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AND IMMUNOLOGY



VACCINE INFORMATION FOR PARENTS & CAREGIVERS

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Amayeza, Vaccine Information Centre (<http://www.amayeza-info.co.za/>)

Centre for Communicable Diseases Fact Sheets (<http://www.cdc.gov/vaccines/hcp/vis/>)

World Health Organization Fact Sheets (<http://www.who.int/mediacentre/factsheets/en/>)

National Department of Health, South Africa (<http://www.health.gov.za/>)

Disclaimer

This book is intended as an educational tool only. Information may be subject to change as schedules or formulations are updated.

Summarized and simplified information is presented in this booklet. For full prescribing information and contraindications for vaccinations, please consult individual package inserts.

There has been no financial contribution from any pharmaceutical company to the compilation of this booklet.

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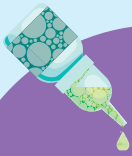
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Foreword

BENEFIT of Vaccines

Vaccines are widely acknowledged to be the most successful medical advance ever. Vaccines continue to save hundreds of thousands of lives annually. History is full of descriptions of the devastation wrought on populations by infectious diseases before the age of vaccination. Huge numbers were killed by diseases like measles and smallpox, and hundreds of thousands left paralyzed by polio.

The demonstration in the 1970's that smallpox could be wiped out by vaccination led to the introduction of the "Expanded Program on Immunization" by the World Health Organization in 1974. Universal vaccination introduced global access to vaccines against "the big six" diseases – polio, tuberculosis, measles, diphtheria, pertussis and tetanus.

Huge strides have been made in combating these diseases using vaccination. Many of these diseases are now uncommon, and mothers today may have never even heard of friends who have lost children due to illnesses like measles or diphtheria. The success of vaccines may therefore lead to complacency and a false sense of comfort, unless we remember the devastation that these diseases caused in years gone by. In some areas of Africa, it was customary for mothers not to name their babies until the measles season had passed, for fear they would not live through the season.

Such fear of measles is no longer with us, and yet it is only by a continued sense of urgency that we can ensure that vaccine-preventable diseases do not return.

In South Africa, newer vaccines have been introduced as they have been developed, allowing protection against *Haemophilus influenzae* type b, *Streptococcus pneumoniae*, hepatitis B, human papillomavirus and rotavirus. These vaccines are making a large impact on the health of South African children. We hope to see even more vaccines developed and implemented in the years to come.

We hope you find this booklet helpful to find information regarding the vaccines your child/children will get at each stage of their development. We have also included workpages so that you can remind yourself when they will be due for their next vaccination. We include answers to some frequently asked questions and misconceptions about vaccines as well as links to where you can find further reliable information.

Prevention is always better than cure. Vaccines are the best prevention we can offer our children against infectious diseases – let's make vaccine-preventable disease a distant memory for our children's generation.

Dr Melinda Suchard

Head, Centre for Vaccines and Immunology
National Institute for Communicable Diseases
October, 2016

Section 1



Introduction

How do vaccines work?

Our body's defenses are often stronger the second time they are challenged than the first time.

The process of vaccination involves giving a person small, harmless amounts of an infectious agent (for example a virus) in order for the immune system to see it and prepare itself for the next time it meets the same infectious agent. Some vaccines are weakened forms of live infectious agents (called live attenuated vaccines) and some are inactivated parts of the infectious agent.

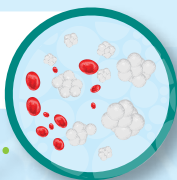
Vaccines are highly safe and effective at preventing diseases. Vaccines are more studied for safety than any other medication.

Each vaccine has been described in this booklet according to the usual age at which it is first given to children in South Africa. For further information, internet links are given after the discussion of the different vaccines. This booklet focuses on the vaccines in routine use in the state immunization schedule at the current time. Some general information on other vaccines is discussed at the end.

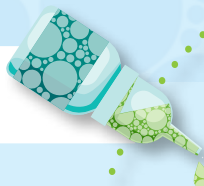
Vaccination is the best way to protect your child from unpredictable side effects of serious infectious diseases. Vaccination protects your child, and children in your community. Please be informed regarding vaccine choices, and discuss vaccines with your health care provider if you require further information.

By vaccinating your child, you become part of a global effort to rid the world of the devastating childhood diseases that were so common in our parents' and grandparents' generations.

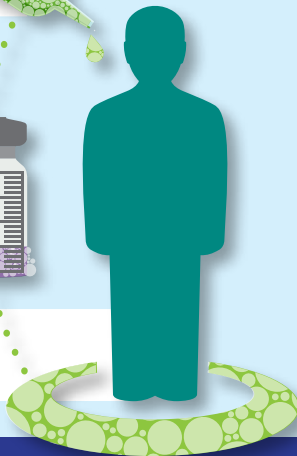
Vaccinated person develops immunity



Vaccine administered



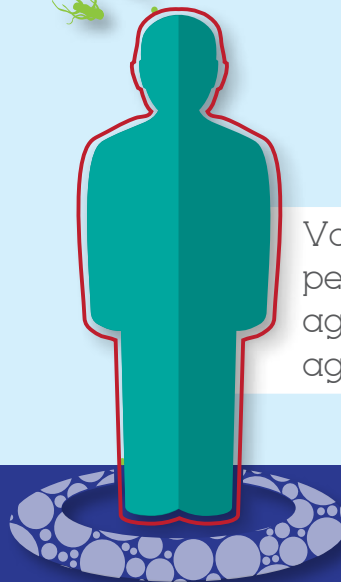
Un-vaccinated person



Infectious agent attacks



Vaccinated person protected against infectious agent



Vaccine schedule in South Africa

The national expanded program on immunization (EPI) schedule in use in 2016 is shown below. Multiple other schedules are available from private providers. A comparison of private South African schedules used in 2016 is given in appendix B.

National EPI schedule in South Africa, December 2015

Age	Vaccine Name	Abbreviation (Dose number)
Birth	Polio vaccine Tuberculosis vaccine (Bacille Calmette-Guerrin)	OPV (0) BCG
6 weeks	Oral polio vaccine Rotavirus vaccine Diphtheria-tetanus-acellular pertussis-injectable polio- <i>Haemophilus influenzae</i> b- Hepatitis B vaccine Pneumococcal conjugate vaccine	OPV (1) RV(1) DTaP-IPV-Hib-HepB (1) PCV (1)
10 weeks	Diphtheria-tetanus- acellular pertussis-injectable polio- <i>Haemophilus influenzae</i> b-hepatitis B vaccine	DTaP-IPV-HIB-HepB (2)
14 weeks	Rotavirus vaccine Diphtheria-tetanus- acellular pertussis-injectable polio- <i>Haemophilus influenzae</i> b-hepatitis B vaccine Pneumococcal conjugate vaccine	RV(2) DTaP-IPV-Hib-HepB (3) PCV (2)
6 months	Measles vaccine	Measles (1)
9 months	Pneumococcal conjugate vaccine	PCV (3)
12 months	Measles vaccine	Measles (2)
18 months	Diphtheria-tetanus- acellular pertussis-injectable polio- <i>Haemophilus influenzae</i> b-hepatitis B vaccine	DTaP-IPV-Hib-HepB (4)
6 years	Tetanus, reduced dose diphtheria vaccine	Td (1)
9 years	Human Papilloma Virus vaccine (2 doses 6 months apart)*	HPV (1) HPV (2)
12 years	Tetanus, reduced dose diphtheria vaccine	Td (2)

*HPV vaccine is given as part of the school health programme rather than the expanded program of immunization.

Workpages

Parents, this is your workpage to keep track of your child's due date for vaccines, and to help you understand which vaccines your child is getting at each visit. You can work out the due dates in advance from the time you know their birth date, and fill in the dates on the table below, to make sure you keep track and don't miss any doses. Your nurse will record the relevant injections on the child's road to health card.

Age	Diseases against which vaccines protect (sometimes many are combined into 1 injection)	Name of child 1	Name of child 2	Name of child 3	Name of child 4	Name of child 5
Date for vaccines given at birth	Oral polio vaccine					
	Tuberculosis vaccine (Bacille Calmette-Guerrin)					
Date for vaccines given at 6 weeks of age	Oral polio vaccine					
	Rotavirus vaccine					
	Diphtheria-tetanus-acellular pertussis-injectable polio-Haemophilus influenza b- hepatitis b vaccine					
	Pneumococcal conjugate vaccine					
Date for vaccines given 10 weeks of age	Diphtheria-tetanus- acellular pertussis- injectable polio- Haemophilus influenzae b-hepatitis b vaccine					
Date for vaccines given at 14 weeks of age	Rotavirus vaccine					
	Diphtheria-tetanus- acellular pertussis- injectable polio- Haemophilus influenzae b-hepatitis b vaccine					
	Pneumococcal conjugate vaccine					

Age	Diseases against which vaccines protect (sometimes many are combined into 1 injection)	Name of child 1	Name of child 2	Name of child 3	Name of child 4	Name of child 5
Date for vaccine given at 6 months of age	Measles vaccine					
Date for vaccine given at 9 months of age	Pneumococcal conjugate vaccine					
Date for vaccine given at 12 months of age	Measles vaccine					
Date for vaccines given at 18 months of age	Diphtheria-tetanus- acellular pertussis-injectable polio- Haemophilus influenzae b-hepatitis b vaccine					
Date for vaccines given at 6 years of age	Tetanus-reduced dose diphtheria vaccine					
Dates for vaccines given at 9 years of age	Human Papilloma Virus vaccine (2 doses 6 months apart)					
Date for vaccines given at 12 years of age	Tetanus-reduced dose diphtheria vaccine					

Additionally, your child may receive extra doses due to mass campaigns that may occur periodically. For information on mass campaigns, see page 31.

