the existing vaccines in the MPPS, including pneumococcal vaccines (both conjugate and polysaccharide) FA, IPV, OPV, Rotavirus, TT, and disposable syringes, making it impossible the fulfillment of the vaccination schedules and significantly lowering the coverage (9,10).

The figures reported by PAHO / WHO for the year 2019 show us the low vaccination coverage starting with Hepatitis B of the newborn with 59 % coverage, the failures in the IPV vaccine are shown with 32 % coverage in the first dose and the third dose of OPV with 52 %; diphtheria, pertussis (whooping cough), and tetanus vaccine (DTP vaccine) 60 % in the third dose and 31 % in the first booster (11). There is a total absence of the *Pneumococcus* 13V and Rotavirus vaccines 0 % coverage (5), in terms of MMR in the second dose barely reaches 39 % (8).

This weakness in the EPI, added to the interruption of epidemiological surveillance mechanisms, the dismantling of public hospitals, the massive exodus of qualified medical personnel, place the health of Venezuela in a situation of serious risk (18). Likewise, hyperinflation from 2017, the escalation of violence, the failure of basic services, the lowest minimum wage in the entire continent and the terrible and endless political-social crisis, the levels of malnutrition of the child and adult population; They contribute as negative factors to increase the risks of suffering from immuno-preventable diseases, as occurred with the diphtheria epidemic (4,5,9,10,12). Now during the Pandemic, all these risks are enhanced by the fact that quarantine keeps people away from vaccination centers.

BCG Vaccine or Tuberculosis Vaccine

Indicated in countries with a high burden of tuberculosis (TB) disease (more than 40 cases of TB in any form per 100 000 inhabitants), all healthy newborns and infants should be placed during the first days of life or as soon as possible. Do not use in cases of immunodeficiency or HIV. It can be placed up to 7 years of age, without previous a purified protein derivative (PPD) skin test to determine if you have tuberculosis. After this age, it is only applied according to epidemiological indication. Between 10 %-20 % of those vaccinated do not develop a scar, which does not mean that they do not have immune protection (5,6,8).

Hepatitis B Vaccine

Indicated for all newborn children in the first 12 hours of life before leaving the maternity ward. If the mother's serological status for hepatitis B is unknown, request anti-HBcore antibodies and anti-HBsAg surface antigen. If the mother is negative for hepatitis B, the vaccine can be placed in the schedule at 2, 4, and 6 months alone or in combination with other vaccines. If the mother is positive, it is necessary to vaccinate in the first 12 hours and apply 0.5 mL of anti-hepatitis B immunoglobulin, comply with the schedule and verify the immune response to the vaccine if the response of the surface antigen Anti HBsAg is

less than 10 IU/L, the entire scheme is repeated. School children for adolescents with chronic diseases such as diabetes, kidney disease, heart disease, asthma, etc. It should be ensured that you have the complete outline, if you don't have it, stick to it (5,6,8,10).

Inactivated Anti Polio Vaccine (IPV) (IM injection) (trivalent poliovirus types 1, 2 and 3)

Suspension for injection in the multidose vial, for IM injection into the anterolateral part of the thigh in children < 2 years or deep SC injection into the deltoid muscle in children ≥ 2 years and adults. Indicated as the first dose of polio applied at 2month. It can be applied alone or in combination with the Hexavalent. Since 2014, WHO started the strategy to eradicate polio by changing the oral poliovirus vaccine trivalent (OPVt) (virus 1, 2,3) for (OPVb) (virus 1 and 3). Since May 1, 2016, OPVb has been applied worldwide; the first dose is met with the Inactivated Polio Vaccine (IPV), followed by two doses of OPVband for boosters and campaign doses. Immunocompromised children of HIV mothers should receive IPV (5,6,8).

Oral Anti Polio Vaccine. OPV (Virus 1 and 3)

Children usually get the inactivated poliovirus vaccine (IPV) at ages 2 months, 4 months, 6–18 months, and 4–6 years. Children who receive a combined Polio vaccine with hexavalent should receive some booster orally. The dose should be repeated in case of vomiting or regurgitation. It is not used in adolescents or adults (5,6,8).

Pentavalent Vaccine

Indicated in all healthy children from 2 months, to be given in three doses and two boosters: 2, 4, 6, 18 months, and at 5 years of age. It confers immunity against Diphtheria, tetanus, pertussis, Hemophilus Influenza type b infections, and Hepatitis B (5,6,8).

Coberturas de vacunación Penta3 según Estado y criterio de riesgo. Venezuela, Enero a Julio de 2016.

