Pertussis (Whooping cough)

The Immunisation Advisory Centre

What is whooping cough?

Whooping cough, also known as pertussis, is a highly infectious disease with symptoms that can last for weeks to months. It is caused by the *Bordetella pertussis* bacterium. Outbreaks of the disease occur every 3–5 years because whooping cough protection decreases with time after having either the disease or immunisation.

How common is it? How do you catch it?

Whooping cough occurs worldwide. The bacteria can be transferred from person to person through close contact with droplets of saliva. Some people carry the bacteria in their nose and throat without getting sick but can pass the bacteria onto others. In other people, the bacteria invade and cause disease.

A person with whooping cough is most likely to pass the infection on from the week before they start coughing to three weeks after they start coughing. Up to 90% of people who are not protected from the disease and living in the same house as a person with whooping cough will catch it. Without immunisation almost every child will catch whooping cough at some time.

Infants less than six months of age whose mother did not have a whooping cough booster immunisation during pregnancy and who are too young to have completed their first three immunisations are most likely to catch whooping cough from their mother. Siblings, adolescents and adults in the household, and health care workers are also sources of infection for this age group. School children and adolescents tend to be infected by another student or friend.

What are the symptoms of whooping cough?

After exposure it usually takes 7–10 days before coughing begins. During the week before the cough begins a person may notice mild cold-like symptoms including a runny nose. Typically, the cough is initially dry and non-productive, then progresses to fits of coughing to expel thick mucus sometimes followed by vomiting. Coughing fits may be started by eating or drinking, talking or crying, or even hearing another person coughing.

After the coughing fit ends a strong breath in against a narrowed throat causes the whoop sound. The coughing fits and whooping sound may last for four or more weeks. An irritating cough can continue for weeks before settling, then often returns whenever the person gets a cold or similar virus in the following year.

Symptoms can present differently in infants. They may stop breathing or even die suddenly instead of having apparent coughing fits. Older children, adults and those who have been immunised or previously exposed to the disease may have a milder cough.

Who is at risk from whooping cough? How serious is it?

Infants less than 12 months of age whose mother did not have a whooping cough booster immunisation during pregnancy and who are too young to have been fully immunised are at risk of catching whooping cough and have the highest risk of developing severe disease and needing to be admitted to hospital.

Infants who have had any one of their immunisations delayed and infants who have only just completed their first three immunisations and not yet had time to develop protection are also at risk of catching the disease and developing complications.

Possible complications of whooping cough are described in the table on page 3. Severe complications are more common for infants and young children and include needing to be in hospital for supportive treatment, pneumonia and, particularly for infants less than 12 months of age, death. Before immunisation became available, whooping cough was a major cause of infant death.

Unimmunised children, older children and adolescents who did not have their booster immunisation at four and 11 years of age, and adults also have a high risk of catching the disease. They can also develop complications from whooping cough including problems relating to not being able to eat and drink, collapsing after severe coughing, broken ribs, and pneumonia.

How do you prevent infection?

There are two strategies to protect infants less than 12 months of age because they have the highest risk of developing serious complications:

- A whooping cough booster immunisation given to women during the second or third trimester of every pregnancy, preferably early in the second trimester, and
- On-time immunisation for the infant at six weeks, three months and five months of age.

Ensuring older siblings are up to date with immunisations and adult household members in close contact with an infant are protected against whooping cough can reduce the risk of the infant being exposed to the disease.

Children with whooping cough are advised not to attend early childhood services, school or other public places for three weeks after they started coughing or five days after starting antibiotic medicine. Adults are advised not to attend work or public places for the same periods of time.

Close contacts of a person with whooping cough who attend early childhood services, are in contact with infants less than 12 months of age or pregnant women, or who are health care workers can complete a course of antibiotic medicine to reduce their risk of developing the disease.

A whooping cough booster immunisation will not prevent the disease developing if there has been a recent exposure.

How do you treat it?