Section 2



Vaccines included in the expanded programme on
Immunization of South Africa

Vaccines first given at birth

Polio vaccine

What is polio?

Polio, or poliomyelitis, is a viral infection that mostly affects young children. It is transmitted through consumption of food or water contaminated with faeces that contains the virus. After the virus enters the body of a healthy individual, the infection can be asymptomatic or can cause fever, fatigue, headache, vomiting, stiffness in the neck and painful limbs. In certain cases, the virus attacks the nervous system, causing sudden weakness or paralysis of the limbs. The muscles responsible for breathing can also be affected, which can lead to death.

What is polio vaccine?

There are two types of polio vaccines: The oral polio vaccine (OPV) and the injectable polio vaccine (IPV). The oral vaccine consists of the virus that has been weakened such that it does not cause disease but protects the body by stimulating the immune system. The injectable vaccine is made using killed or inactivated polio virus.

At what age should polio vaccine be given?

The polio vaccine is included in the South African EPI schedule at the following times:

- The oral vaccine (OPV) is given at birth and at 6 weeks of age.
- The injectable vaccine (IPV) is given at 6 weeks, 10 weeks and 14 weeks, with a booster at 18 months

What should I do if my child misses a dose?

Polio vaccination schedule can be caught up at any age. The injectable vaccine is preferred for adults.

If my child receives the polio vaccine, what is the chance he/she could still get polio?

Polio vaccines are highly effective. Following 3 doses, more than 95% of recipients are protected against wild-type polio infection. The oral vaccine is better than the injectable vaccine at preventing viral shedding from the gastrointestinal tract and therefore at preventing transmission from an infected person to a second individual.

Are there any side-effects of poliomyelitis vaccine?

The injection site is sometimes painful after administration of inactivated polio vaccine.

Severe allergic reactions are rare but could present as hives, swelling of the face and throat, difficulty breathing, increased heartbeat, dizziness and weakness.

A very small proportion of people can get symptoms similar to wild-type poliomyelitis after taking the live attenuated oral vaccine. This is very rare (estimated as 1 in 2.4 million doses) and the benefit of vaccination is considered to outweigh the risk. The injectable polio vaccine cannot cause polio-like disease.

In areas of low immunization coverage, vaccine virus from the oral polio vaccine may circulate from person to person. Such circulation can have benefits of immunizing new individuals. If such circulation continues uninterrupted for many years however, it is possible for the vaccine virus to mutate and become similar to wild polio virus again, a condition known as vaccine-derived polio virus.

Prolonged circulation of virus only occurs in areas with low vaccine coverage rates. In areas with good vaccine coverage, circulation of vaccine virus stops when the virus encounters immune individuals and mutations therefore cannot accumulate. It is very important to maintain high population vaccination coverage rates to stop the spread of polio viruses.

Is there still polio in the world? Hasn't polio been eradicated?

Polio is targeted for global eradication, meaning that there would then be no more virus circulating anywhere in the world. Only one human disease has ever been eradicated – this example is smallpox, against which we no longer need to vaccinate. There are 3 strains of wild type polio virus, types 1, 2 and 3. Wild poliovirus type 2 was eradicated, and last seen in 1999. Wild poliovirus type 3 was last seen in 2012. Only wildtype 1 polio virus and vaccine-derived polio viruses are still circulating. The last case of wild type polio in South Africa occurred in 1989

but there still remain two countries (Pakistan and Afghanistan) which have circulating wild-type polio virus. Even one visitor could spread the disease to other countries, so we need to maintain high vaccination levels for protection.

Are there any people who should not receive the vaccine?

Yes, these include:

- People who have had a serious life-threatening allergic reaction to any of the substances contained in the vaccine (IPV contains trace amounts of the antibiotics streptomycin, neomycin, polymixin B). Previous allergic skin rashes are not a contraindication to vaccination.
- People who are seriously ill
- People with severe forms of inherited primary immune deficiencies

What are the trade names and who are the manufacturers of the vaccine?

Oral vaccine:

OPV Merieux® (Institut Merieux)

Polioral® (Novartis)

Oral polio vaccines used to contain all three strains of polio virus, poliovirus type 1, poliovirus type 2 and poliovirus type 3 (trivalent OPV). Because type 2 poliovirus has been eradicated globally, from April 2016 oral polio vaccines only contain poliovirus type 1 and poliovirus type 3 (bivalent OPV).

Injectable vaccine:

- **Infanrix Hexa®** (GlaxoSmithKline), **Hexaxim®** (Sanofi Pasteur): This is a combination of diphtheria, tetanus, acellular pertussis, inactivated poliomyelitis, Haemophilus influenzae b and Hepatitis B vaccines.
- **Hexaxim®**: This is a combination of diphtheria, tetanus, acellular pertussis, inactivated poliomyelitis, hepatitis B and Haemophilus influenzae b vaccines. (Sanofi Pasteur)

Injectable polio vaccines contain all three strains of inactivated polio virus, poliovirus type 1, poliovirus type 2 and poliovirus type 3.

Further information can be obtained from:

- <http://www.polioeradication.org/>
- <http://www.who.int/immunization/diseases/poliomyelitis/en/>



Vaccines first given at birth

Tuberculosis vaccine



What is Tuberculosis?

Tuberculosis (TB) is a disease caused by *Mycobacterium Tuberculosis*. The most frequent part of the body affected by TB is the lungs, although the brain, bones and other organs can be affected. TB is very common in South Africa. South Africa has one of the worst TB epidemics in the world.

What is the Tuberculosis vaccine?

The TB vaccine, called Bacille Calmette-Guérin (BCG) vaccine, is made using live, weakened mycobacteria. The mycobacteria in the vaccine do not cause illness but help the body to develop protection against TB. The TB vaccine has been used in South Africa since 1973.

At what age is Tuberculosis vaccine given?

A single dose of BCG is given as soon as possible after birth as an injection into the skin of the right shoulder.

What happens if my child missed a dose?

If a child does not get the vaccine at birth, it can be given up to 1 year of age, but a doctor should be seen before the decision to vaccinate is made as the child may already have come into contact with the mycobacteria.

What are the chances of my child getting the disease even after being vaccinated?

The BCG vaccine has been proven to protect about 8 out of 10 people against severe forms

of TB, such as brain and bone infections. Protection can last for up to 15 years. Protection against TB of the lungs however is variable, so it is still possible for children to develop TB. The illness should be milder than if they had not been vaccinated. Consult your doctor immediately if you are concerned that your child may have TB.

What are the side-effects of the vaccine?

Common side effects include pain, swelling and redness at the injection site. Often a small raised blister lasts for a few weeks or couple of months – this indicates a healthy, strong immune response and should not be cause for concern. More rarely, an abscess or ulcer may form at the injection site or under the armpit – these require medical attention. Allergic reactions are possible. Immediately seek medical attention if the following occur: severe skin rash, difficulty breathing or swallowing, wheezing.

Severe side effects caused by the mycobacteria are possible in children who are immunocompromised, such as in those children who are very ill with HIV. BCG vaccination should not be given to children known to be HIV-infected. Because BCG in South Africa is given at birth, it is usually not known whether a child born to an HIV-infected mother will become HIV infected.

In this case, BCG vaccine is usually given to the child at birth, as for HIV uninfected children, unless the child is noticeably ill with symptoms of HIV (Hesseling et al, 2009).

Who should not receive tuberculosis vaccine?

- Any infant who has signs of HIV infection.
- Any infant who is very sick. In this case, the health professional will determine when the vaccine should be given after the infant has recovered.
- Allergy to any of the substances contained in the vaccine.

What are the trade names and who are the manufacturers of the vaccine?

- BCG, Statens Serum Institute, Copenhagen
- BCG, Serum Institute India

Further information online from:

World Health Organization information on TB vaccines:

- <http://www.who.int/biologicals/areas/vaccines/bcg/Tuberculosis/en/>
- BCG vaccination in South African HIV exposed infants – Risks and Benefits. Hesseling et al, S Afr Med J 2009 99(2) at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2869300/>



Vaccines first given at 6, 10 and 14 weeks

Diphtheria, tetanus, pertussis, *Haemophilus influenzae* b, hepatitis B and inactivated polio combination vaccine

Why vaccinate against diphtheria, tetanus, pertussis, *Haemophilus influenzae* b, polio and hepatitis B?

