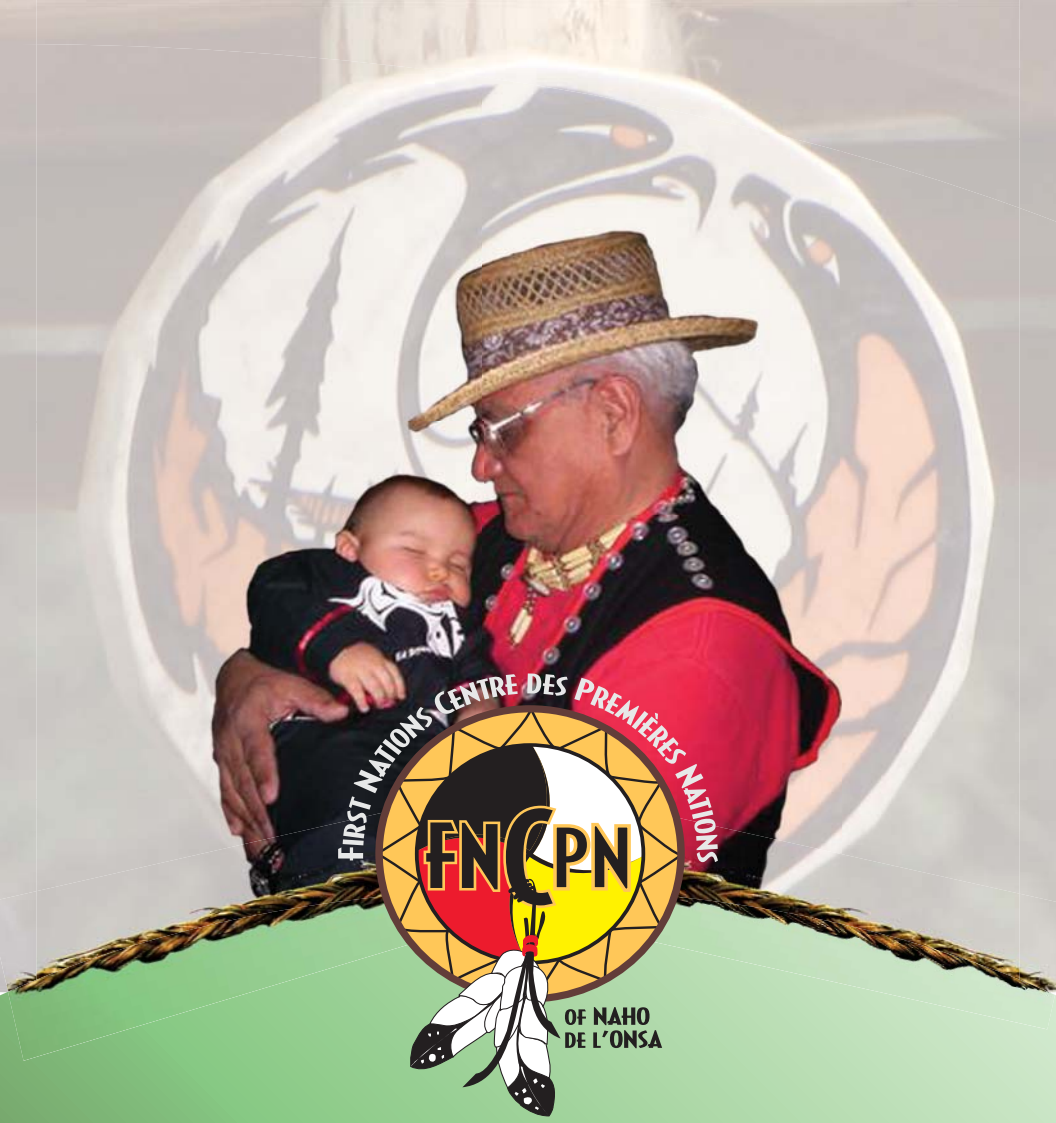
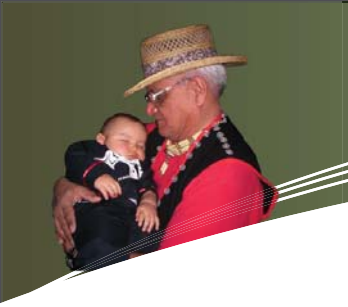


Understanding Immunization Toolkit

Risks of the Vaccine vs. Risks of the Disease



Risks of the Vaccine vs. Risks of the Disease

June 2010

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Diphtheria

What is it?

