



Childhood Immunisation

Contents

Introduction	1
What is immunisation?	2
What is a vaccine?	2
Different types of vaccines	2
How safe are vaccines?	3
How the safety of vaccines is monitored in New Zealand	3
How well do vaccines work?	3
Why do we still need vaccines?	4
Community immunity	4
Breastfeeding and immunisation	4
The National Immunisation Schedule	5
The National Immunisation Schedule protects children against these diseases	5
Other immunisations for targeted groups	7
Starting immunisations at six weeks of age	8
How vaccines are given	8
Combined vaccines	8
Your child may have a mild reaction after immunisation	9
Rare allergic reactions following immunisation, eg, anaphylaxis	10
Are there some children who should not be immunised?	10
How long do immunisations last?	11
If my child has had any of the diseases, does my child still need to be immunised? ..	11
Do children have to have all the immunisations?	12
Do healthy children need to be immunised if they are kept away from other children who are sick?	12
Immunisation records and the Immunisation Certificate	12
What the Immunisation Certificate is used for	13
The National Immunisation Register (NIR)	13
Tables showing the diseases and disease versus vaccine risks	13
Hepatitis B	14
Diphtheria	15
Tetanus	16
Pertussis (whooping cough)	17
<i>Haemophilus influenzae</i> type b (Hib)	18
Poliomyelitis (polio)	19
Measles	20
Mumps	21
Rubella	22
Pneumococcal disease	23
Human Papillomavirus	24
Source information	inside back cover
When you take your children to be immunised	back cover
For more information about immunisation	back cover



**Protect your
child and your
family by having
your children
immunised**

Introduction

This booklet is designed to help you make an informed decision about immunisation. The back page contains further sources of information about immunisation, including websites and organisations you can contact. Your health care provider will also be able to discuss immunisation with you.

Immunisation is a way of preventing infectious diseases throughout a person's life. The National Immunisation Schedule is regularly updated to make sure that New Zealand's children receive safe and effective vaccines.

All childhood immunisations are free in New Zealand. All immigrant and non-resident children are eligible for free immunisations and free Well Child Tamariki Ora services, regardless of their immigration and citizenship status.

The World Health Organization and the Ministry of Health recommend that you immunise your children. The immunisations begin when your child is six weeks old. (See page 6 for The National Immunisation Schedule.)

To be fully protected, children need to have all the immunisations in the series.

If the immunisations are given at the recommended age, your child can be protected as early as possible from a range of serious diseases. The Ministry of Health supports immunisation but it is your choice whether or not you agree to your child being immunised.

The immunisations your children receive will be recorded in their *Well Child Tamariki Ora Health Book* and the National Immunisation Register. Children require an Immunisation Certificate (see page 12) before they attend an early childhood service or start school.

The *Well Child Tamariki Ora Health Book* is a taonga/treasure – keep it safe and secure as it may be required in the years ahead, for example, to show the Immunisation Certificate at an early childhood service or school, or when your child is older and travels to other countries for study or work.

What is immunisation?

The body's immune system fights illness and infection. When a harmful organism, eg, a virus or bacteria, enters the body, it is usually attacked by the immune system. The immune system has a range of cells and antibodies to fight the infection.

The first time an organism enters the body, the immune system is not prepared. It takes time for the body to develop protection. During this time, the person becomes ill. As the antibodies are made, the person recovers. The immune system remembers the organism. If it enters the body again, it is usually controlled before the person becomes ill because the body is immune to the illness or disease. Active immunisation uses vaccines to stimulate the body to make these special cells and antibodies without the need to become ill with the disease.

What is a vaccine?

A vaccine is a preparation which induces the body to produce special cells and antibodies against disease-causing organisms. The vaccine contains a killed or a weakened form of the organism, or a part of the organism. When the vaccine is injected into the body, the immune system responds by developing protective cells and antibodies. If the person comes into contact with the disease, these cells and antibodies should protect them from getting sick.

Different types of vaccines

There are generally three types of vaccines:

- live vaccines: bacteria or viruses that have been weakened so that they cannot cause disease, eg, measles, mumps and rubella
- killed (inactivated) vaccines: bacteria and viruses that have been killed or inactivated, eg, polio vaccine
- subunit vaccines: bacterial toxins that have been made harmless, eg, diphtheria and tetanus or parts of bacteria or viruses, eg, *Haemophilus influenzae* type b (Hib) and hepatitis B.

Vaccines may also contain:

- substances that help the body respond to the vaccine
- preservatives
- traces of the materials that are used during manufacture.

The very small amounts of these substances that are in the vaccines do not cause any harm.

How safe are vaccines?

Strict procedures are followed when vaccines are made. Before a vaccine can be licensed for use, it goes through large trials, sometimes with tens of thousands of people. Throughout all of these processes, safety is monitored very closely. The clinical trials with volunteers take several years.

Before a vaccine is approved for use in New Zealand, the manufacturer must demonstrate its safety and effectiveness to the satisfaction of Medsafe, a division of the Ministry of Health.

How the safety of vaccines is monitored in New Zealand

After a vaccine is introduced, its safety continues to be monitored for the duration of its use. The safety of vaccines is monitored internationally using many different methods. In New Zealand, any event following administration of a vaccine can be reported to the Centre for Adverse Reactions Monitoring (CARM) at Otago University, usually by your doctor or nurse. If you are worried about your child following an immunisation, contact your doctor.

You can also report a suspected reaction to CARM by calling (03) 479 7247 or reporting online (<https://nzphvc-01.otago.ac.nz/adr/>).