Diphtheria, tetanus, pertussis and *Haemophilus influenzae* b are bacterial infections that cause severe disease and death, especially in younger children. Since complications are common even with adequate treatment, the best way to control these infections is by prevention using vaccines. Hepatitis B is a viral infection that can cause liver damage or lead to liver cancer in later life.

What is diphtheria?

Diphtheria is an infection with the bacterium *Corynebacterium diphtheriae*, which is transmitted by respiratory droplets (coughing, sneezing) from an infected to an uninfected person. The bacterium produces a toxin that causes disease with sore throat, cough, swollen lymph nodes, fever, skin rash and weakness. A dark grey membrane sometimes appears in the throat and this can obstruct the airways leading to difficulty breathing or even death. The heart and brain can also be affected.

Diphtheria is very uncommon today, although in the 1930s it was one of the leading causes of childhood death in countries like England. After many years without diphtheria, South Africa reported diphtheria cases, including deaths, in 2015.

What is tetanus?

Tetanus is caused by the bacterium *Clostridium tetani* that is transmitted to a healthy individual from contaminated objects or from the soil, through an opening on the skin. The clinical manifestations of the disease are as a result of the tetanus toxin produced by the bacterium which causes painful muscular contractions or spasms. A frequent sign of the disease, caused by spasms of facial muscles, is the inability for the patient to open his/her mouth, hence the name "locked jaws".

Tetanus can also be seen in newborn babies if the umbilical cord was treated in an unhygienic manner. The risk of newborn tetanus is the reason women are boosted for tetanus vaccination during pregnancy. Due to good vaccination coverage with tetanus-containing vaccines as well as high rates of medically attended births and hygienic birth practices, South Africa has not had a case of neonatal tetanus since 2002.

What is pertussis?

Pertussis or "whooping cough" is an infection of the upper respiratory tract by a bacterium called *Bordetella pertussis*. The disease initially presents as flu-like symptoms following infection with respiratory droplets from an infected individual. About ten days later, severe episodes of coughing begin, accompanied by a "whoop" sound when the

patient breathes. The cough is often followed by vomiting, difficulties breathing and loss of consciousness especially in infants. The cough can be long lasting, and used to be referred to as "the 100 day cough".

What is *Haemophilus influenzae* b?

Haemophilus influenzae b (Hib) is a bacterium that causes severe disease, especially in children under 5 years of age. Infection is spread by respiratory droplets from an infected person who coughs or sneezes, to an uninfected person. Different parts of the body can be infected by *Haemophilus influenzae* b including the face, joints, bones, lungs, brain, heart and abdomen. The consequences of this infection can be permanent hearing loss and even death.

There are other types of *Haemophilus influenzae* which cause milder illness than subtype b. The other subtypes are not prevented by the vaccine.

What is hepatitis B?

Hepatitis B is an infection of the liver by the hepatitis B virus. Hepatitis B virus is spread by contact with infected blood or body fluids, such as sexual exposure or intravenous drug use. Hepatitis B can also be passed from a mother to her newborn baby.

Hepatitis B can cause either short term or long term illness. Abdominal pain, nausea and yellow colour of eyes are symptoms of infection. Infection sometimes has no symptoms, and the person may not know s/he is infected. Asymptomatic people can still spread the disease. Long term infection can lead to liver cirrhosis, failure, liver cancer or death.

What is the diphtheria, tetanus, pertussis vaccine?

Diphtheria and tetanus vaccines are toxoid vaccines, meaning they contain inactivated forms of toxins produced by the bacteria (*Corynebacterium diphtheria* or *Clostridium tetani*). The pertussis vaccine contains toxoid and other proteins from the bacterium, *Bordetella pertussis*. There are different doses of the diphtheria and pertussis components of the vaccine for use in infants compared with adults. The pertussis component is referred to as "acellular" because it is made from part of the bacterium, as opposed to the older "whole cell vaccines" which were made using the whole pertussis bacterium.

Nomenclature of diphtheria, tetanus and pertussis vaccines

An "a" before the P denotes acellular pertussis vaccine, whereas "w" denotes whole cell pertussis vaccine.

Upper and lower case letters are used to indicate dosage of the diphtheria and pertussis components of the vaccines. Upper case letters indicate full doses, used in young children less than 7 years old, and lower case letters imply reduced doses, used for older children and adults. DTaP therefore indicates a standard dose, and Tdap indicates standard dose tetanus toxoid together with reduced dose diphtheria and acellular pertussis vaccines.

What is the *Haemophilus influenzae b* (Hib) vaccine?

The Hib vaccine is a part of the *Haemophilus influenzae b* bacterium, attached to a carrier protein to improve its immune response. The Hib vaccine has been used in South Africa since 1999.

What is the hepatitis B vaccine?

The hepatitis B vaccine is made using a protein from the envelope of the virus called the hepatitis B virus surface antigen. The hepatitis B vaccine is a recombinant vaccine, where the hepatitis B surface antigen is now produced by yeast cells. The hepatitis B vaccine was first introduced into the South African national Expanded Program on Immunisation (EPI) in 1995.

Which vaccine formulations are available and when are they given?

In order to prevent multiple injections, these

vaccines can be combined into different formulations.

Diphtheria, tetanus, acellular pertussis (DTaP) vaccines

- 6-in-1 (infants): Diphtheria, tetanus, acellular pertussis, inactivated poliomyelitis, *Haemophilus influenzae b* and hepatitis B (DTaP-IPV-Hib-HBV) for Hexaxim® (Sanofi Pasteur) and (DTaP-IPV-HBV/Hib) for Infanrix Hexa®, (GlaxoSmithKline),
- Tetanus, reduced dose pertussis, reduced dose diphtheria (Tdap) and inactivated polio for those older than 3 years including adolescents and adults; Adacel Quadra® (Sanofi Pasteur), Boostrix Tetra® (GlaxoSmithKline) (from 4 years).
- Tetanus toxoid alone: Tetavax® (Sanofi Pasteur)
- Hepatitis B alone: Heberbiovac HB®, Center for Genetic Engineering and Biotechnology, Cuba; Euvax®, Sanofi-Pasteur; Engerix-B®, GlaxoSmithKline;
- Hiberix® (GlaxoSmithKline): *Haemophilus influenzae b* alone.

Vaccines first given at 6, 10 and 14 weeks

Diphtheria, tetanus, pertussis, *Haemophilus influenzae* b, hepatitis B and inactivated polio combination vaccine

Boosters

Tetanus and diphtheria vaccine boosters are given at 6 years of age. Immunity to tetanus, diphtheria and pertussis vaccines decreases with time. Boosters are therefore recommended every ten years. An individual requires 5 doses of tetanus toxoid vaccines to be protected for life. Tetanus toxoid (TT or Td) boosters are given following injuries, unless a booster has been received within the previous 5 years.

Tetanus toxoid boosters are recommended during pregnancy. Tetanus toxoid vaccination in pregnancy may be tetanus alone (TT), tetanus with adult dose diphtheria vaccine (Td) or tetanus, diphtheria and acellular pertussis vaccine (Tdap). Combinations such 4-in-1 (Tdap-IPV) vaccines are also safe in pregnancy. It is recommended for mothers to be vaccinated during pregnancy so that they can pass protection to their infants before the infants are old enough to be vaccinated themselves.

What happens if my child missed a dose?

- Tetanus, diphtheria and acellular pertussis vaccine schedule can be caught up at any age – the adult dose (reduced dose) of diphtheria and pertussis components will be used from 7 years of age.
- Hepatitis B vaccine can be caught up at any age

- Polio vaccine can be caught up at any age using the inactivated polio vaccine (IPV). Oral polio vaccine is not recommended for adult vaccination as the first dose of polio vaccine. IPV should be used first, and may be followed in subsequent doses by either IPV or OPV.
- *Haemophilus influenzae* b vaccine can be caught up until age 5.

What are the side-effects of the diphtheria, tetanus, pertussis and *Haemophilus influenzae* b vaccines?

Common mild side-effects include pain, swelling and redness at the vaccine injection site. Other common mild side effects are irritability, low grade fever, tiredness or occasionally mild vomiting.

Uncommon moderate side-effects include swelling of the arm or leg where vaccine was administered (risk of 1 in 30, more common following 4th and 5th dose); prolonged crying for more than 3 hours (risk of 1 in 1000); high fever (risk of 1 in 16000); seizures (risk of 1 in 14000); hypotonic hyporesponsive syndrome where children become lethargic with low muscle tone for a few hours, followed by full recovery (risk of 1 in 10000).

These side effects are likely due to the pertussis component of the vaccine. If these occur, the child can get diphtheria and tetanus

containing vaccines (for example, the Td vaccine), without the pertussis component, in future vaccinations.

Severe allergic reactions are very rare (less than 1/million) and medical care should immediately be sought if a severe reaction is suspected. Symptoms of severe allergy could include rash on skin (hives) together with swelling of face or throat, dizziness, weakness, fast breathing and fast heartbeat.