- Bacteria that releases a toxin that damages the lining of the nose/throat and sometimes the skin.
- Causes patches of pus appear in the throat that can sometimes be so thick they block air and can cause suffocation.

How does it Spread?

- Through close contact with an infected person or their coughs or sneezes.
- It does not spread from contaminated objects.
- Some people can be infected and spread the bacteria without symptoms

What are the symptoms?

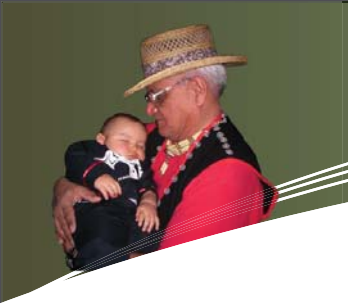
- Initial symptoms: sore throat, loss of appetite, and low fever.
- After a day or two: the infected person will be come weak, gray patches of pus appear in the throat.

How serious is it?

- It causes death for one of every ten people infected with it (Gold, 2006, p. 301).
- Treatment requires an antitoxin (to stop the effects of the toxin) and antibiotics (to stop the bacteria from producing more toxin) (Heymann, 2004, p. 175).

Vaccine Side Effects

- Redness, swelling, and pain at the injection site, fever, irritability (PHAC, 2006, p. 170).
- The vaccine is given with vaccines for tetanus and pertussis (the vaccine is called DTaP) and sometimes polio (DTaP-IPV).
- The fourth dose of DTaP may cause more redness, swelling, and pain at the injection site, and fever (Kimmel, 2002, p. 2114).



Hepatitis B

What is it?

- Virus that causes an infection of the liver.
- Very few people actually look or feel sick (Heymann, 2004, p. 253).
- Some infected people will not be able to get rid of the virus and will be infected for life. These people are able to spread to virus to other people.

How does it Spread?

- Through contaminated body fluids (such as blood, semen, vaginal secretions) (PHAC, 2006, p. 190) and by contaminated equipment (such as shared needles, razors, or other sharp items that may come into contact with blood).
- Newborn babies can get the virus before or during birth.

What are the symptoms?

- The most common symptoms are: fever, weakness, tiredness, loss of appetite, abdominal pain, aches and pains, nausea and vomit ing, skin rash, and yellow skin and eyes (jaundice). (PHAC, 2006, p. 189)
- Urine may become very dark.

How serious is it?

- Almost all babies infected during birth have long-term illness, including liver damage, and can give the virus to other people.
- Most adolescents and adults will have mild illness and will completely recover.
- With acute infection, about 1 in 100 people will have liver failure.

Vaccine Side Effects

- Slight fever, headache, diarrhea, and redness and

soreness at the injection site. (PHAC, 2006, p. 203; Mathew et al., 2008, p. 16)

- Anaphylactic reaction* is possible but rarely happens.

**Anaphylaxis or anaphylactic shock is a serious allergic reaction that can be life threatening. The body produces a strong response to an allergen and affects all body systems. It can result in difficulty breathing, abdominal cramps, vomiting, diarrhea, circulatory collapse, coma, and even death.*

Haemophilus influenzae type b

What is it?

- Infection starts in the nose/throat and may go to the bloodstream.
- Once in the blood, the bacteria can infect the lungs, heart, joints, and skin.
- Does not cause the flu but can cause meningitis**, pneumonia, blood infection (bacteremia), ear infections, eye infections, and epiglottitis (infection of the flap that closes off your airways when you swallow).

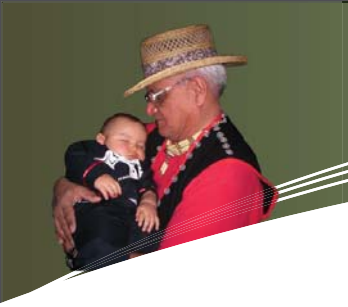
How does it spread?

- Through direct contact with an infected person or through their coughs or sneezes
- Through contact with contaminated objects such as doorknobs.

What are the symptoms?

- Some people will not feel or look sick.
- The symptoms depend on the illness but can include: fever, loss of appetite,

***Meningitis is an infection of the tissues and fluid surrounding the brain and spinal cord and is most common in children between the ages of 2 months and 5 years. (Swingler, Michaels, & Hussey, 2007).*



nausea, vomiting, drowsiness, confusion, irritability, crying, agitation, and other general symptoms.