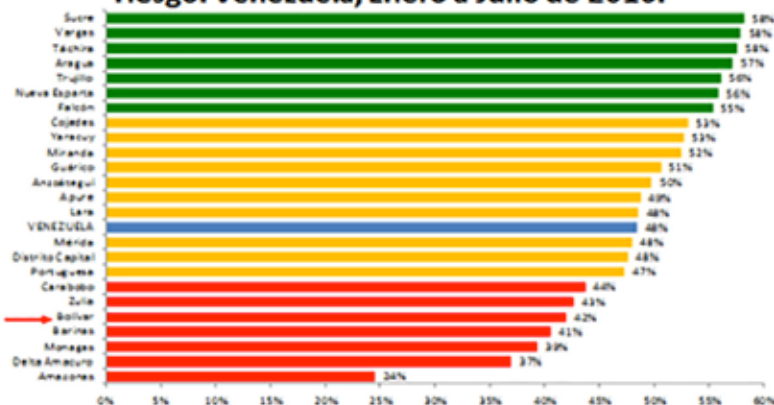


Figure 2. Penta3 vaccination coverage of the different states of the country (9).

Figure 2 shows the low vaccination coverage of the different states of the country from January to July 2016, offered by the PAHO, where it is evident in the third dose of the pentavalent vaccine that in no case is 58 % of vaccination coverage exceeded in any state in the country and it is the Bolívar state with 42 % coverage, the gateway to the diphtheria epidemic in 2016 from cases in Brazil and a susceptible population found especially in the indigenous people who worked in the mines of the Bolívar state, alerting PAHO and WHO of the reappearance of this preventable immune disease that spread to neighboring countries Brazil, Colombia, with cases in Peru and Ecuador (4,5,9,11,12).

Hexavalent vaccine

Indicated in all healthy children from two months of age: 2, 4, 6, 18 months, and 5 years. It confers immunity against Diphtheria, Tetanus, pertussis, Hemophilus influenza, Hepatitis B, and Polio infection (5,6).

Anti Rotavirus Vaccine

Indicated in all healthy children from two months. The Monovalent RV1/Rotarix vaccine

scheme: it is applied in two doses at 2 and 4 months. The Pentavalent Human-Bovine RV5 / Rotateq vaccine: is applied in three doses at 2, 4, and 6 months. The dose should not be repeated in case of vomiting or regurgitation. The minimum age of administration is 6 weeks maximum age is 32 weeks (5-7).

Pneumococcal 13V vaccine

Indicated in all children from 2, 4, 6 months, with reinforcement at 18 months. If the first dose is after 7 months, only two more doses. If you start the scheme between 12 - 23 months, only apply two doses. In healthy children without previous vaccination from 24 to 59 months, only apply one dose. Included by the Expanded Immunization Program in the National Scheme in Venezuela since January 07, 2014: indicated at 2, 4 months, and reinforcement between 12 and 15 months. This vaccine has not been fulfilled since 2017 in Venezuela.

Mixed scheme

Children at high risk of pneumococcal infection due to immunosuppression or HIV use 13V Pneumococcal conjugate vaccine

and the complementary 23V polysaccharide vaccine (4-6,8).

Anti Influenza Vaccine

Indicated to all healthy or sick children from six months of age, with annual reinforcement to prevent seasonal influenza. Pediatric doses (0.25 mL) are used in children under 3 rd. In children under the age of 9 years, who have never been vaccinated, administer two doses at intervals of four weeks. In pregnant women from the 2nd trimester, the tetravalent vaccine is recommended (5,6).

Trivalent Viral RPS Vaccine

Since the year 2017 to control the outbreak of Measles it is indicated to all healthy children from six months, this dose is not counted for compliance with the routine two-dose schedule. Then at one year of age, with a second dose between 18 to 24 months, to favor the eradication of Measles with reinforcement at 10 years of age (4-6,8,9).

The very low vaccination coverage of the MMR vaccine in its second dose, shown in this Figure 3, below 80 % for the year 2017, according to PAHO figures, are what justify the

re-emergence of immuno-preventable diseases by vaccines like measles. This vulnerable population has been displaced from the country due to the serious political, social and economic crisis that has been immersed in the country for more than a decade, contributing to the Americas with 68 % of the reported measles cases and many of the deaths related to this. The D8 genotype isolated from patients in Venezuela, Brazil, Colombia, Peru, and Ecuador, is associated with endemic transmission in Asia and the Pacific and is the main lineage circulating in South America (4). The reestablishment of measles transmission due to the continuous circulation of the imported or indigenous virus for more than twelve months 2017-2018, has caused the Americas to lose the certification of the Measles Free Region in 2018 (4,9-11).