What are the chances of my child getting the disease even though they have been vaccinated?

The whole cell pertussis vaccine was the first vaccine widely used to prevent pertussis. Whole cell pertussis vaccine was prepared from the whole *Bordetella pertussis* organism that had been inactivated. The vaccine was effective in a high proportion of recipients, but frequently caused mild side effects such as redness and swelling at the injection site. The whole cell vaccine was replaced with the acellular pertussis vaccine in South Africa in 2009 with the aim of decreasing the risk of mild side effects. The acellular pertussis vaccine is prepared from small parts of the bacterium or toxins from the bacterium that have been inactivated. The acellular vaccine has lower efficacy (80-85%) than the whole cell vaccine. This means that 15-20 of 100 children vaccinated may still be susceptible

to catch the illness if they come into contact with it, but the disease should be milder than if they had not been vaccinated.

Hepatitis B vaccine is 95% effective in preventing infection and its chronic consequences. This implies 5 in 100 vaccine recipients would still have a risk of getting Hepatitis B.

Who should not receive diphtheria, tetanus, pertussis and *Haemophilus influenzae b* vaccines?

- Individuals who are allergic to any of the substances used to make the vaccine.
- Individuals who have had a severe reaction, seizures, collapse or uncontrolled crying for longer than 3 hours following a previous dose of the vaccine. (children may receive vaccines containing Tetanus and diphtheria components only, without pertussis component, in future vaccinations)
- Any child who is very sick e.g. hospitalized children. In this case, the doctor will determine when the vaccine should be given following adequate recovery.

Further information can be obtained online from:

DTP Hib:

- <http://www.cdc.gov/vaccines/hcp/vis/vis-statements/hib.html>
- <http://www.cdc.gov/vaccines/hcp/vis/vis-statements/dtap.html>
- <https://www.nlm.nih.gov/medlineplus/ency/article/007594.htm>

Hepatitis B:

- <http://www.cdc.gov/vaccines/vpd-vac/hepb/downloads/PL-dis-hepB-color-office.pdf>
- <http://www.who.int/mediacentre/factsheets/fs204/en/>
- <http://www.cdc.gov/vaccines/hcp/vis/vis-statements/hep-b.html>



Vaccines first given at 6, 10 and 14 weeks

Pneumococcal conjugate vaccine (PCV)

What is pneumococcal disease?

Pneumococcal disease is caused by the bacterium *Streptococcus pneumoniae* that infects the respiratory tract but can lead to severe infections of the blood, ears or brain. In South Africa, it is one of the leading cause of ear infections (otitis media) and meningitis. The disease is transmitted through tiny droplets of secretions from the nose and throat of infected persons.

What is the pneumococcal conjugate vaccine (PCV)?

The vaccine is made using sugars (polysaccharides) of the bacterial capsule of *Streptococcus pneumoniae*. There are 90 types of pneumococcal bacteria and the PCV 13 vaccine offers protection against 13 of them. The pneumococcal sugars of interest are attached (conjugated) to a carrier protein to improve the immune response to them.

PCV in South Africa

In 2008, PCV7, was introduced into the South African Expanded Program for Immunisation and was replaced in 2011 with a new type of vaccine, PCV13.

How PCV is given

The vaccine is given as an injection into the thigh.

The South African Expanded Program for Immunisation (EPI) recommends three doses in the first year of life:

- First dose at 6 weeks,
- Second dose at 14 weeks
- Third dose at 9 months.

What happens if my child missed a dose?

The number of doses required for catching up varies according to the age of the child. You should see a doctor who will advise on the appropriate catch-up plan.

What are the chances of my child getting the disease after getting the vaccine?

The Pneumococcal Conjugate Vaccine is very effective in preventing infection caused by the 13 strains that cause severe pneumococcal disease. The vaccine does not offer protection against types of pneumococcal bacteria that are not contained in the vaccine.

What are the side-effects of the Pneumococcal Conjugate vaccine?

Mild side effects that frequently occur include pain and swelling at the vaccine injection site, loss of appetite and mild fever.

Some moderate, less common side effects include: non-stop crying, drowsiness and high fever. Severe allergic reactions are very rare and

medical care should be immediately sought if a severe reaction is suspected.

Who should not receive PCV?

- People who are allergic to any of the substances used to make the vaccine.
- People who have had an allergic reaction to a previous dose of the vaccine or to a diphtheria vaccine.
- Any person who is very sick. In this case, the health professional will determine when the vaccine should be given after assessing if the patient has recovered well enough.

What are the trade names and who are the manufacturers of the vaccine?

- Prevnar13® (Wyeth/Pfizer)
- Synflorix® (GlaxoSmithKline)

Further information can be obtained online from:

- <http://www.cdc.gov/vaccines/hcp/vis/vis-statements/pcv13.html>
- <http://www.nejm.org/doi/full/10.1056/NEJMoa1401914#t=article>
- http://apps.who.int/iris/bitstream/10665/90380/1/WHO_IVB_13.10_eng.pdf

Rotavirus vaccine

What is Rotavirus?

Rotavirus is a major cause of diarrhoea worldwide. This diarrhoea can be mild or it can be serious, accompanied by fever and vomiting leading to severe dehydration. The virus is transmitted when faecal matter from a patient is ingested by a healthy individual through unclean hands, contaminated objects, food or water. There are 8 types of Rotavirus species – A-H. Type A causes >90% of rotaviral disease in humans and comprises multiple serotypes.

What is the rotavirus vaccine?

The rotavirus vaccine is made using live rotavirus A that has been weakened such that it cannot cause disease but stimulates the immune system to develop protection against rotavirus type A infection.

Rotavirus vaccine in South Africa

The rotavirus vaccine was first included in the South African Expanded Program for Immunisation in 2009.

How the rotavirus vaccine is given

The vaccine is administered as oral drops.

The South African Expanded Program for Immunisation (EPI) recommends two doses of Rotarix®:

- First dose at 6 weeks,
- Second dose at 14 weeks

What happens if my child missed a dose?

The catch-up schedule depends on which vaccine is used. Rotarix® can be given up to 24 weeks of age. Rotateq® first dose can be given up to 14 weeks of age and last dose must be administered by 8 months of age. Rotavirus vaccines should not be caught up later than these recommended ages.

What are the chances of my child getting the disease after getting the vaccine?

The Rotavirus vaccine is very effective in preventing infection but the vaccine does not offer protection against those types of Rotavirus that are not contained in the vaccine.

What are the side-effects of the rotavirus vaccine?

Mild side effects that frequently occur include mild diarrhoea or vomiting and irritability. Severe allergic reactions are very rare and medical care should be immediately sought if a severe reaction is suspected. Intussusception (a form of bowel obstruction) is a rare but severe complication of the rotavirus vaccine.

Who should not receive rotavirus vaccine?

- Children who are allergic to any of the substances used to make the vaccine.
- Children who have had an allergic reaction to a previous dose of the vaccine.

- Children with severe immune suppression
- Children with a history of intussusception, which is a type of intestinal obstruction.
- Any child who is very sick. In this case, the health professional will determine when the vaccine should be given after assessing if the patient has recovered well enough.

What are the trade names and who are the manufacturers of the vaccine?

- Rotarix®, (GlaxoSmithKline)
- Rotateq®, (Merck)

Further information could be obtained online from:

- http://www.nicd.ac.za/?page=rotavirus_faq&id=176
- <http://www.cdc.gov/vaccines/hcp/vis-statements/rotavirus.html>
- <http://www.who.int/immunization/diseases/rotavirus/en/>

Vaccines first given at 6 and 12 months

Measles vaccine

What is measles?

Measles is a contagious viral infection, usually affecting children. The disease starts with high fever and flu-like symptoms (cough, sore throat, nasal congestion, conjunctivitis). There may be white spots inside the mouth, on the inner cheeks. This is followed by a fine rash on the face, which spreads within 3 days to the rest of the body and usually lasts for 5-7 days. Severe complications, such as diarrhoea, dehydration, pneumonia, brain infection, blindness or death may follow. Severe disease mostly occurs among poorly nourished children, especially those with insufficient vitamin A, or those whose immune systems have been weakened by HIV or other diseases. Measles complications are unpredictable however, and can also affect children from high socioeconomic groups.

Does South Africa still have measles?

Yes! Measles has become much less common due to vaccination, but measles outbreaks still occur. South Africa had an outbreak of 18000 cases in 2009-2010. Measles is highly infectious and spreads very quickly.

The African region is hoping to eliminate measles by 2020. This means that we are hoping to have no more new measles infections in the region by that date. To meet that target, we need to vaccinate more than 95% of children in every district. Eliminating

measles would go a long way towards reducing the number of childhood deaths. In our parents and grandparents day, death from measles was very common. In some areas of Africa, mothers did not name their babies until measles season had passed, for fear the child would not live through the disease. We have made much progress since those days, but if we become complacent and stop vaccinating, measles will come back.

What is the measles vaccine?