The information provided to CARM by doctors, nurses and parents will assist in identifying those children who should receive follow-up immunisation in a controlled environment, such as a hospital.

Mild reactions such as mild fever, pain, or redness where the injection was given are usually not reported to CARM (see page 9 for information on mild reactions).

Any serious events may also be recorded on the National Immunisation Register (NIR) (see page 13 for more information on the NIR).

In addition to this type of safety monitoring, there are ongoing studies that compare vaccinated with unvaccinated people to ensure the vaccines we use are as safe as possible.

How well do vaccines work?

Studies have shown that if all recommended doses of vaccines are given, they will protect 80–95 percent of the children who are immunised. For example, the pertussis (whooping cough) vaccine is effective at preventing disease in 84 percent of children and the measles vaccine in 90–95 percent of children.

A very small number of children who are immunised do not develop strong immunity, and they may still become ill with one of the diseases. If that happens, they usually have a milder illness than people who have not been immunised. More than one dose of some vaccines is needed for full protection. Booster doses may also be required in later years to maintain immunity, eg, against tetanus.

Why do we still need vaccines?

Vaccines have been very successful at reducing the occurrence of several diseases in New Zealand and worldwide. However, some diseases, such as whooping cough and pneumococcal disease, are still relatively common in New Zealand, and we experience outbreaks of others, such as measles, so it is important to continue vaccinating against them.

Other diseases have virtually been eliminated from New Zealand, but still occur in other parts of the world. Because international travel is so common, the diseases can be brought into the country. Examples of these diseases include polio, rubella and diphtheria.

Tetanus exists in the environment but is not passed from one person to another. We can never eliminate tetanus from the environment, and therefore vaccination against it will always be required.

Community immunity

Community immunity is an important part of protecting the community against disease. People who have not been immunised are often protected by community immunity because immunised people do not usually get sick from an illness they are vaccinated against. This prevents infection from circulating in the community and helps to prevent an unimmunised person, those too young to be immunised and those who cannot receive a vaccine for some reason, from becoming infected.

Approximately 95 percent of the people in the community must be immunised to achieve community immunity against diseases such as measles and whooping cough. If 95 percent of children in the community are immunised, then those who do not develop strong immunity have a smaller chance of becoming infected, because of community immunity.

Breastfeeding and immunisation

Breastfeeding helps to protect baby against a range of infections, particularly stomach bugs. Also, for some diseases that mothers have been exposed to or immunised against, protective antibodies may be passed to the baby either before birth or in the breast milk. Protection passed from mother to baby is only temporary, and babies will need to develop their own protection. Mothers do not pass on protection against every disease they have been exposed to, therefore immunisation is still important, even when the baby is breastfeeding. There is some evidence to show that breastfed infants make stronger responses to some vaccines. Breastfeeding is not an alternative to immunisation, and both contribute to the health of babies.

The National Immunisation Schedule

The National Immunisation Schedule is the series of free vaccines available in New Zealand.

Some vaccines are also offered as targeted programmes, for babies, children and adults at higher risk of certain diseases (see page 7).

The table on the following page shows the vaccines that are offered at each age and the number of injections. The vaccine trade names are in brackets.

The National Immunisation Schedule protects children against these diseases

- 1 hepatitis B
- 2 diphtheria
- 3 tetanus
- 4 pertussis (whooping cough)
- 5 *Haemophilus influenzae* type b (Hib)
- 6 poliomyelitis (polio)
- 7 measles
- 8 mumps
- 9 rubella
- 10 pneumococcal disease
- 11 human papillomavirus (HPV) – girls only

The injections will be given by your doctor or nurse.

(See page 14 for more information on these diseases).



The National Immunisation Schedule

Age	Diseases covered and Vaccines
6 weeks	Diphtheria/Tetanus/Whooping cough/Polio/ Hepatitis B/ <i>Haemophilus influenzae</i> type b 1 injection (INFANRIX [®] -hexa) Pneumococcal 1 injection (SYNFLORIX [®])
3 months	Diphtheria/Tetanus/Whooping cough/Polio/ Hepatitis B/ <i>Haemophilus influenzae</i> type b 1 injection (INFANRIX [®] -hexa) Pneumococcal 1 injection (SYNFLORIX [®])
5 months	Diphtheria/Tetanus/Whooping cough/Polio/ Hepatitis B/ <i>Haemophilus influenzae</i> type b 1 injection (INFANRIX [®] -hexa) Pneumococcal 1 injection (SYNFLORIX [®])
15 months	<i>Haemophilus influenzae</i> type b 1 injection (Act-HIB) Measles/Mumps/Rubella 1 injection (M-M-R [®] II) Pneumococcal 1 injection (SYNFLORIX [®])
4 years	Diphtheria/Tetanus/Whooping cough/Polio 1 injection (INFANRIX [™] -IPV) Measles/Mumps/Rubella 1 injection (M-M-R [®] II)
11 years	Tetanus/Diphtheria/Whooping cough 1 injection (BOOSTRIX [™])
12 years girls only	Human papillomavirus 3 injections given over 6 months (GARDASIL [®])
45 years	Tetanus/Diphtheria 1 injection (ADT booster)*
65 years	Tetanus/Diphtheria 1 injection (ADT booster)* Influenza 1 Injection (annually)

*While the ADT booster vaccine is free at 45 and 65 years, you may need to pay for the visit (contact your doctor or nurse for details).