How serious is it?

- Bacterial meningitis kills about one out of every 20 children infected but it kills all children who do not get treatment. Infection can have long-term effects, such as deafness. (PHAC,2006, p. 374)
- Epiglottitis can make it difficult for a child to breathe. It develops quickly and without emergency treatment the child can suffocate.
- Treatment for Hib infection requires antibiotics. All serious cases of Hib disease require intravenous (IV) antibiotics.

Vaccine Side Effects

- Fever, reaction at injection site including pain, swelling, and redness in 5% to 30% of those vaccinated. (PHAC, 2006, p. 178)
- Rash and abnormal crying are less common side effects. (Lawrence et al., 2005, p. 258).

Influenza (The flu)

What is it?

- An infection of the airways caused by a common virus that can also cause bronchitis and pneumonia.
- The flu can cause complications for people with health conditions such as diabetes, heart disease, or cancer.

How does it spread?

- Through direct contact with an infected person or through their coughs or sneezes.
- Through direct contact with contaminated objects, such as doorknobs and toys.

What are the symptoms?

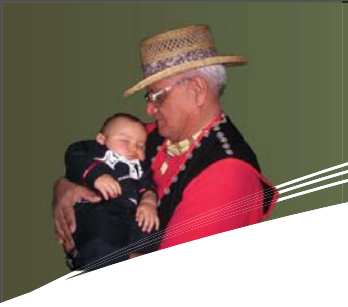
- The symptoms are similar to those of a cold (runny nose, sore throat, and cough) but can also be: fever, chills, headache, aches and pains, muscle weakness, loss of appetite, vomiting, abdominal pain, diarrhea, and tiredness.

How serious is it?

- Pneumonia and bronchitis can occur, especially in the elderly and children under two years old.
- Severe complications can lead to death. Almost all flu deaths are elderly people (Gold, 2006, p. 242. Heymann, 2004, p. 282).
- Every year between 2000 and 8000 Canadians die from influenza (Gold, 2006, p. 242; PHAC, 2010).

Vaccine Side Effects

- Soreness at the injection site lasting up to 2 days (PHAC, 2006, p. 218).
- Fever and muscle aches.
- Allergic reactions can occur especially for people with allergies to eggs. (PHAC, 2006, p. 218)
- Other effects such as wheezing, coughing, red eyes, chest tightness, difficulty swallowing, sore throat, and facial swell ing can occur (oculo-respiratory syndrome) (PHAC, 2006, p. 218).
- A rare side effect is Guillain-Barré syndrome (weakness, paralysis, and abnormal sensations) can occur (PHAC, 2006, p. 218; Lawrence et al.,2005, p. 257; Gold, 2006, p. 254). It is estimated to occur in one in a million doses (NACI, 2008, p. 22; CDC, 2003).



Measles

What is it?

- Caused by a highly con tagious virus. (Heymann, 2004, p. 349).
- Infection is more severe in very young or mal-nourished children.
- The vaccine is combined with mumps and rubella vaccines (the MMR vaccine).

How does it spread?

- Through contact with respiratory droplets con-taining the virus.
- The virus can stay in the air and be breathed in hours later.

What are the symptoms?

- Runny nose, cough, high fever, and rash (the rash appears first on the face and head and then spreads over the body to the arms and legs).
- The rash can last up to 2 weeks.

How serious is it?

- In Canada, about one out of every 1000 cases of measles causes death (Gold, 2006, p. 303).
- Some people with measles get ear infections, pink eye, diarrhea, or pneumo-nia (PHAC, 2006, p. 228).
- Brain swelling (encepha-litis) occurs in about one in 1000 cases and about two of three cases of encepha-litis result in permanent brain damage (Gold, 2006, p. 303).
- Measles infection can result in the development of 'subacute sclerosing panencephalitis' (SSPE), a fatal disease that can oc - cur years after measles infection (PHAC, 2006, p. 228).