Measles vaccine contains live virus that has been weakened (attenuated) such that it cannot cause disease but stimulates an immune reaction. It is available as a single vaccine or in a combination with other vaccines:

- Measles + rubella (MR vaccine)
- Measles + mumps + rubella (MMR vaccine)
- Measles + mumps + rubella + varicella (MMRV vaccine)

Measles vaccine in South Africa

There are two formulations of measles vaccine available in South Africa; the single vaccine and the measles, mumps and rubella vaccine. The vaccine is administered as an intramuscular or subcutaneous injection (MeasBio® must be given only subcutaneously) on the thigh or arm. The national Expanded Program on Immunization recommends measles vaccines at 6 months and 12 months of age. Until 2015

the vaccine was given at nine and 18 months of age. Some countries only administer the first dose from 1 year of age. The vaccine is less effective in infants less than one year old, so a minimum of two doses are essential. During outbreaks or mass campaigns, older children, adolescents or adults can also be vaccinated against measles.

What happens if my child missed a dose?

It is never too late to catch up measles vaccination. If a child (or adult) missed a dose at the recommended age, the individual can be vaccinated and brought up to date.

What are the chances of my child getting the measles even though they have been vaccinated?

After 2 doses of measles vaccine, 95% of individuals are protected against measles. It is still possible for a small number of vaccinated people to get measles, but the disease will be milder than in individuals who are not vaccinated.

What are the side-effects of the measles vaccine?

Common side effects include mild fever, tenderness or redness at the vaccine injection site. The measles vaccine often produces a mild fever with measles-like rash within a few days or weeks after vaccination. This reaction is normal and not a cause for concern.

Severe allergic reactions are possible but very rare. Medical care should be immediately sought if a severe reaction is suspected. The measles vaccine is safe and effective to protect the child from measles infection.

Who should not receive the measles vaccine?

The following groups of people should not be given the measles vaccine:

- Children with severe immune-suppression or immunodeficiency. (Measles vaccine should be given to HIV infected children unless they are severely ill)
- People who are severely allergic to any of the components of the vaccine.
- Pregnant women.

What are the trade names and who are the manufacturers of the vaccine?

- Rouvax® (Sanofi Pasteur)
- MeasBio® (Biovac)

Further information can be obtained from:

- <http://www.who.int/mediacentre/factsheets/fs286/en/>
- <http://www.who.int/immunization/diseases/measles/en/>
- http://www.nicd.ac.za/?page=measles_faq&id=43



Vaccines first given at 9 years

Human papillomavirus vaccine

Human papillomavirus vaccine

What is human papillomavirus?

Human papillomavirus (HPV) is a virus which is spread mainly through sexual intercourse. The virus can cause warts in the genital areas or can be asymptomatic. The virus predisposes to certain cancers, such as cancer of the cervix (cervical cancer) in females and cancer of the penis in males. Cervical cancer is a very common cancer in South Africa; in fact, in women it is the second most common cancer after breast cancer. There are more than 150 types of HPV, but the ones that most commonly cause cervical cancer are types 16 and 18 while those that most commonly cause warts include types 6 and 11.

What is the human papillomavirus vaccine?

The human papillomavirus vaccine contains non-infectious HPV proteins, from certain strains of HPV, in virus-like particles together with an adjuvant to boost the immune response. The proteins are produced in yeast (Gardasil®) or harmless bacteria (Cervarix®). There is a bivalent vaccine containing serotypes 16 and 18 (Cervarix®) and a quadrivalent vaccine containing serotypes 16, 18, 6 and 11 (Gardasil®).

What are side effects of the human papillomavirus vaccine?

Side effects include mild pain, redness and swelling at the injection site, nausea, vomiting, headache or fever. Episodes of fainting may occur.

Who should not get the human papillomavirus vaccine?

Patients with severe allergies to any vaccine components including yeast (used in production of Gardasil® vaccine).

If my child is vaccinated, can she still get cervical cancer?

Yes, although it is much less likely. HPV types 16 and 18 cause up to 70% of cervical cancer but there are other HPV types that may also cause cancer. Not all HPV types are included in the vaccine.

Should my son be vaccinated against human papillomavirus?

The quadrivalent vaccine (Gardasil®) prevents boys from being infected with the serotypes of HPV most likely to cause genital warts or penile cancers. Penile cancer is very uncommon, therefore although the vaccine is beneficial for boys, it is not yet included in the routine schedule for boys.

What are the trade names and who are the manufacturers of the vaccine?

- Gardasil® (Merck): contains virus-like particles of HPV types 6, 11, 16 and 18.
- Cervarix® (GlaxoSmithKline) contains virus-like particles of HPV types 16 and 18.

At what age should the vaccine be given?

In the school health program, HPV vaccines are given to pre-adolescent girls, usually from the age of 9 upwards. The vaccine should be given before the recipient is sexually active in order to be effective. Because immunity may decrease after a few years, the vaccines are not given during infancy, but rather to pre-adolescents. The vaccines are licensed for girls aged 9-45 years and Gardasil® for boys 9-26 years. Since 2014 the vaccine has been given to 9 year old girls in grade 4 in public schools in South Africa.

Section 3



Additional vaccines

Certain vaccines are not routinely included in the state infant immunization schedule, for cost or other reasons. Such vaccines may be provided by the private sector or employers. Examples are the influenza vaccine, MMR vaccine, chicken pox, meningococcal and travel vaccines.

What is influenza?

Influenza is a disease of the respiratory tract and is caused by influenza viruses.

Influenza usually starts suddenly and symptoms include fever/chills, sore throat, muscle aches, fatigue, cough, headache and runny or stuffy nose.

Certain groups of people are more likely to have severe disease if infected by the influenza virus. These include young children, people 65 and older, pregnant women, and people with certain health conditions (such as heart, lung or kidney disease, diabetes, asthma, nervous system disorders, or a weakened immune system).

What is influenza vaccine?

The influenza vaccine (flu shot) is an injection containing inactivated viral components. Other types such as live attenuated nasal spray vaccines are not available in South Africa.

New flu vaccines are made each year since the influenza viruses are constantly changing. The vaccine protects against a number of strains of virus that are most likely to cause disease during that particular year therefore protection

does not last from one year to the next. The influenza vaccine should be given each year before the start of the influenza season.

At what age should influenza vaccine be given?

- The influenza vaccination is not part of the EPI schedule.
- The injectable vaccine can be given as early as 6 months of age.
- For children between 6 months and 8 years of age who are receiving the influenza vaccine for the first time, two doses one month apart are given in a single year.

Where on the body is influenza vaccine given?

The injectable vaccine or flu shot is given on the arm (or the thigh of infants).

If my child receives the influenza vaccine, what is the chance he/she could still get the disease.

About two weeks are required following vaccination for the body to develop protection. During this time, it is possible to be infected with the influenza virus. Protection conferred by the vaccine lasts

for several months up to a year but a few individuals can still get the disease.

Are there any side-effects of influenza vaccine?

Side-effects sometimes occur after administration of the vaccine. These include pain, redness, or swelling where the shot was given, hoarseness, sore, red or itchy eyes, cough, fever, aches, headache, itching or fatigue.

Severe allergic reactions can occur a few minutes or hours following vaccine administration and usually presents as hives, swelling of the face and throat, difficulty breathing, increased heartbeat, dizziness and weakness.

Are there any people who should not receive the vaccine (contraindications)?

Yes, these include:

- People who had a serious allergic reaction to any of the substances contained in the vaccine e.g. egg allergy.
- People who have had Guillain-Barre syndrome.
- People who are seriously ill.

What are the trade names and who are the manufacturers of the vaccine?

- Trivalent inactivated injectable influenza vaccine: Vaxigrip® (Sanofi-Pasteur),
- Influvac® (Abbott), and Fluvax® (Biovac)

Further information can be obtained from:

- <http://www.cdc.gov/vaccines/hcp/vis/vis-statements/fluive.html>
- <http://www.cdc.gov/vaccines/hcp/vis/vis-statements/flu.html>



Why vaccinate against measles, mumps and rubella?

Measles, mumps and rubella (MMR) are contagious viral infections that mostly affect children. These infections can be mild but sometimes lead to serious complications or death.

What is measles?

See measles vaccination see measles vaccination on page 18

What is mumps?

The mumps virus causes a disease commonly seen in children and young adults. Mumps virus is transmitted through the air by tiny droplets from the nose or mouth of patients, or by direct contact with respiratory secretions from infected persons.

The illness usually starts with a few days of low grade fever, headache, tiredness, muscle pain and loss of appetite. This is followed by swelling of the parotid glands in the cheeks (parotitis). In a small proportion of individuals, mumps may result in infection of other organs, leading to complications like meningitis, paralysis, hearing loss, pancreatitis or infection of the testes, which may result in infertility. Complications are more common in adults than children.

What is rubella?