Other immunisations for targeted groups

Immunisations which may be given at birth

Hepatitis B vaccine and hepatitis B immunoglobulin (antibodies) are given at birth to babies of mothers who carry the hepatitis B virus. This is to ensure that the babies do not become infected with hepatitis B. It is important that these babies continue with the usual National Immunisation Schedule at six weeks, three and five months of age, and complete their immunisations on time.

Babies at higher risk of tuberculosis (TB) will be offered BCG (Bacillus Calmette-Guérin) immunisation at birth if they:

- will be living in a house or family/whānau with a person with either current TB or a past history of TB
- have one or both parents or household members or carers who (within the last five years) have lived for a period of six months or longer in a country where TB is common*
- will be living for three months or longer (during their first five years) in a country where TB is common* and will be likely to be exposed to those with TB.

Your lead maternity carer or doctor will discuss your baby's TB risk with you.

*The Ministry of Health website contains a list of countries where TB is common (www.moh.govt.nz/immunisation).

TB causes disease in the lungs but any part of the body can be affected.

Influenza immunisation

Influenza is a viral infection spread by coughing and sneezing. The symptoms include high fever and muscle aches. Influenza immunisation is not on the National Immunisation Schedule for all children, but it may be recommended for children with certain ongoing medical conditions. Ask your doctor for more information.

Pneumococcal immunisation for children at high risk of pneumococcal disease

Children under five years with certain ongoing medical conditions will be offered additional vaccines to protect against pneumococcal disease. See the pneumococcal disease table (on page 23) for information about the disease.

Your doctor or nurse will discuss these vaccines, and the recommended timing, with you.

Pre- and post-splenectomy immunisation

Individuals who have had their spleens removed or are due to have their spleens removed are at increased risk of complications from certain diseases. Therefore, babies, children and adults, pre- or post-splenectomy, will be offered vaccines to protect against pneumococcal, meningococcal and Hib disease.

Your doctor or nurse will discuss these vaccines, and the recommended timing, with you.

Starting immunisation at six weeks of age means babies are protected at the earliest possible time

Starting immunisations at six weeks of age enables your baby to start developing protection as soon as possible, particularly at a time where they are most vulnerable. Your baby comes into contact with millions of viruses and bacteria every day, and their immune systems are constantly responding to these. Immunisation makes use of this natural process. A small baby has the same vaccine dose as a large baby. There is no increased risk of reaction. Babies who are born early (preterm) usually receive their immunisations at the indicated ages. If your baby was born very early, ask your doctor about timing of immunisations. Immunisation does not affect the growth and development of your baby.

How vaccines are given

Vaccines on the National Immunisation Schedule are given by injection into the arm or leg. When two to three vaccines are to be injected at the same time, they are not given in the same place but on a different arm or leg. Two or three injections will be given at each visit. Refer to The National Immunisation Schedule (see page 6).

Combined vaccines

Combined vaccines, eg, MMR, mean fewer visits and injections. Protection against up to six different diseases can be given with a single injection. Combined vaccines do not overload the immune system.



Your child may have a mild reaction after immunisation

These may be quite common, occurring in some or most vaccine recipients. Serious events after immunisation occur more rarely – these are described in more detail in the disease tables from page 14.

The table below explains what to do if your child has a reaction following an immunisation.

If you have any concerns ring your doctor

	Type of reaction	What to do for reactions
Mild	<ul style="list-style-type: none"> Your child may have some pain, swelling or redness at the place where the injection was given for the first day or two. The arm may also feel heavy. <p>These are normal side effects and may last a day or so.</p> <ul style="list-style-type: none"> 5–12 days after MMR is given, your child may have a mild rash and fever, or swollen glands. Older children may feel tired and not want to play. <p>These reactions usually only last for a few days.</p>	<ul style="list-style-type: none"> Avoid rubbing the injection site as this may make the reaction worse. Loosen their clothing and don't overdress. Give extra fluids to drink (eg, water or more breastfeeds). Give paracetamol or ibuprofen only as advised by your nurse or doctor.
Serious	<ul style="list-style-type: none"> Your child may have a high fever, ie, over 39° C. This is rare. In very rare instances, a high fever can lead to a child having a fit, called a febrile convulsion. These can occur with any high fever, not just a high fever following immunisation. 	<ul style="list-style-type: none"> Contact your doctor. Give extra fluids to drink (eg, water or more breastfeeds). Loosen their clothing and don't overdress. Make sure your child is physically safe and seek medical assistance immediately.

A separate pamphlet on vaccine reactions is also available (code HE1504).

Rare allergic reactions following immunisation, eg, anaphylaxis

You and your child will be asked to wait at the clinic or surgery for 20 minutes after a vaccine is given. This is to make sure that treatment is at hand if an allergic reaction called anaphylaxis occurs.

It is only on very rare occasions that anaphylaxis occurs after immunisation. In anaphylaxis, a skin rash, dizziness and noisy breathing start soon after the vaccine is given. Drugs to treat this allergic reaction work very quickly. Allergic reactions can also occur after exposure to almost anything including medicines and food or from bee stings, and not just from vaccines. See the tables from page 14 onwards for other rare events.

Are there some children who should not be immunised?