The bacterium uses multiple ways to invade the body and cause the disease symptoms. Antibiotic medicine may change the development of whooping cough if it is started before the cold-like symptoms become obvious. Once the cold-like symptoms are obvious or the cough has started, antibiotics decrease the risk that the person will pass the infection onto another person but will not reduce the disease symptoms.

Supportive treatment for infants less than 12 months of age is essential because they have the highest risk of developing complications with long term consequences. Infants may need to be hospitalised for oxygen treatment and have mucous removed from their nose and throat with suction. Sometimes they need to be given fluid directly into their bloodstream and liquid nutrition directly into their stomach.

Which vaccines protect against whooping cough?

All the vaccines that protect against whooping cough are combination vaccines that include protection against other diseases. There is no whooping cough-only vaccine available in New Zealand.

The vaccines on the National Immunisation Schedule that protect against whooping cough are Infanrix®-hexa, Infanrix®-IPV and Boostrix®.

How safe are the vaccines?

The acellular whooping cough vaccines used in New Zealand are less likely to cause severe vaccine responses than the whole-cell vaccines. Common and rare vaccine responses are described in the table on page 3.

Continued ...

How safe are the vaccines? Continued

Limb swelling after the fourth or fifth vaccine dose reflects a robust immune response after the latter immunisations. These local reactions resolve without treatment and with no long-term consequences.

Rarely, a hypotonic hyporesponsive episode (HHE), a period of decreased muscle tone and responsiveness, will occur within 48 hours after immunisation. An HHE can last for a few minutes to several hours and resolves with no long-term consequences.

Very rarely, a severe allergic reaction (anaphylaxis) to a component in the vaccine occurs.

In the late 1970s brain inflammation (encephalopathy) with subsequent seizures and developmental delay was thought to be a possible reaction to vaccines containing whole cell whooping cough components. More current research has not been able to show a link between whooping cough vaccines and encephalopathy.

Vaccine safety in pregnancy

Pregnant women have been immunised in the U.S. since 1957 using tetanus and inactive polio vaccines, and worldwide since the 1970s using tetanus vaccines. Since 1988 several trials using other inactive viral and bacterial vaccines have also been conducted. No evidence of harm for the course of the pregnancy, growing baby, or newborn has been identified from the use of inactive vaccines, including the tetanus/diphtheria/acellular pertussis vaccines, during pregnancy.

How protective are the vaccines?

A whooping cough booster immunisation given to a woman during pregnancy can provide newborns with temporary protection from severe whooping cough, serious complications and needing to be admitted to hospital for up to three months after they are born. During this time the infant will be able to receive their first two immunisations and start developing their own protection.

For most adolescents and adults one immunisation is expected to effectively boost existing whooping cough protection whether they have previously been immunised or not.

During the first year after immunisation almost everyone will be protected from severe disease, around nine in 10 protected from typical disease and around seven in 10 protected from mild disease.

After the first year the initial protection against whooping cough begins to decrease in a similar way that protection after having the disease decreases. Studies have shown that protection lasts between four and six years after immunisation.

Protection against whooping cough gained after immunisation or after exposure to the disease, whether symptoms were present or not, can be boosted by a single immunisation in adolescents and adults or by being exposed to whooping cough in the community.

Are the vaccines changing?

Small changes in *B. pertussis* bacterium have been studied since the late 1990s. Some changes are possibly a result of the use of vaccines. Monitoring of the bacterium's characteristics and development of whooping cough vaccines that provide protection for longer is ongoing. Even with the small changes in the bacterium on-time immunisation with the vaccines that are currently available can prevent the disease.

Who should have the whooping cough vaccine?

Women who are pregnant

One whooping cough booster immunisation during the second or third trimester of every pregnancy, preferably early in the second trimester, stimulates the mother's immune system to make protective cells (antibodies) that circulate in her blood stream making her less likely to get sick with whooping cough. Most importantly, the protective cells also travel across the placenta into her baby's blood stream and help protect the baby from severe whooping cough for up to three months after birth.