Vaccine Side Effects

- Fever and rash. About 1 in 3000 children may have convulsions associated with the fever (PHAC, 2006, p. 233).
- Sometimes children will have low levels of platelets in their blood (this occurs in 1 in 22,000 and 1 in 29,000 children; platelets are required for blood clotting) (Demicheli et al., 2005; Scheifele et al., 2003, p. 216). This can occur up to 2 months after vaccination (Demicheli et al., 2005; PHAC, 2006, p. 233).
- Brain swelling (encephalitis) may occur in 1 child for every 1 million doses of the vaccine (PHAC, 2006, p. 233).

Meningococcol

What is it?

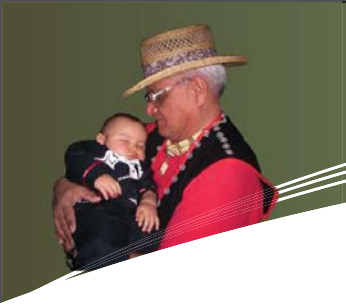
- Bacteria that cause meningitis, bacteremia (infection of the blood), septicemia (severe blood infection), and other infections. (Conterno et al., 2006, p. 4)
- Many people can have the bacteria without having any symptoms (Heymann, 2004, p. 361).

How does it spread?

- Through direct contact with saliva (through kissing and sharing drinks or cutlery) or through an infected person's coughs or sneezes.

What are the symptoms?

- The most noticeable symptom of invasive disease is a rapidly spreading rash. Most, but not all, cases develop the rash.
- Other symptoms are the same as the flu (fever, rash, body aches, joint pain,



nausea, vomiting, drowsiness, headache, stiff neck, rapid breathing, and loss of appetite).

How serious is it?

- Septicemia can lead to shock (quick drop in blood pressure), and can damage organs including the lungs, heart, and kidneys.
- It used to kill about half of the people infected (Heymann, 2004, p. 359). Antibiotics, intensive care units,and other measures have reduced the chance of death to between 8% and 15% of cases (Heymann, 2004, p. 359; Conterno et al., 2006, p. 4). It still kills half of all children it the infection gets into the blood.
- One in ten infected people will have deafness, brain damage, or limb amputation. (Gold, 2006, p. 303)

Vaccine Side Effects

- Redness, soreness, and swelling at the injection site in half the people who get the vaccine. (PHAC, 2006, p. 247)
- Other side effects include irritability, fever, and more crying than usual in infants. (Conterno et al., 2006, p. 19)
- Headaches may occur in one in four people who receive the vaccine (Lawrence et al., 2005, p. 253; PHAC, 2006, p. 247).

Mumps

What is it?

- Caused by a virus and is more common in adolescents and adults than children.
- There is no treatment for mumps.

How does it spread?

- Through direct contact between people or through an infected person's cough or sneeze.
- Sometimes mumps is spread from objects contaminated by an infected person.

What are the symptoms?

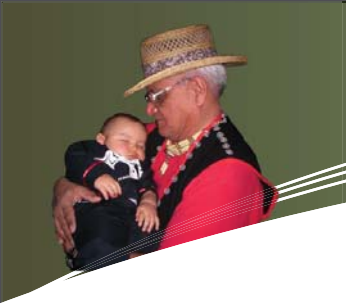
- Some infected people will not look or feel sick.
- The typical symptom of mumps is swollen saliva glands.
- It usually starts as a fever, with body aches, and loss of appetite.
- Other symptoms can include: headache, neck stiffness, stomach pain, tiredness, or dizziness.

How serious is it?

- Can cause swelling of the testicles or ovaries in post-pubertal boys and girls (PHAC, 2006, p. 375).
- Mumps meningitis occurs in up to 10% of cases but it is usually mild (Heymann, 2004, p. 376).
- Mumps encephalitis (swelling of the brain) is caused by an allergic reaction to the mumps virus. It can occur in one or two people of every 10,000 cases and causes death in about 1% (Heymann, 2004, p. 376).
- It can lead to temporary or permanent deafness, seizures and paralysis (PHAC, 2006, p. 251).

Vaccine Side Effects

- Fever and rash lasting 3 days and occurring 7-12 days after vaccination.
- About 1 in 3000 children may have convulsions associated with the fever (PHAC, 2006, p. 254).
- Some children will have low levels of platelets in their blood (platelets are required for blood clotting). This can occur up to 2 months after vaccination (PHAC, 2006, p. 254).



Pertussis

What is it?

- Caused by bacteria and is known as 'whooping cough' because the common symptom is coughing spells that end with a 'whoop' sound as the person takes a breath. The 'whoop' is most common in children with the disease.
- The cough can last for months after infection (Heymann, 2004, p. 399). Coughing spells can be so severe that they interfere with breathing or cause vomiting.