Rubella, commonly called "German measles" is a common viral rash in children. The infection is spread by tiny droplets from the nose or mouth of the patient, or by direct contact with infected respiratory secretions or body fluids. About half of rubella virus infections are asymptomatic. Some individuals may have influenza-like symptoms such as low grade fever, cough, nasal congestion, sore throat, mild red eye (conjunctivitis), lack of appetite and tiredness that lasts for a few days (2-5) before the rash appears. The rash first appears on the face and spreads rapidly to the chest and then to arms and legs. Complications of rubella include joint pain and brain infection (encephalitis). The most devastating consequences of rubella infection are foetal abnormalities that occur when a pregnant woman has rubella early in pregnancy. A pregnant woman who is exposed to an individual with rash must consult her doctor.

Measles, mumps and rubella (MMR) vaccine

MMR vaccine is a combination of live measles, mumps and rubella viruses that have been weakened such that they stimulate the immune system without causing illness. It is not part of the Expanded Program for Immunization (EPI).

How is the MMR vaccine administered?

The vaccine is administered as an injection under the skin or into the muscle of the arm. The first dose of MMR is recommended to children 12-15 months of age and the second doses at 4-6 years of age.

What are the side effects of the MMR vaccine?

Common side-effects of the vaccine include pain, redness or swelling at the injection site, rash or fever. Severe allergic reactions are very rare. Please seek immediate medical attention if a severe allergic reaction is suspected. A woman who receives the vaccine should avoid getting pregnant for one month after the vaccine administration.

Who should not take the MMR vaccine?

- People with weak immune systems, caused by HIV infection or other medical conditions.
- Anyone who has experienced a severe allergic response to a previous dose of MMR vaccine
- If you are allergic to the antibiotic neomycin or any other components of the vaccine
- Pregnant women
- People who are sick at the time the shot is supposed to be given should wait until they recover before getting MMR vaccine.

HIV infected children may be vaccinated unless they are severely immunocompromised.

What are the trade names and who are the manufacturers of the vaccine?

- Trimovax® (Sanofi Pasteur)
- Priorix® (GlaxoSmithKline)

Further information can be obtained at:

- <http://www.cdc.gov/travel/yellowbook/2012/chapter-3-infectious-diseases-related-to-rubella>
- <http://www.cdc.gov/vaccines/hcp/vis/vis-statements/mmr.html>



Additional vaccines

Varicella (chickenpox) vaccine

What is chickenpox or varicella?

Chickenpox is a viral illness caused by varicella zoster. Symptoms include itchy blisters on the skin. Occasionally chickenpox can cause complications like brain infection (encephalitis) or pneumonia. The same virus can reactivate in later life and cause painful blisters to reappear in one section of the body – this is known as shingles or herpes zoster.

What is the chickenpox vaccine?

The chickenpox vaccine is a live, weakened form of the Varicella zoster virus. The chickenpox vaccine is used in children to prevent them from getting chickenpox. (the chickenpox vaccine contains a much higher dose compared to the zoster vaccine, which is used in adults to prevent shingles). The risk of the virus reactivating as shingles in later life is lower following chickenpox vaccination than following infection with wild type chickenpox virus.

Who should receive the chickenpox vaccine?

Because children usually heal with no complications from chickenpox infection, the chickenpox vaccine is not included in the state vaccination schedule. It is available on request in the private sector.

What are the side effects of chickenpox vaccine?

Side effects include mild pain, redness or swelling at the injection site. There may be a mild rash. Febrile seizures are a rare complication.

Who should not receive the chickenpox vaccine?

The chickenpox vaccine is a live vaccine, so it should not be given to pregnant women, people with weakened immune systems or people on medication which dampens their immune systems. It should not be given to anyone severely allergic to neomycin or gelatin.



Meningococcal vaccine

What is meningococcal disease?

Meningococcal disease includes rash, meningitis (brain infection) and septicaemia (blood infection) caused by the bacterium *Neisseria meningitidis*. Meningococcal disease is rare in South Africa but when it occurs, it can rapidly lead to complications or death. Meningococcal disease is very common in certain parts of Sub-Saharan Africa known as “the meningitis belt”. There are different types of *Neisseria meningitidis*, known as types A, B, C, W135 and Y.

What is the meningococcal vaccine?

There are two types of meningococcal vaccine available in South Africa – a polysaccharide vaccine and a conjugate vaccine. The polysaccharide vaccine contains sugars from the *Neisseria meningitidis* bacterium that have been attached (conjugated) to carrier proteins to improve the immune response to the bacterium.

The polysaccharide vaccine is only useful for people above 2 years of age and protection only lasts for a year or two. The conjugate vaccine can be given to infants as young as 9 months of age and protection from this vaccine lasts for longer than the polysaccharide vaccine. The conjugate vaccine may eliminate carriage of the bacterium in the respiratory tract of healthy individuals. For these reasons the conjugate vaccine is preferable in most circumstances if available.

Who should receive the meningococcal vaccine?

Because meningococcal disease is rare in South Africa and the vaccine is quite expensive, meningococcal vaccination is not included in the state vaccine schedule. Vaccination is required by international travel law for pilgrims attending the Hajj in Mecca. It is also advisable that students in universities or colleges be given the vaccine. The vaccine is available for infants and adolescents in the private sector. The vaccine should also be considered for young adults attending tertiary education institutions if resources are available as this group is at increased risk of meningococcal disease.

What are the side effects of the meningococcal vaccine?

Side effects include mild pain at the injection site, redness, swelling, tiredness and headache. Diarrhoea and irritability may be seen in infants.

Who should not receive the meningococcal vaccine?

People who are severely allergic to any components of the vaccine.

Who are the manufacturers of meningococcal vaccine?

- Menomune® (Sanofi Pasteur) – polysaccharide vaccine against types A, C, W-135 and Y.
- Menactra® (Sanofi Pasteur) – conjugate vaccine against types A, C, W135 and Y.



This booklet aims to discuss the vaccines used in the routine infant vaccination schedule. Other vaccines are however licensed in South Africa and used in particular situations, such as for travellers or for post-exposure prophylaxis. A brief overview is given below, with links to appropriate sources for further information.

Travel vaccines

Examples of vaccines that may be recommended to travellers include cholera vaccine, yellow fever vaccine, typhoid fever vaccine, Hepatitis A vaccine and meningococcal vaccine.

These are vaccines targeted for individuals who travel to a geographic location that has diseases not routinely found in their home country. Vaccinating before you leave lessens the risk of getting the disease when you are on your trip. It may also prevent you carrying the disease back home to your community. Vaccination doesn't replace healthy practices, such as treating dirty water, cleaning fruits and vegetables before cooking and avoiding potentially contaminated foods and water. Always remember "boil it, cook it, peel it or forget it!"

For vaccination guidelines for travellers to or from South Africa, consult the following sources:

- <http://www.who.int/ith/en/>
- <http://www.sanhnnet.co.za>

Post-exposure prophylaxis vaccines

Some vaccines are not included in the universal vaccination schedule for all infants, but are available if a person is exposed to a certain infection. Examples include the rabies vaccine given after injury from an animal that may have rabies.

Often a preparation of antibodies taken from individuals who have recovered from the disease is available. These "hyperimmune globulins" are very expensive and in limited supply. Immune globulins will only be used in specific circumstances of high risk – for example varicella immune globulin may be used for chickenpox exposure in a person with a weakened immune system. Hepatitis B immune globulin for a baby born to a mother with hepatitis B or a health care worker with a needlestick injury. A commonly used immune globulin is rabies immune globulin – this is given to people bitten or scratched by an animal who may have rabies, in addition to a course of rabies vaccines. The rabies immunoglobulin used in South Africa is prepared from immunised individuals.

Vaccines for specific groups

There are many other vaccines recommended for specific target groups, such as transplant recipients or those without a functioning spleen. People in certain occupations such as health workers, veterinarians or sewerage workers may require additional vaccinations. There are certain vaccines available in the private sector for elderly individuals. Please consult your doctor for individual information if required.

Section 4



Frequently asked questions and helpful tips regarding vaccination

Frequently asked questions

about allergies, mass campaigns and missed doses

What if my child has allergies?

Children with mild allergies can be vaccinated. A mild allergy comprises symptoms such as itch, redness or small rashes on exposure to a particular substance. Children with eczema or asthma can be vaccinated. Discuss with your doctor if you have a child who has had a severe allergy prior to vaccination. A severe allergy is one that has resulted in swelling of the lips, nose or eyes, closing of the throat, wheezing, rapid breathing, rapid pulse rate or fainting. If the child has had a severe allergic reaction to a previous vaccine or to substances inside a particular vaccine, that vaccine should be avoided in future. Other vaccines that do not contain the substance causing the allergy can still be given. Other children in the same family can still be vaccinated.

If my child is allergic to eggs, can they receive the influenza vaccine?

It depends on how severely allergic they are. In most cases, the egg allergy is a mild allergy and the flu vaccine can still be given. If your child has eaten baked goods containing eggs (such as Marie biscuits) the vaccine can be given. If your child has never eaten eggs previously, the vaccine can be given. If your child has had only mild skin rashes or nausea or diarrhoea from eggs, he/she can still receive the vaccine.