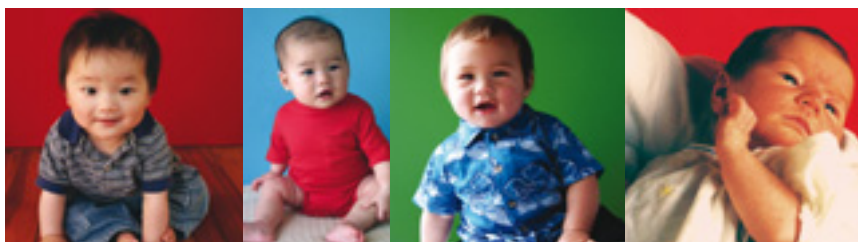
There are very few children who should not be immunised. However, if your child:

- has had a serious reaction to a vaccine
- has had a blood transfusion or other blood products in the last year (live vaccines only, eg, MMR or BCG)
- is being treated for cancer or other severe illness

talk to your doctor, specialist or nurse before the immunisation.

Children with asthma or allergies, and children who are recovering from an illness, such as a common cold, can be immunised. If you are worried about the health of your child, or your child has a fever, talk to your doctor or nurse.

As the MMR vaccine contains a small amount of egg protein, it was thought that children with severe allergy (anaphylaxis) to eggs should not be immunised. However, research has shown that children with severe allergy to eggs can be given the vaccine safely under close supervision.



How long do immunisations last?

The length of time varies with different diseases and different vaccines. Lifelong immunity to a disease is not always produced by either natural infection or immunisation.

Some vaccines require booster doses to maintain immunity, eg, four doses of polio vaccine are given to protect children, and a polio booster may be recommended for adults when travelling overseas to certain countries. Diphtheria and tetanus boosters are offered at 45 and 65 years of age and after some injuries.

Boosters later in life are not usually needed for the hepatitis B or the mumps, measles and rubella vaccines.

The timing of vaccine doses aims to give the best protection against the disease at the time in life when individuals are most at risk, which is usually during infancy. Some vaccines will start to protect against the disease after the first dose, but **all** the recommended doses of the vaccine are needed to get the best protection.

See the disease tables on pages 14–24 for more information.

If my child has had any of the diseases, does my child still need to be immunised?

If you think that your child has had one of the diseases, talk to your doctor, who will be able to tell you about tests that are available to check for antibodies against measles, mumps, rubella and hepatitis B. If your child is already immune, eg, to one of the MMR diseases, your child will still need to be protected against the others.

A child who has had a disease normally develops immunity. However, a child under two years who has Hib disease may not develop immunity, so immunisation is still recommended. This is one vaccine which produces better immunity than infection with the disease itself.

If you are unsure whether your child has had a disease, your child can still be immunised. There is no increased risk of a reaction to a vaccine if your child is already immune.



Do children have to have all the immunisations?

You can agree to your children having some vaccines but not others. However, children are at risk from any disease they are not immune to. Most vaccines need more than one dose to ensure protection.

Some parents ask if the combined vaccines can be separated. In New Zealand, most vaccines on the National Immunisation Schedule are combined and are not available singly. However, single Hib, single polio and single hepatitis B vaccines are available for the few children for whom pertussis vaccine is not recommended. Only children under five years of age receive Hib vaccine.

If you want your child to have the single vaccines that are available but not on the National Immunisation Schedule, then your family doctor will need to order them. You may have to pay for the vaccines and the visit to your doctor.

Do healthy children need to be immunised if they are kept away from other children who are sick?

Diseases are often spread before a child shows any sign of illness. This makes it impossible to keep your child away from children who may have the disease. Even the healthiest children can still catch these diseases if they are not immunised.

Immunisation records and the Immunisation Certificate

Your doctor or nurse will keep a record of the immunisations your child has been given. This information is also held on the National Immunisation Register (see page 13). They will also record the immunisation in your child's *Well Child Tamariki Ora Health Book*.

All parents will be asked for the Immunisation Certificate when their child is starting at an early childhood service, kōhanga reo or primary school. The certificate is in the back of your child's *Well Child Tamariki Ora Health Book*. The certificate shows whether your child has completed the series of childhood immunisations. Your doctor or nurse will sign the certificate when giving the 15-month immunisations and again after the four-year-old immunisations.

You will still be asked to produce a signed certificate even if you have decided not to have your child immunised. Your doctor or nurse can sign the certificate at any time.

Children can still attend an early childhood service or school even if they have not been immunised.

What the Immunisation Certificate is used for

The information on the certificate will be recorded on the early childhood service or school register, which you can check. If your child starts before the age of 15 months, the certificate is shown once they are 15 months old.

The Medical Officer of Health will check the register if there is a threat, or an outbreak, of disease in your area. Children who have not been immunised will be offered immunisation. Those who have not been immunised may be asked to stay at home until the disease has gone to help stop it spreading.

The National Immunisation Register

The National Immunisation Register (NIR) is a computerised information system that holds the immunisation details of your child. Your lead maternity carer, family doctor or practice nurse will discuss the NIR with you, including what information is collected and stored and who can access the information.

The NIR helps you and your health care provider, such as your family doctor, to keep an accurate record of your child's immunisations. This will help to make sure that your child receive the appropriate immunisations at the recommended ages. Children may visit many different health care providers for their health care. The NIR will make sure that information about your child's immunisations is available even if they receive health services in another part of the country (if you shift to another area, or to another doctor).

The NIR will also tell your health care provider when your child's next immunisations are due or if they are overdue.

You can choose not to have your child's information stored on the NIR, but you will need to complete and sign a form that your lead maternity carer, family doctor or practice nurse can provide.

For additional information, talk to your doctor, practice nurse or lead maternity carer. A separate pamphlet on the NIR is also available (code HE1501).