How does it spread?

- Through close, direct contact with an infected person or their coughs and sneezes.
- Sometimes through contact with contaminated objects, such as toys (Heymann, 2004, p. 401).

What are the symptoms?

- In children, the first symptoms are usually runny nose and cough. The cough will get worse and that the child may have coughing spells.

How serious is it?

- About one in four infants need to be hospitalized and of these, about one in 400 will die and the same number will have permanent brain damage.
- There are one to three deaths each year from whooping cough in Canada (PHAC, 2006, p. 257).
- Antibiotics can be used to treat whooping cough, but they will not prevent the cough unless they are given early in the infection (Heymann, 2004, p. 404).

Vaccine Side Effects

- Pain, redness, and swelling at the injection site as well as fever, irritability, drowsiness, and less commonly persistent crying, and convulsions (PHAC, 2006, p. 264).

Pneumococcal

What is it?

- Caused by a common bacteria.
- Can cause severe ear infections, meningitis, pneumonia, or an infection of the blood (bacteremia).
- There are many different strains of these bacteria.

How does it spread?

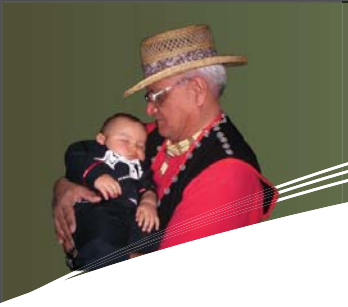
- The bacteria spread through direct contact with an infected person through coughing, sneezing, kissing, and sharing drinks, cutlery, lipstick, etc.

What are the symptoms?

- Some people will not look or feel sick.
- The symptoms depend on the type of infection For example, the symptoms of pneumococcal pneumonia are high fever, chills, muscle aches, headache, cough, chest pain, difficulty breathing, and fast breathing (Heymann, 2004, p. 413).

How serious is it?

- Young and elderly people are at increased risk of serious illness as well as people with other health conditions, such as diabetes, HIV/AIDS, heart or lung disease, or kidney failure.
- Up to half of infected people with underlying health conditions die from the disease.



- Up to one in five pneumococcal meningitis patients die even with treatment. About the same number have brain damage or deafness (Gold, 2006, p.303).

- Septicemia (a severe illness in which the bacteria infect the blood and damage the heart, lungs, kidneys, or other organs) can occur in people with underlying health conditions, such as AIDS. It kills up to 40% of patients (Heymann, 2004, p. 416).

Vaccine Side Effects

- Redness, swelling, and pain at the injection site can last for up to 2 days (Gold, 2006, p. 129).

- Fever and irritability are also common (Gold, 2006, p. 129; PHAC, 2006, p. 274).

Polio

What is it?

- This virus infects the throat then the intestines and spreads to the lymph nodes, blood, and some times to the spinal cord and brain (central nervous system) (Heymann, 2004, p. 425).

- Almost all infections cause no symptoms, but infected people who don't look or feel sick can spread the virus.

- One in 100 people who are infected with polio have the form of the disease that causes paralysis (Heymann, 2004, p. 425; PHAC, 2006, p. 277).

How does it spread?

- Through direct and indirect contact and through coughing or sneezing.

- Infected people can spread the virus in throat secretions for up to 1 week and

in their feces for up to 6 weeks.

- The virus can spread from food, water, or hands contaminated with feces (Hey mann, 2004, p. 427).

What are the symptoms?

- Some people may have minor symptoms, such as fever, headache, sore throat, muscle aches, nausea, vomiting, abdominal pain, and constipation.

- People with the severe form of polio will have weakness or paralysis of muscles including the muscles used for breathing.

How serious is it?

- Severe infections can permanently weaken or damage muscles causing paralysis (affects legs more often than arms).

- The virus can affect a person's ability to breathe and swallow and can be life-threatening. These patients may require mechanical ventilators to survive (called "iron lungs" in the past).

- Among people who are paralyzed from polio, about 5% to 10% will die (PHAC, 2006, p. 374).