Measles and Rubella

These vaccines are indicated from 6months to increase vaccine coverage and reduce the outbreak of Measles. However, this results in opening an epidemiological window to the appearance of mumps, since it leaves a susceptible group without the due reinforcement of this vaccine. That is why the SVPP recommends the MMR vaccine (5,6).



Figure 3. SRP2 vaccination coverage. Countries and territories from the continent (9).

Anti Arylic Vaccine

Indicated from 12 months and in epidemic areas from 6 months. The doctor must take into account the risk of suffering the disease or the possibility that exists in children between 4 and 9 months of presenting encephalitis after the vaccine. As of 2013, the WHO declared no need for reinforcement (5,6,9).

Hepatitis A Vaccine

Indicated for all healthy children over one year of age with booster starting six months after the first dose is applied. As of 2018, a dose from 6 to 11 months is included, which will not be taken into account to comply with the routine two-dose schedule, suggested by the SVPP immunization commission, due to the socio-economic deterioration conditions of the population, the progressive health deterioration, the fact that the disease is endemic in our country, plus the absence of a hepatitis A vaccine for more than two years. It can be applied at any age, schoolchildren, and adolescents (5-7,11). Pending inclusion in the Middle Years Programme (MYP).

Varicella Vaccine

Indicated for all healthy children over one year of age with a second dose between four and six years of age. In unvaccinated adolescents, two doses are used with three-month intervals between them (5,6,11). Pending inclusion in the MYP (8).

Anti-Meningococcal Conjugate Vaccine: ACYW (MCV4)

Indicated from 9 month of age in healthy children with a second dose of 12 month to 15 month and reinforcement in adolescence from 11 to 19 years. In healthy unvaccinated children over the age of 2, a single dose with a booster in adolescence in children at high risk due to HIV or non-HIV immunosuppression, anatomical or functional asplenia, the first two at 9 months, the second dose 8 weeks later with a booster every 5 years. In adolescents who have not received

the vaccine, consider if the first dose is before the 12th, a booster on the 16th. If the first dose is before the age of 15, a booster on the 18th. If it is administered after the 16th, it is a single dose. Since 2009, serogroups B, C, Y of meningococcus (N meningitides) have been circulating in Venezuela, causing endemic and epidemic disease, meningitis, and meningococemia. There are outbreaks in different areas of the country, in the Sucre State serogroup W. Data from the SIREVA 2013 report on serogroups B, Y, C affected children under 1 and 5 years of age. This is why the quadrivalent conjugate vaccine (A, C, Y, W) is recommended in Venezuela. Just as the group from 5 years to 14 years was affected by serogroups B, C, Y, causing meningitis and sepsis. In the group from 15 years to 25 years, serogroup C, B, Y predominated (2,5,6,7).

23V Pneumococcal Vaccine

Indicated only in children over the age of 2 years, adolescents, and adults of all ages. Recommended in special cases of sickle cell anemia, functional or anatomic asplenia, immunocompromised HIV and non-HIV; a mixed schedule with conjugate pneumococcal vaccines must be followed (complete previous schedules VCP10 VCP13), the minimum interval is eight weeks. As of 2013, the Advisory Committee on Immunization Practices (ACIP) recommends revaccination up to two doses before 65 years of age with VPS23, five years after the first dose. This practice applies to children and adolescents. If VPS23 is administered first, a year must wait before VCP13 is applied (5,6,13).

Regarding the ideal scheme for adolescents (Figure 4), the great absence is the HPV vaccine, which is not included in the EPI despite being recommended in the Ideal Immunization Scheme of PAHO. We are the only country in Latin America that does not apply it, even Haiti, which was the poorest country in the region, now Venezuela has that sad distinction, it has the HPV vaccine in its scheme, and the Adenocarcinoma (AC) of the uterine cervix continues being among the leading causes of morbidity and mortality in young Venezuelan women (5,6,8,11).

VACCINES FOR ALL AGES IN VENEZUELA



Figure 4. Immunization scheme for adolescents in Venezuela, 2020 (6).

Human papillomavirus vaccine

The application of the Tetravalent vaccine against HPV serotypes (6,7) Gardasil®, Merck) is recommended in children and adolescents from 9 years of age, the schedule to be met is three doses with intervals of eight weeks between each vaccine, intramuscularly. This vaccine is not included in the MPPS scheme nor was it allowed to be offered for a private consultation. There are three types of vaccines approved in the United States and Europe for routine use against human papillomavirus in both sexes:

Quadrivalent vaccine against HPV serotypes: 6, 11, 16, and 18 (Gardasil®, Merck).