The following tables show the diseases and disease versus vaccine risks

The tables may state that no links with a specific disease have been found. This statement addresses past suggestions indicating that there may have been a link. However, these suggestions have been fully researched with no supporting evidence being found in New Zealand or overseas.

See page 9 for common reactions that may occur after immunisation.

Hepatitis B

Virus

Hepatitis B is caused by a virus that attacks and damages the liver. It was a common disease in New Zealand until a vaccine was introduced in the 1980s.

How it is spread

Hepatitis B is passed on through close contact with blood and other body fluids from an infected person, eg, from cuts and scratches, sharing toothbrushes, and sex without a condom.

Hepatitis B can be passed from infected mothers to their babies, usually at the time of birth. Hepatitis B vaccine and immunoglobulin (a blood product with special antibodies) are given straight after birth to prevent the baby from becoming infected (see page 6). This protects almost all babies. The baby then follows the usual National Immunisation Schedule, and a blood test is taken at 5 months to check that the baby is protected from hepatitis B. If the baby is not protected, a further two doses of hepatitis B vaccine may be required.

Symptoms

Symptoms can include nausea, tiredness, dark urine, pale bowel motions, joint and muscle pain, and jaundice (a yellow tinge to the skin and eyes).

Illness

Children who have the disease usually develop a very mild illness, and they sometimes have no sign of illness at all. However, they are at much greater risk of becoming a carrier of the disease and infecting someone else. The illness itself is more serious for adults.

Risk of disease in New Zealand

Hepatitis B has declined since the vaccine was introduced to New Zealand in the 1980s. There were 609 cases notified in 1984, 55 cases in 2009 and 51 cases in 2010.

The percentage of children the vaccine protects

After 3 doses of vaccine 95% of infants and children develop protection. The duration of protection is expected to be greater than 20 years, and probably life long.

Protection for babies whose mothers carry the hepatitis B virus

Hepatitis B vaccine and hepatitis B immunoglobulin together protect 95% of babies; this is reduced to 80% if the mother is highly infectious.

Severe risks associated with hepatitis B

- The virus causes liver infection and acute illness.
- Severe illness is rare in children.
- Fatalities are rare and are more likely in adults.
- Some people become carriers of the virus, especially children (6 in 100).
- Liver cirrhosis occurs in 1 in 20 carriers (half of these will die).
- Liver cancer occurs in 1 in 10 male carriers and 1 in 20 female carriers and usually leads to death.

Severe risks associated with Hep B containing vaccines

- Anaphylaxis (see page 10) occurs extremely rarely (around 1 per 600,000 vaccine doses).
- No links have been found between the vaccine and serious disorders.

Diphtheria

Bacteria

The bacteria cause a throat infection, which can lead to breathing difficulties.

How it is spread

Bacteria enter through and attack the skin lining the nose, mouth and throat.

Symptoms

Symptoms include fever, sore throat, headache, difficulty breathing, foul breath, sleepiness, swollen glands and white patches on the tonsils.

Illness

A false membrane (like a skin) forms in the throat, leading to difficulty in swallowing and breathing.

Complications

- The bacteria produces a toxin (chemical) which affects the body, in particular, the heart and kidneys.
- 2–10% of people with diphtheria die.

Risk of disease in New Zealand

Diphtheria is now rare in New Zealand, and immunisation has helped this decline. Since 2002, one case has been reported. Diphtheria still circulates in some countries and may be imported into New Zealand, therefore we cannot stop vaccinating.

The percentage of children the vaccine protects

The vaccine gives 87–98% protection from the disease, and the disease is less severe in the 2–13% who have been immunised but who are not fully protected. The duration of protection is expected to be around 10 years.

To ensure that protection continues, a tetanus-diphtheria (Td) booster is offered at 45 and 65 years of age.

Severe risks associated with diphtheria

- The bacterial toxin can lead to nerve paralysis and heart failure.
- Between 2–10 infected people in 100 die.

Severe risks associated with diphtheria-containing vaccines

- Anaphylaxis (see page 10) occurs extremely rarely after a diphtheria-containing vaccine is given.
- Fewer than 1 per 100,000 people who receive the Td vaccine may develop nerve inflammation (pain and weakness) in the arm.



Tetanus

Bacteria

Tetanus is a serious infectious disease caused by bacteria that are usually found in the soil.

How it is spread

Bacteria enter the body through wounds such as cuts, grazes and puncture wounds. This could happen, for example, from a scratch or cutting yourself when gardening. A person with tetanus is not infectious to others.

Symptoms

The symptoms usually appear within 4–5 days and include weakness, stiffness, cramps and difficulty in chewing and swallowing food.

Illness

Bacteria in the wound produce a toxin. This toxin causes the muscles to stiffen around the jaw, neck, back, chest, abdomen and limbs. There may be a fever and sweating. The toxin irritates the nerves, causing severe muscle spasms and difficulty in breathing.

Risk of disease in New Zealand

Tetanus has declined since immunisation was introduced, but cases still occur, mainly in older people who are unlikely to have been immunised as children. Of the 34 tetanus hospitalisations between 2000 and 2010, 28 of the people affected were aged 40 or over. It is not possible to acquire immunity to tetanus other than by immunisation.

The percentage of children the vaccine protects

Virtually all infants have protection after three doses of vaccine. The duration of protection is expected to last at least 20 years. There has never been a case of tetanus occurring in someone who has received all the recommended doses of tetanus vaccine.

To ensure protection continues, tetanus-diphtheria (Td) booster is offered at 45 and 65 years of age. Boosters may also be needed after some cuts, grazes and wounds.