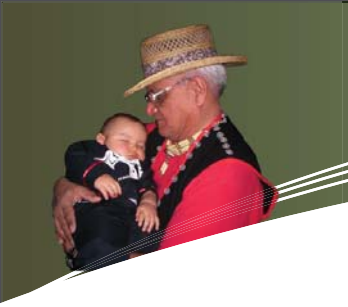
- There is no cure for polio.

Vaccine Side Effects

- Common side effects are pain and redness at the injection site (Gold, 2006, p. 92).

- Anaphylaxis has been reported rarely (PHAC, 2006, p. 282).

- The oral vaccine caused paralysis in one of every 2.4 million people vaccinated. (PHAC, 2006, p. 282) This vaccine is not used anymore in Canada.



Rubella

What is it?

- Caused by a virus (also called German measles).
- If a pregnant woman gets rubella in the first 20 weeks of pregnancy, the baby can be born with damage to the brain, eyes, ears, heart, or other organs (called "congenital rubella syndrome"). The risk is highest early in pregnancy but there are risks throughout the whole pregnancy.

How does it spread?

- Through an infected person's cough or sneeze.
- A person can be contagious a week before any symptoms start.
- Babies born with congenital rubella syndrome can spread the virus for months in their urine or saliva (Heymann, 2004, p. 466).

What are the symptoms?

- Symptoms are low fever, general aches and pains, swollen glands, and eye redness.
- A rash appears on the face and scalp about 2 days after the start of symptoms, and spreads over the whole body (similar to measles) (Heymann, 2004, p. 464).

How serious is it?

- Almost all babies born to women infected with rubella during the first trimester will get congenital rubella syndrome (CRS) (Heymann, 2004, p. 465). It can cause miscarriage, stillbirth, or effects on the baby, (i.e. congenital heart disease, cataracts, deafness, and mental deficiency) (PHAC, 2006, p. 375).
- Effects of CRS can appear years after birth and it may lead to diabetes and brain

swelling (encephalitis) later in life.

- Encephalitis occurs in one out of every 6000 cases of rubella, more often in adults (PHAC, 2006, p. 375).
- There is no treatment for rubella and there is no way to reverse the damage of CRS (Heymann, 2004, p. 468).

Vaccine Side Effects

- Rash, swollen lymph nodes, muscle pain or joint pain that can last up to 3 weeks after vaccination (PHAC, 2006, p. 303).
- Joint pain (most common in adult women) (Gold, 2006, p. 313).

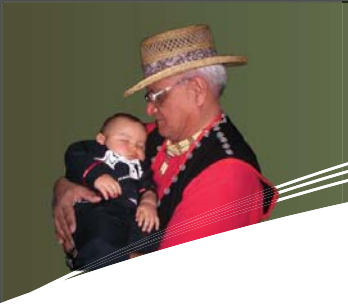
Tetanus

What is it?

- Bacteria that live in the intestines of humans and other animals.
- Have a special coating that allows them to live outside the body in the environment. They are very hard to kill.
- The bacteria produce a toxin that blocks nerves. Tetanus can make it hard to swallow and open your mouth and it can be fatal if it affects the muscles responsible for breathing.
- The vaccine is called Bacille Calmette-Guérin (BCG).

How does it spread?

- It does not spread from person to person.
- Infection occurs if bacteria in the environment get into the body through an injury (i.e. a puncture, scrape, or bite). The injury does not have to be severe to become infected. If it is



not cleaned and has been exposed to tetanus, the person can get sick.

What are the symptoms?

- The major symptom is long, uncontrollable, and painful muscle spasms.
- In many cases the first symptom is a spasm in the jaw muscle (another name for tetanus is "lock-jaw") (PHAC, 2006, p. 374).
- Other muscles can be affected including muscles in the neck, chest, abdomen, arms, leg, and face.

How serious is it?

- Tetanus is a serious disease (PHAC, 2006, p. 374). About one or two people out of every 10 infected will die from the disease even with treatment (Gold, 2006, p. 302).
- Newborn babies can get tetanus if the umbilical cord is cut using unclean tools.
- Tetanus can be treated with antitoxins and antibiotics and requires surgical cleaning of the wound to remove bacteria.

Vaccine Side Effects

- Redness and swelling at the injection, fever, swollen lymph nodes, and rarely brain or spinal cord swelling, and nerve problems in the shoulder causing pain and weakness of the arm rarely occur (PHAC, 2006, p. 313).
- Difficulty opening the mouth occurs in a few people (PHAC, 2006, p. 314).
- Anaphylaxis may occur.