If my child is allergic to antibiotics, can they still receive vaccines?

It depends on how severely allergic they are, and to which antibiotic. Antibiotics are only present in very small amounts in vaccines. The antibiotics have been used in the manufacturing process to prevent bacterial infection of the vaccine during production. Antibiotics used are not those commonly given to children to treat infections, and do not include penicillins, cephalosporins or sulpha drugs. If your child is allergic to penicillins, cephalosporins or sulpha drugs, your child may be safely vaccinated. The antibiotics that may be present in vaccines include neomycin, gentamycin and polymixin B. If your child is allergic to neomycin, gentamycin or polymixin B – depending on how severely allergic they are (see above), you may need to avoid vaccines containing these antibiotics. You can check the package insert of the vaccine to check whether a particular vaccine contains these antibiotics. Other vaccines not containing the antibiotic to which your child is allergic can still be given. If your child has had any severe allergies (see above) a doctor should be consulted prior to vaccination.

My child is allergic to yeast. Can my child still be vaccinated?

Most vaccines do not contain yeast. The hepatitis B vaccine and one type of HPV vaccine (Gardasil®) are produced in yeast cells so may contain traces of yeast. Whether your child can have the vaccines depends on how severely allergic they are. If they have had only gastrointestinal symptoms (nausea, vomiting or constipation) or

skin rashes, they may receive the vaccines. If they have had a life-threatening reaction (see above for symptoms) they should not receive vaccines containing yeast.

What is a mass vaccination campaign?

A mass vaccination campaign is when vaccines are administered to a large population over a short amount of time. Mass vaccination campaigns are used to 'catch up' the population to ensure high population immunity to disease threats. Mass campaigns can also be used to control outbreaks of infectious diseases as well when a new vaccine is introduced into the national immunization program. Mass campaigns target a wide population group including those who may not have accessed routine care, such as immigrants. During mass campaigns, the campaign dose is often not recorded on the child's road to health card. The campaign dose does not replace other doses of the same vaccine according to the routine schedule on the child's chart.

Do I need to take part in a mass campaign if my child is already vaccinated?

Yes, you should. Vaccines are very effective but not 100% effective, meaning that of every 100 children vaccinated, there are 5 or 6 who are not immune to the illness. Every year this number builds up, creating a group of non-immune individuals that might become big enough to allow a disease epidemic. Mass campaigns give a booster dose to those previously vaccinated, which means the campaign will catch up those few children who may not have become immune after their routine vaccinations.

If your child has received the same vaccine within 4 weeks of the campaign dates, the campaign dose is not likely to be effective and the child need not receive that particular vaccine via the campaign. There is however no harm done by receiving an additional dose within 4 weeks of a prior dose. There are sometimes other medications given as part of the campaign, such as deworming medicines or vitamin A, which your child should still receive.

I missed my appointments and my child has not received all his vaccines, what should I do?

It's never too late to vaccinate. You should take your child for catch up vaccinations. This can be done at any age. Your health provider will advise you on the appropriate schedule for catch up vaccines. Some changes may be made to the vaccine schedule.

Examples of changes to the schedule include: Rotavirus vaccine is not given after 24 weeks of age. The vaccine against Haemophilus influenzae b is not given after 5 years of age because by that age the risk period for severe disease has passed. The dose of the diphtheria, pertussis and tetanus toxoid vaccine changes after age seven years – after which the Tdap (adult dose) will be given. For polio vaccine – in adults the inactivated vaccine is preferred to the live vaccine for a first vaccination. BCG is usually not caught up, as South African children have likely already been exposed to TB and the vaccine is intended for use prior to exposure to TB.

It is never too late to vaccinate for measles, pneumococcus and hepatitis B. In fact, adult vaccination is becoming increasingly favoured. Tetanus immunity should be boosted every ten years and some countries recommend Tdap in every pregnancy to protect the infant. Some countries recommend pneumococcal vaccination for the elderly.

Are vaccines safe in pregnancy?

The overriding principle is that for pregnant women, live vaccines should be avoided but non-live (inactivated) vaccines can be given. For specialist advice for particular medical conditions, please consult a doctor. Certain vaccines are particularly recommended for pregnant women, such as influenza vaccines and Tdap-IPV (tetanus, adult dose diphtheria, acellular pertussis and IPV vaccine).

A table showing common live and non-live vaccines is given below.

Live vaccines	Non-live vaccines
BCG	DTaP (and Tdap)
Oral polio	<i>Haemophilus influenzae b</i>
Rotavirus	Inactivated polio
Measles (or MMR)	Inactivated polio
Varicella	Hepatitis B
Zoster	Pneumococcal
	Influenza (injectable)

My child has a weakened immune system (immune-compromised) – can he be vaccinated?

The principle is that for people with weak immune systems such as those born with immune deficiencies, or those recovering from cancer or taking medication which dampens down their immune system, live vaccines should be avoided but non-live (inactivated) vaccines can be given. In fact, the non-live vaccines become even more important to protect the person from possible future infections.

It is possible that the immune response to vaccines may not be as strong as in a health person and the child may need re-vaccination once they are fully recovered. It is also important to check that all other children AND adults in the household have been vaccinated, in order to protect the child from catching diseases from them. If household members require vaccination, inactivated vaccines should be given but a doctor should advise regarding whether live vaccines can be given to the household members. Some live vaccines given to household members may prove a risk to a child with a severely weakened immune system. See table 1 above for list of common live and non-live vaccines.

Resources

- World Health Organization recommendations for interrupted or delayed primary immunization – see table 3 at http://www.who.int/immunization/policy/immunization_tables/en/
- Centres for Disease Control Vaccine schedules in the United States <http://www.cdc.gov/vaccines/default.htm>



Hints and tips

for parents and care-givers preparing for vaccination visits

- Have your vaccination card (road to health card) with you so that it can be updated.
- Your baby should be wearing something that allows for easy access to the upper leg and upper arm.
- Remain calm. Babies pick up on your stress and will become unnecessarily anxious and scared at the clinic.
- Be prepared to offer the child comfort directly after the vaccination. For young children, breast-feed or bottle-feed immediately after the injection to comfort the infant. If breast-feeding, you can also ask the nurse to administer the vaccines whilst the baby is on the breast. For older children, bring a sweet or treat to reward them directly after the vaccination.
- Bring a book or the child's favorite toy to use as a distraction after vaccination.
- Ask the nurse to explain possible side-effects to you so you know what to look out for and how to manage these at home.
- Don't plan anything else for the day of vaccination. Take your baby home and keep him quiet and relaxed, rather than taking the child out to errands or play-dates.
- If you wish, you may apply Arnica cream to the injection area to help with bruising.
- If your child becomes feverish following vaccination, you may give paracetamol to decrease the fever. It is not necessary to give paracetamol in advance of vaccinations.
- If you notice anything that concerns you following vaccination, contact your doctor/nurse.
- Don't build up anticipation or anxiety about the injection; it is only a small part of the health visit. Most of the visit will be about weighing and measuring the child, discussing nutrition and general health. As soon as your child is old enough, engage them in conversation about visits to their health worker, such as 'we are visiting the clinic so that the nurse can check you are growing big and strong'.
- At home, when your children are misbehaving, do not use the clinic as a threat (for example, "if you're naughty you'll go the clinic for an injection!") – this builds fear for next time.
- Reward the child for being so brave during the vaccination (regardless of how much they fussed or cried) and praise them in front of others – build their confidence for next visit.

Glossary of terms

Adjuvant	an adjuvant is a substance that is added to a vaccine to increase the body's immune response to the vaccine
Conjugate vaccine	a conjugate vaccine is created by attaching a weak (polysaccharide or sugar) antigen to a carrier protein (preferably)
Immunization	is the process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. Immunization can also occur as a consequence of natural infection
Inactivated vaccine	an inactivated vaccine (or killed vaccine) consists of virus particles which have been grown and then killed
Live attenuated vaccine	a live attenuated vaccine is a vaccine created by modifying an infectious agent while still keeping it alive so that it becomes harmless or less virulent
Serotype	serotypes are groups within a single species of microorganisms, such as bacteria or viruses, which share distinctive surface structures
Vaccination	vaccination is the injection of a killed or weakened organism into the body so that the body produces immunity against that organism

Abbreviations

BCG	Bacille Calmette Guerin vaccine
DTaP-IVP-Hib-HBV	(Hexavalent): Diphtheria, tetanus, acellular pertussis/inactivated polio/Haemophilus influenza type b and hepatitis B vaccine
DTaP	Diphtheria, tetanus and acellular pertussis vaccine
HBV	Hepatitis B vaccine
HPV	Human papillomavirus vaccine
MCV	Meningococcal conjugated vaccine
MMR	Measles, mumps and rubella vaccine
OPV	Oral polio vaccine
PCV	Pneumococcal conjugated vaccine
RV	Rotavirus vaccine
Td vaccine	tetanus & reduced amount of diphtheria vaccine
Tdap-IPV	(Quadrivalent): Tetanus & reduced amounts of diphtheria and acellular pertussis with inactivated polio vaccine

Appendix A.