Severe risks associated with tetanus

- The bacteria produce toxins that cause painful muscle spasms and lockjaw.
- Hospital intensive care treatment is needed.
- About 1 in 10 patients dies.
- The risk is greatest for the very young or old.

Severe risks associated with tetanus-containing vaccines

- Anaphylaxis (see page 10) occurs extremely rarely.
- Fewer than 1 per 100,000 people who receive the Td vaccine may develop nerve inflammation (pain and weakness) in the arm.

Pertussis (whooping cough)

Bacteria

Pertussis is a serious infection caused by bacteria that damage the breathing tubes. It occurs mainly in young children and is most serious in children under 1 year of age.

How it is spread

The disease is extremely infectious and spread through the air by coughing, sneezing and breathing.

Symptoms and illness

Pertussis begins with a runny nose and temperature followed by a cough. The coughing spells are so strong that it is hard for the child to breathe. Children often gasp for air and some make a 'whooping' sound. They may also vomit after coughing. Babies under 6 months of age are particularly at risk as they are not protected against whooping cough until after they have received the third vaccine dose at 5 months of age. Infected babies often require admission to hospital.

Risk of disease in New Zealand

Pertussis is a common disease in New Zealand. There are outbreaks of the disease every 3–5 years. Over 800 cases were reported in New Zealand in 2010, with more than 90 people hospitalised. Children under 1 year of age had the highest rate of disease.

The percentage of children the vaccine protects

A study of children under 2 years of age showed that 84% have protection against the disease. The duration of protection starts to wane after about 6 years. For this reason, a booster shot of tetanus-diphtheria-pertussis vaccine is offered to children at 11 years of age.

Severe risks associated with pertussis

- The cough may last up to 3 months.
- Pertussis can lead to pneumonia.
- Pertussis can lead to encephalopathy (brain damage), convulsions and death. The risk of encephalopathy ranges from about 1 in 100 to 1 in 1000 cases.

Severe risks associated with pertussis-containing vaccines

- In overseas trials of acellular pertussis vaccine, 0–2 recipients in 10,000 had fits or 'shock-collapse' – neither of which caused long-term problems.
- Swelling of the entire thigh or upper arm may occur in 2–3% of children after the fourth and fifth pertussis vaccine doses. The swelling resolves without long-term effects.
- Anaphylaxis is very rare (see page 10).
- There are no long-term conditions associated with the acellular pertussis vaccine.

Haemophilus influenzae type b (Hib)

Bacteria

Hib is a bacteria that causes serious illness in young children. Hib disease has almost disappeared since the vaccine programme was introduced.

How it is spread

Hib bacteria are found in the nose and throat, usually without causing symptoms, and are spread through the air by breathing, coughing and sneezing.

The illness

Hib most often leads to:

- meningitis, an infection of the membranes that cover the brain and spinal cord
- epiglottitis, an infection and swelling in the throat that blocks the breathing passages.

It can also cause other forms of illness such as pneumonia, infection of the joints and skin infection. Although antibiotics can be used to treat the disease, children still die and some risk permanent ongoing damage to the brain and spinal cord.

Risk of disease in New Zealand

Before the vaccine was introduced, Hib was the most common cause of life-threatening bacterial infection in children under 5 years of age. Before the vaccine, around 1 in every 350 children had the disease before they were 5 years old. From 2000 to 2010, there were 50 Hib cases in children under 5 years of age, including 6 infants under 6 months of age.

The percentage of children the vaccine protects

After vaccination, 95% to 100% of children are protected. It is only in very rare cases that the vaccine fails to protect against the disease.

Severe risks associated with Haemophilus influenzae type b

- About 1 in 20 patients with meningitis dies and 1 in 3 survivors has permanent brain or nerve damage.
- About 1 in 100 patients with epiglottitis dies.

Severe risks associated with Hib-containing vaccines

- There are no severe risks associated with the vaccine although anaphylaxis can occur very rarely after any immunisation.



Protect your child and your family by having your children immunised



Poliomyelitis (polio)

Virus

Polio is caused by a virus that can lead to a mild or a very serious illness. The virus infects the bowel and from there can attack the nervous system, causing meningitis or paralysis. Infection may be without symptoms.

How it is spread

The virus is found in secretions from the nose and throat and is spread by coughing, sneezing, sharing drink bottles, etc. It is also spread from person to person through the faecal-oral route, eg, from not washing hands when going to the toilet and then eating food or putting your fingers into your mouth.

Symptoms

Symptoms include headache, diarrhoea, tiredness, stiffness of the neck and back, and pain in the limbs, back or neck with or without paralysis.

Illness

Children who develop paralysis may appear to recover only to become ill again after a few days.

There is no cure for polio and the paralysis is usually permanent.

Risk of disease in New Zealand

Polio has disappeared from New Zealand and most parts of the world as a result of immunisation. The Western Pacific region (of which New Zealand is a part) was declared polio free in 2000.

However, polio is still found in some overseas countries and could be brought into New Zealand by travellers and immigrants. It is important that New Zealand children continue to be immunised against polio. Between 2003 and 2005, 25 previously polio-free countries were re-infected due to the virus being imported.

The percentage of children the vaccine protects

After vaccination, over 90% of children are protected. The duration of protection is expected to be long term. Boosters may be recommended for travel overseas to certain countries where polio still occurs.