Tuberculosis (TB)

What is it?

- TB affects the lungs and can affect other body parts.
- It can be in your body without making you sick. Most infected people will not have any symptoms or need any treatment (Heymann, 2004, p. 560).

How does it spread?

- Through an infected person's breathing, coughing, sneezing, or even talking (PHAC, 2008a).
- People who live in over crowded houses without good air circulation are at greater risk (PHAC, 2008a).

What are the symptoms?

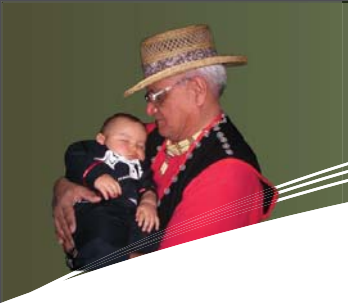
- The symptoms are cough, fever, night sweats, loss of appetite and weight loss.

How serious is it?

- TB can also infect the lungs, kidneys, brain, or spine.
- Treatment for TB can take up to 9 months.
- If untreated, many people with TB die within a few years (Heymann, 2004, p. 561).

Vaccine Side Effects

- Common side effects from the vaccine include redness and a small bump or divot at the injection site that can leave a scar (PHAC, 2006, p. 154).
- There may be swollen lymph nodes near the injection site (PHAC, 2006, p. 154). Less commonly, the lymph nodes become infected in up to 4 people out of every 1000 people



vaccinated (PHAC, 2006, p. 154).

- A serious complication of vaccination is BCG infection spread throughout the body which can occur in up to 1 out of every 1 million people vaccinated and can be fatal (PHAC, 2006, p. 154).

Varicella (Chickenpox)

What is it?

- It is caused by a very contagious virus (Gold, 2006, p. 303).
- Infection starts with a fever and leads to a rash of itchy red spots that turn into blisters filled with fluid.
- An infected person may have hundreds of spots. After about four or five days the spots dry out and the scabs fall off. The whole illness lasts between 7 and 10 days.

How does it spread?

- The virus spreads easily through exposure to drop lets in respiratory secretions or from direct contact with the rash.
- The rash can release the virus into the air.
- People are most contagious the day before the rash appears.

What are the symptoms?

- Before the rash, an infected person might have a fever, aches and pains, headache, and loss of appetite.
- The rash usually appears first on the face and scalp and spreads to the trunk, arms, and legs. The rash is usually itchy.

How serious is it?

- Chickenpox is usually mild (Gold, 2006, p. 305). Few

adults get chickenpox, but most chickenpox deaths are in adults (NACI, 2002, p. 3).

- Complications of chickenpox include ear infections, pneumonia, heart problems, skin infections, and encephalitis (brain swelling) (Heymann, 2004, p. 95).

- If a pregnant woman gets chickenpox, the baby may have damaged eyes or blindness, skin scars, abnormal growth of arms or legs, or brain damage. The risk is higher if the infection happens close to delivery. Between 17% and 30% of infants born to mothers infected at this time have severe chicken pox and effects on the brain, heart, and liver (PHAC, 2006, p. 328). One in five infected newborns dies without treatment.

- The virus can cause a pain ful rash of blisters called shingles years after the chickenpox (Heymann, 2004, p. 95).

Vaccine Side Effects

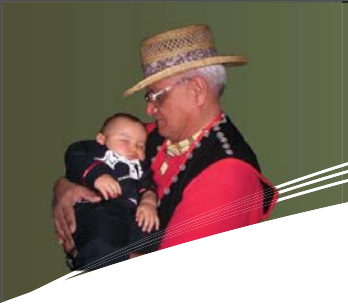
- Pain, swelling, and redness at the injection site in 10% to 20% of those vaccinated (PHAC, 2006, p. 337).

- Up to 5% of people vaccinated get a chickenpox-like rash (Kimmel, 2002, p. 2118).

Potential Longer Term Effects of the Vaccines

There are gaps in the information about long term effects of vaccines. Most studies only look at adverse events that occur within four weeks of vaccination (Ward, 2000, p. 207). Links have been made between vaccines and various conditions and disorders, but research hasn't been unable to confirm these links.

There will always be adverse events following immunization. This does not mean that the vaccine itself is responsible for the illness. Studies have not been to clearly show that vaccines cause long-term illnesses (PHAC, 2009a).



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