The bivalent vaccine against serotypes 16 and 18 (Cervarix® Glaxo Smith Kline).

Monovalent vaccine against serotypes 6, 11, 16, 18, 31, 33, 45, 52 and 58 (Gardasil® 9, Merck) (5,8,11).

Recommendations

In this work we observe how the low vaccination coverage has led us to the reemergence of vaccine-preventable diseases that had already been controlled in our country, that is why we suggest:

1. Re-establish the epidemiological surveillance services to know the national statistics in a timely manner and, depending on the results, establish the operations with the necessary corrections for each case.
2. Maintain a permanent supply of all the vaccines of the MPPS National Immunization Scheme as well as trained personnel in outpatient clinics and vaccination centers throughout the country, emphasizing daily work with due compliance with their schedule to increase the vaccination coverage.
3. Implement in the public and private schools of the country, from maternal, basic and high school, to have a complete immunization scheme according to age, as an essential requirement to enter the school year.
4. Implement in the public and private universities of the country, have the complete immunization scheme for the age, as an essential requirement to enter to carry out higher studies.
5. Implement in the public and private companies of the country, have complete the immunization scheme according to age, as an essential requirement to obtain the job.
6. Continually promote in schools, colleges, universities, public and private entities about the proper use of vaccines, as a healthy practice

in promoting health and preventing diseases.

7. Create vaccination centers in all clinics and hospitals, where it is easier to comply with the updating of immunization schedules for people of all ages, with trained personnel who work every day of the week attending to this epidemiological emergency.
8. Educate the population, through public media networks, from children on the prevention of diseases through the reasonable use of vaccines at all ages, as an instrument to achieve a better standard of living and health.

REFERENCES

1. Paniz-Mondolfi AE, Tami A, Grillet ME, Márquez M, Hernández-Villena J, Escalona-Rodríguez MA, et al. Resurgence of Vaccine-Preventable Diseases in Venezuela as a Regional Public Health Threat in the Americas. *Emerg Infect Dis.* 2019;25(4):625-632.
2. CDC. Meningococcal Vaccination. What You Should Know. CDC Disponible en: <https://www.cdc.gov/vaccines/vpd/mening/public/index.html>
3. NIH. ¿Qué significa inmunidad de grupo o inmunidad colectiva? NIH MedlinePlus Magazine. Disponible en: <https://magazine.medlineplus.gov/es/article/what-is-community-immunity>
4. AAP. Immunization Schedules. Red Book Online. AAP Point-of-Care-Solutions Disponible en: https://redbook.solutions.aap.org/SS/Immunization_Schedules.aspx
5. Sociedad venezolana de puericultura y pediatría. SVPP. Disponible en: <http://www.svpediatria.org/secciones/publicaciones/esquema-de-inmunizacion/>
6. CDC. Hepatitis A In-Short. 2019. Disponible en: <https://www.cdc.gov/vaccines/vpd/hepa/public/in-short-adult.html>
7. CDC. Immunization Schedules. CDC. 2020. Disponible en: <https://www.cdc.gov/vaccines/schedules/index.html>
8. Ministerio del poder popular para la salud. Inmunizaciones. Disponible en: <https://drive.google.com/drive/folders/0By6RZhEq4ajR0wyQk0xb2JTtIU>
9. Tirso CP, <https://www.facebook.com/pahowho>. PAHO/WHO. Country Profiles (IM). Pan American Health Organization / World Health Organization. Disponible en: https://www.paho.org/hq/index.php?option=com_content&view=article&id=2577:2010-country-profiles-im&Itemid=2065&lang=en
10. Martín O, <https://www.facebook.com/pahowho>. PAHO/WHO Data - Visualización | OPS/OMS. Pan American Health Organization / World Health Organization. 2017. Disponible en: https://www.paho.org/data/index.php/es/?option=com_content&view=article&id=515:indicadoresviz&Itemid=348
11. OPS. IM Coverage Disponible en: https://ais.paho.org/imm/IM_JRF_COVERAGE.asp
12. WHO. Epidemiological Update: Diphtheria - 18 June 2020 - PAHO/WHO. Pan American Health Organization. Disponible en: <https://www.paho.org/en/documents/epidemiological-update-diphtheria-18-june-2020>
13. CDC. Pneumococcal Vaccination. What You Should Know. CDC. Disponible en: <https://www.cdc.gov/vaccines/vpd/pneumo/public/index.html>
14. The Lancet null. The collapse of the Venezuelan health system. *Lancet Lond Engl.* 2018;391(10128):1331.