Severe risks associated with polio

- About 1 in 20 hospitalised patients dies and fewer than 2 in 100 patients who survive are permanently paralysed.
- The overall risk of paralysis is about 1 in 100. This increases with age, ie, 1 in 75 adults.
- Deaths from paralytic polio increase with age.
- Post-polio syndrome occurs 30–40 years after poliomyelitis (ie, muscle pain and worsening of existing muscle weakness).

Severe risks associated with polio-containing vaccine

- No serious reactions have been reported although anaphylaxis can occur very rarely after any immunisation.

Measles

Virus

Measles is a highly infectious viral infection. Before immunisation, almost all children caught measles.

How it is spread

Measles is easily spread from person to person through the air by breathing, coughing and sneezing.

The symptoms and illness

Measles usually causes a rash, high fever, runny nose, cough and sore watery eyes.

Risk of disease in New Zealand

In 1997, about 2000 people, mostly babies and children, were infected during an epidemic of measles, with over 300 people needing hospital care. In 2009, there were 253 measles cases, 80% of these caused by three outbreaks. In 2010, 48 cases were notified. Outbreaks continue to occur, however, when travellers bring the disease into New Zealand and infect unimmunised children and adults.

The percentage of children the vaccine protects

After one dose of MMR vaccine, 90–95% of children are protected, and after 2 doses, 95–100% of children are protected. The World Health Organization states that 2 doses of measles vaccine are needed to eliminate measles from the community. The duration of protection is at least 20 years and may be lifelong.

Severe risks associated with measles

- About 1 in 10 cases get pneumonia, an ear infection or diarrhoea.
- Encephalitis (inflammation of the brain) occurs in 1 in 1000 cases, of whom 15 in 100 people die and 25–35 people in 100 are left with permanent brain damage.
- 1 in 1000 children may die.
- 1–4 per 100,000 cases get subacute sclerosing panencephalitis several years after infection. This disease destroys the brain.

Severe risks associated with MMR vaccine (see also mumps and rubella)

- Seizures associated with fever may occur (a rate of 1 seizure per 2500 vaccinations given has been reported).
- After a first dose of MMR vaccine, thrombocytopenia (low platelets causing bruising or bleeding, which may last for a few weeks) may occur. A rate of 1 case in 30,000 vaccinations has been reported.
- Encephalitis occurs in fewer than 1 in a million cases. There may be some long-term effects from this.
- Anaphylaxis can occur very rarely after any immunisation.
- No link has been found between MMR vaccine and the development of autism in children.

Mumps

Virus

Mumps is an acute viral illness, and a few cases occur each year in New Zealand.

How it is spread

It is spread through the air by breathing, coughing and sneezing.

The symptoms and illness

Mumps causes fever, headache and swelling of the glands around the face.

Risk of disease in New Zealand

The last mumps epidemic was in 1994, when there were 188 hospitalisations. In 2010, there were 10 hospitalisations.

The percentage of children the vaccine protects

After vaccination, 95–96% of children will be protected against mumps. The duration of protection decreases slowly over time with 74% being protected after 20 years.

Severe risks associated with mumps

- Mumps causes aseptic meningitis in 15 in 100 people, but it is usually relatively mild.
- Mumps causes encephalitis (inflammation of the brain) in about 1 in 6000 people, of whom 1 in 100 will die, and nerve deafness in 1 in 15,000 people.
- If infected after puberty, 1 in 5 males gets testicle inflammation and 1 in 20 females gets ovary inflammation. In rare cases this leads to infertility.

Severe risks associated with MMR vaccine (see also measles and rubella)

- Aseptic mumps meningitis occurs in 1 in 800,000 vaccine recipients.
- Anaphylaxis can occur very rarely after any immunisation.



Rubella

Virus

Rubella is usually a mild, viral illness, but can have severe consequences if a mother passes it to her unborn baby, especially during the early months of her pregnancy. All women of child-bearing age should be screened for rubella antibodies and immunised where necessary prior to pregnancy. The test and vaccine is free to women.

How it is spread

Rubella is spread through the air by breathing, coughing and sneezing.

Symptoms and illness

Rubella may cause a mild illness with a rash, fever and swollen glands in children. In teenagers and adults, rubella may cause a rash, swollen glands and joint pain.

Risk of disease in New Zealand

A few cases of rubella occur in New Zealand each year, with 4 in 2010.

The percentage of children the vaccine protects

After vaccination, 90–97% of children will be protected. The duration of protection is expected to last at least 16–21 years in 90% of those vaccinated.

Severe risks associated with rubella

- For women in early pregnancy, 85% of babies infected during the first 8 weeks after conception will have a major congenital abnormality such as deafness, blindness, brain damage, or a heart defect. This declines to about 10–20% by 16 weeks of the pregnancy.
- About 1 in 3000 rubella patients gets thrombocytopenia (low platelets causing bruising or bleeding).
- 1 in 6000 develops encephalitis (inflammation of the brain). This usually occurs in young adults. This may result in death.

Severe risks associated with MMR vaccine (see also measles and mumps)

- Joint symptoms may occur in 0–3 in 100 children and in 1 in 5 adult women after MMR vaccine. This is mild and short-lasting.
- Anaphylaxis can occur very rarely after any immunisation.



Pneumococcal disease

Bacteria

The infection is caused by bacteria. There are 90 different types of pneumococcal bacteria. Serious infection is more common in infants and young children under the age of 5 years, in older people over 65 years, and children and adults of any age with certain ongoing medical conditions.

How it is spread

The bacteria are carried in the throat, often without causing disease, and are spread through the air during coughing and sneezing.