Department of Health routine immunization schedule

Expanded programme on immunisation – EPI (SA) revised childhood immunisation schedule from December 2015

Age of child	Vaccines needed	How and where it is given
At birth	BCG Bacilles Calmette Guerin OPV(0) Oral Polio Vaccine	Right arm Drops by mouth
6 weeks	OPV(1) Oral Polio Vaccine RV(1) Rotavirus Vaccine DTaP-IPV-Hib-HBV(1) Diphtheria, Tetanus, Acellular Pertussis, Inactivated Polio Vaccine and Haemophilus Influenzae Type B and Hepatitis B Combined PCV(1) Pneumococcal Conjugated Vaccine	Drops by mouth Liquid by mouth Intramuscular/left thigh Intramuscular/ right thigh
10 weeks	DTaP-IPV-Hib-HBV(2) Diphtheria, Tetanus, Acellular Pertussis, Inactivated Polio Vaccine and Haemophilus Influenzae Type B and Hepatitis B Combined	Intramuscular/left thigh
14 weeks	RV(2) Rotavirus Vaccine* DTaP-IPV-Hib-HBV(3) Diphtheria, Tetanus, Acellular Pertussis Inactivated Polio Vaccine and Haemophilus Influenzae Type B and Hepatitis B Combined PCV(2) Pneumococcal Conjugated Vaccine	Liquid by mouth Intramuscular/left thigh Intramuscular/right thigh
6 months	Measles Vaccine (1)**	Subcutaneous/left thigh
9 months	PCV(3) Pneumococcal Conjugated Vaccine	Intramuscular/right thigh

*Rotavirus Vaccine should NOT be administered after 24 weeks

**Do not administer with any other vaccine

Continued on following page ...

Department of Health routine immunization schedule (continued)

Age of child	Vaccines needed	How and where it is given
12 months	Measles Vaccine (2)**	Subcutaneous/right arm
18 months	DTaP-IPV-Hib-HBV (4) Diphtheria, Tetanus, Acellular Pertussis, Inactivated Polio Vaccine and Haemophilus Influenzae Type B and Hepatitis B Combined	Intramuscular/left arm
6 years (both boys and girls)	Td Vaccine Tetanus and reduced strength of Diphtheria Vaccine	Intramuscular/left arm
12 years (both boys and girls)	Td Vaccine Tetanus and reduced strength of Diphtheria Vaccine	Intramuscular/left arm

*Rotavirus Vaccine should NOT be administered after 24 weeks

**Do not administer with any other vaccine



Appendix B.

Comparison of state and private vaccination schedules in South Africa.

Courtesy of Amayeza Information Centre: 0860 160 160

Vaccine Schedules for South Africa for 2016, Compiled by Amayeza Info Services' Vaccine Helpline:

Age of child	EPI Schedule	Private
At birth	OPV(0) ¹ BCG	OPV(0) ¹ BCG
6 weeks	OPV(1) ¹ RV(1) PCV(1) DTaP-IPV-Hib-HBV(1)	OPV(1) ¹ RV(1) PCV(1) DTaP-IPV-Hib-HBV(1)
10 weeks	DTaP-IPV-Hib-HBV (2)	RV ² (2) PCV(2) DTaP-IPV-Hib-HBV (2)
14 weeks	RV(2) PCV(2) DTaP-IPV-Hib-HBV (3)	RV ² (2 or 3) PCV ³ (3) DTaP-IPV-Hib-HBV (3)
6 months	Measels ⁴ (1)	Not applicable
9 months	PCV(3)	Measles or MMR ³ (1) MCV (1)
12-15 months	Measles (2) ⁴ at 12 months	PCV(4) ⁶ MMR (1 or 2) Varicella ⁷ (1) Hepatitis A (repeat 6 months later) MCV (2)

Continued on following page

Comparison of state and private vaccination schedules in South Africa. (continued)

Age of child	EPI Schedule	Private
18 months	DTaP-IPV-Hib_HBV (4)	DTaP-IPV-Hib_HBV (4)
5-6 years	Td vaccine (6 years)	DTaP or Tdap-IPV MMR (2 or 3) Varicella (2)
9 years	HPV ⁸	HPV ⁹ (from 9 years)
12 years	Td vaccine	Tdap-IPV ¹⁰

General:

- (0) birth dose which doesn't count as part of primary series
- (1) First dose in a series
- (2) Second dose in a series
- (3) third dose in a series
- (4) Fourth dose - a booster

As Infanrix is not available in 2016, schedules specific for this product have been omitted

Continued on following page

Courtesy of Amayeza Information Centre

Referenced notes (Superscripts)

1. On the 12th of April, no more trivalent OPV(t-OPV) will be administered. Bivalent OPV (b-OPV) will be used instead. This is part of the process to eradicate polio worldwide by 2018.
2. If pentavalent rotavirus vaccine is used, then 3 doses are required, 6,10 and 14 weeks and 9 months.
3. A 3 dose series of PCV can also be used, as according to the EPI. i.e. 6 and 14 weeks and at 9 months.
4. The EPI has introduced a new measles vaccine that cannot be given at the same time as other vaccines, It is therefore given at 6 and 12 months. It must also be given subcutaneously.
5. In private sector, there will be sufficient Rouvax[®] for 2016 and so it can still be given at 9 months. Once stocks have been depleted, MMR can be used at 9 months (off label) and again at 15 months. Alternatively the state stock can be given at 6 and 12 months.
6. When Synflorix[®] is used, the 4th dose can be given from 9.5 months provided it has been 6 months since the last dose.
7. Chickenpox vaccine can be given any time from 9 months of age, but is probably most effective if given over the age of 12 months. If not given on the same day as Rouvax[®] (measles vaccine), must then be separated by at least one month. Must not be given at the same time as Measbio[®] - separate by at least one month.
8. HPV - bivalent vaccine for girls only. 2 doses six months apart. given to grade 4 girls in public schools.
9. HPV - quadrivalent vaccine - for boys and girls. Course consists of 2 doses, six months apart for girls 9-14 years of age or doses - 0,1 and 6 month schedule) for older girls.
10. If not given at six years as products are currently only licensed as a single dose.

As Infanrix is not available in 2016, schedules specific for this product have been omitted

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Trade names

Antigen	Trade Name	Age Group
BCG	BCG®	Usually at birth only but in certain cases up to 1 year
Chickenpox	VARILRIX®	9 months and older
DTaP	INFANRIX®	6 weeks to 7th birthday (not usually used for < 2 years of age)
DTaP-IPV-HBV/Hib DTaP-IPV-Hib-HBV	INFARIX-HEXA® (NOT AVAILABLE IN 2016) HEXAXIM®	Children 8 weeks to 2 years 6 weeks to 5 years
Hepatitis A	AVAXIM 80® OR HAVRIX JUNIOR®	1-15 years
Hepatitis B (HBV)	HEBERBIOVAC®, EUVAX® OR ENGERIX-B®	0-adulthood (dose according to age)
HPV	GARDASIL® (QUADRIVALENT) OR CERVARIX® (BIVALENT)	Gardasil ages 9-45 years (girls and women) Gardasil ages 9-26 years (boys and men) Cervarix 9 years and older
MCV (A,C,W,Y)	MENACTRA®	9 months - 23 months; 2 doses 3 months apart > 2 years - 55 years - a single dose
Measels	ROUVAX® MEASBIO®	9 months and older (in private sector) 6 months and 12 months on the EPI. Must be given subcutaneously. Not to be given at the same time as other vaccines
Measels, Mumps, Rubella (MMR)	TRIMOVAX® OR PRIORIX®	1 year - adulthood may be given from 9 months if no measles vaccine is available
OPV	OPV-MERIEUX® OR POLIORAL® trivalent OPV will be replaced by bivalent OPV in April	0-Adulthood (not generally recommended in adulthood due to VAPP - vaccine associated paralytic polio)

As Infanrix is not available in 2016, schedules specific for this product have been omitted

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Courtesy of Amayeza Information Centre

Antigen	Trade Name	Age Group
Pneumococcol (PCV)	PREVENAR-13® SYNFLORIX®	Children from 6 weeks - no upper age limit Children 6 weeks to 5 years
Rotavirus (RV)	ROTARIX® ROTATEQ®	First dose from 6 weeks, second before 24 weeks First dose from 6 weeks of age and by 12 weeks, last dose before 32 weeks
Td	DIFTAVAX®	6 years and older
Tdap-IPV	ADACEL QUADRA® BOOSTRIX TETRA®	From 3 years of age From 4 years of age

Other paediatric vaccines available, for use in certain situations.

- Hiberix® (Hib - Haemophilus influenzae type b): Used up to 5 years of age
- Twinrix® (Hepatitis A + Hepatitis B)

As Infanrix is not available in 2016, schedules specific for this product have been omitted

Courtesy of Amayeza Information Centre

Notes





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