Infants

All three immunisations at six weeks, three months and five months of age are needed for best protection against whooping cough. Some studies have shown that the risk of an infant less than 12 months of age dying from whooping cough is significantly reduced after a single immunisation and needing to be admitted to hospital is significantly reduced after two immunisations.

Infants and children with a personal history of a hypotonic hyporesponsive episode (HHE) within 48 hours of a previous whooping cough immunisation or convulsions with or without a fever within three days of a previous whooping cough immunisation can safely be given their remaining immunisations.

Preschool children and adolescents

The immunisations at four and 11 years of age are important to boost protection against whooping cough during the years at school.

Adults

A whooping cough booster immunisation for adults who have close contact with infants can reduce the risk of the infant being exposed to the disease.

In late 2020, the combined tetanus/diphtheria/whooping cough vaccine will be the vaccine administered to adults who need catch-up and/or booster tetanus and diphtheria immunisation at 45 years and/or 65 years, and when a tetanus booster immunisation is required after sustaining a tetanus risk wound.

Adults who recall having a severe allergic reaction to a tetanus 'vaccine' especially prior to 1960 and were told at the time never to have another tetanus vaccine can generally be vaccinated.

Who should not have the vaccine?

Anyone with severe allergy (anaphylaxis) to a previous dose of the vaccine or any component of the vaccine should not receive the vaccine.

Immunisation should be postponed for people suffering an acute illness or high fever. The presence of a minor infection is not a reason to delay immunisation.

Who should seek specialist advice before immunisation?

There is potential for confusion about the role of immunisation whilst infants and children have an evolving neurological condition, e.g. uncontrolled epilepsy or a deteriorating neurological state. The risks and benefits of withholding immunisation until the clinical situation has stabilised should be considered on an individual basis.

References

A list of references is available in a separate document on the Immunisation Advisory Centre Pertussis disease webpage.

Continued ...

Pertussis (Whooping cough)

The Immunisation Advisory Centre

Disease	Effects of disease	Vaccine responses

A highly contagious bacterial illness lasting for weeks to months that may cause uncontrollable coughing fits.	**Infants less than 12 months of age**
	» Dehydration, weight loss
	» Ear infection (otitis media)
	» Lack of oxygen (hypoxia) during coughing fits
	» Bleeding in the eye (sub-conjunctival haemorrhage)
	» Admission to hospital (5 infants in 10 cases)
	  » Slowed or stopped breathing (apnoea)
	  » Pneumonia
	  » Convulsions (seizures)
	  » Death
	  » Brain inflammation (encephalitis)
	Children from 12 months of age
	» Ear infection (otitis media)
	» Nose bleeds
	» Pneumonia
	» Convulsions (seizures)
	» Brain inflammation (encephalitis)
	Adolescents & adults
	» Urinary incontinence
	» Ear infection (otitis media)
	» Nose bleeds
	» Collapsing (syncope)
	» Pneumonia
	» Broken ribs
	» Brain inflammation (encephalitis)
		Infanrix®-hexa (DTaP-IPV-HepB/Hib)
		Infanrix®-IPV (DTaP-IPV)
		Common responses
		» Mild pain, redness and swelling around injection site.
		» Decreased appetite
		» Vomiting or diarrhoea
		» Irritability, restlessness
		» Unusual crying
		» Limb swelling after the 4th or 5th vaccine dose
		Rare responses
		» Hives
		» Temporary low platelet count
		» Persistent inconsolable screaming
		» Hypotonic, hyporesponsive episode (HHE) in infants
		» Convulsion
		Boostrix® (Tdap)
		Common responses
		» Pain and swelling around the injection site may prevent normal everyday activities for 24—48 hours
		» Headache or nausea
		» Muscle or joint stiffness or pain
		Rare responses
		» Hives
		» Sterile (infection free) abscess at the injection site

Vaccines are prescription medicines. Talk to your doctor or nurse about then benefits or any risks.		