The illness

The pneumococcal bacteria causes severe disease such as:

- meningitis, an infection of the membranes that cover the brain and spinal cord
- septicaemia or blood poisoning
- infections of the joints, around the heart or of the bones and the soft tissue beneath the skin.

The bacteria also causes pneumonia, ear and sinus infections. Pneumococcal disease may be a complication from a viral infection.

Risk of disease in New Zealand

There were 697 cases of invasive pneumococcal disease in 2009, the majority of which were in children under 2 years of age and in adults over 65 years.

Since the pneumococcal vaccine was introduced in 2008, the rate of invasive pneumococcal disease in children under 2 years of age has halved.

The percentage of children the vaccine protects

A study of infants showed that 97% of children were protected against the types of bacteria found in the vaccine following 4 doses of vaccine.

Because this is a newer vaccine, studies are ongoing to determine the duration of protection. However, children under 2 years of age are most at risk of pneumococcal disease, and the vaccine has been shown to offer protection for at least 3 years and it is likely to be much longer.

Severe risks associated with pneumococcal disease

- About 1 in 10 children with pneumococcal meningitis die and 1 in 6 survivors will have permanent brain damage.
- About 1 in 3 children will be left with a hearing impairment after pneumococcal meningitis.
- Pneumonia and septicaemia (blood poisoning) leads to hospitalisation.
- Less severe illness, such as ear infections, may lead to deafness.
- Children with medical conditions, such as congenital heart disease, some chronic lung diseases, kidney diseases, and HIV infection, and children whose immune system is lowered through chemotherapy,

radiation therapy or organ transplant are at higher risk of pneumococcal disease.

- Children with spinal fluid shunts and with cochlear implants are also at higher risk of pneumococcal disease.

Severe risks associated with vaccine

- Fewer than 1 in 1000 pneumococcal vaccine recipients may suffer from an allergic reaction, rash or urticaria (hives).
- Anaphylaxis can occur very rarely after any immunisation.

Human Papillomavirus

Virus

Human papillomavirus (HPV) is a common virus that causes warts on the skin and the genital area. There are many types of HPV. Some high-risk types of HPV may lead to chronic genital infection and, years later, to cancer of the cervix.

How it is spread

HPV is spread by direct skin to skin contact during sexual activity with a person who has the virus.

The vaccine is best given to girls before they start sexual activity.

Symptoms and illness

Most people with HPV genital infection have no symptoms and clear the virus without treatment. Others will need treatment for genital warts. If a woman has a chronic infection with one of the high-risk types, she may develop changes in the cells of the cervix and have an abnormal cervical smear test. Years later, without treatment, the HPV infection may lead to cancer of the cervix, vulva or vagina. Men may develop cancer of the penis or anus.

For women who have regular cervical screening, the New Zealand Cervical Screening Programme has successfully decreased the number of women developing cervical cancer. All women should have a regular cervical smear test every 3 years from the age of 20 until they turn 70 if they have ever been sexually active, even if they have been immunised.

The percentage of young women the vaccine protects

The HPV vaccine protects against the most common types of HPV that cause cervical cancer and genital warts (HPV types 16 and 18, causing around 70% of all cervical cancers, and HPV types 6 and 11, causing around 90% of genital warts). In clinical trials, more than 99% of recipients developed antibodies to the HPV types in the vaccine after 3 doses, and the vaccine was effective in preventing persistent infection in more than 90% of women. As studies are ongoing, the exact period of protection is unknown. So far, protection remains high with no sign of weakening.

Severe risks associated with HPV infection

- Chronic infection with high-risk HPV types leads to an abnormal cervical smear test and if not treated can lead to cervical cancer.

Severe risks associated with vaccine

- No severe side effects were seen in large clinical trials, although anaphylaxis can occur very rarely after any immunisation (3 in 1,000,000 HPV doses).

Source information

This booklet used information from the following sources:

1. Ministry of Health (2011). *Immunisation Handbook 2011*. Wellington: Ministry of Health.
2. American Academy of Pediatrics (2009). In: Pickering L K, Baker C J, Kimberlin D W, and Long S S (eds). *Red Book: 2009 Report of the Committee on Infectious Diseases* (28th edition). Elk Grove Village, IL: American Academy of Pediatrics.
3. Plotkin S A, Orenstein W A, Offitt P A (eds) (2008). *Vaccines* (5th edition). Philadelphia, PA: Saunders Elsevier.
4. Vaccine data sheets, retrieved from <http://www.medsafe.govt.nz/profs/Datasheet/DSForm.asp>



When you take your children to be immunised

- Read the information in this book beforehand.
- Tell older children about being immunised, eg, that it will hurt only for a short while.
- Ask questions if you have any concerns or worries.
- Tell the doctor or nurse how your child reacted after the last vaccine.
- Allow 20 minutes for waiting in the surgery after your child has been immunised. Your baby may need a feed.
- Always take the *Well Child Tamariki Ora Health Book* with you and ensure that the vaccinator fills in the details of the immunisations given.

For more information about immunisation:

- talk to your lead maternity carer, doctor or nurse
- read your *Well Child Tamariki Ora Health Book*
- call your local public health service or Medical Officer of Health
- contact your local Well Child Tamariki Ora Health nurse, family health centre or marae clinic
- call the Immunisation Advisory Centre (IMAC) toll-free on 0800 466 863 (0800 IMMUNE)
- check the following web sites:
www.moh.govt.nz/immunisation
www.immune.org.nz
www.healthed.govt.nz

New Zealand Government

This resource is available from www.healthed.govt.nz or the Authorised Provider at your local DHB.

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