Vaccination of children and adolescents

Why vaccination is important?

Immunity (resistance against infection) is an important part of the body’s defence against infectious diseases. Following an illness, people often acquire life-long immunity to that disease, meaning they do not become ill with the same disease again. Vaccines allow the body to become immune without actually having to suffer the illness.

Once the majority of the population is vaccinated against a disease, there will be few people left for the disease to spread to. This makes it possible to keep a disease out of a country, something that also protects the few who are not vaccinated. Through the use of vaccines, it is possible to achieve global eradication of a disease. So far, smallpox is the only viral disease to be completely eradicated.

From an early foetal stage, a child’s immune system is already prepared to combat any diseases it encounters at birth. This is why infants are able to tolerate vaccines and even multiple vaccines simultaneously. Vaccines only use a small part of the child’s immune capacity and put less strain on the immune system than everyday infections such as a common cold.

All children residing in Norway are offered vaccinations against ten diseases; diphtheria, tetanus, whooping cough, infection with Haemophilus influenzae type B (Hib), pneumococcal disease, poliomyelitis, measles, mumps, rubella (German measles) and human papilloma virus (HPV). Some children are also offered vaccination against hepatitis B and tuberculosis. All of these diseases can cause life-threatening illnesses or result in severe complications. Vaccination protects against diseases in a simple, effective and harmless way. This has been confirmed through research and more than 50 years of experience.

Basic vaccinations are administered at public health centres. Children usually receive their first vaccinations at 3 months old and follow the programme in the table on the next page. Booster doses of vaccines are administered once the child has reached school age. All of the vaccines are administered by injection. None of the vaccines in the childhood vaccination programme contain mercury-based preservatives.

Vaccination is not compulsory.
**Combination vaccines** Combination vaccines have been used since the Norwegian childhood vaccination programme began in 1952. Vaccines against multiple diseases are combined into one injection. This means fewer injections for the child and less additives in the vaccines. A combination vaccine has fewer side-effects than when each vaccine is administered separately.

<table>
<thead>
<tr>
<th>Child’s age</th>
<th>Vaccination against</th>
<th>No. of injections</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 months</td>
<td>Diphtheria, tetanus, whooping cough, poliomyelitis and Hib infection (DTP-IPV-Hib), pneumococcal disease</td>
<td>2</td>
</tr>
<tr>
<td>5 months</td>
<td>Diphtheria, tetanus, whooping cough, poliomyelitis and Hib infection (DTP-IPV-Hib), pneumococcal disease</td>
<td>2</td>
</tr>
<tr>
<td>12 months</td>
<td>Diphtheria, tetanus, whooping cough, poliomyelitis, Hib infection (DTP-IPV-Hib), pneumococcal disease</td>
<td>2</td>
</tr>
<tr>
<td>15 months</td>
<td>Measles, mumps, rubella (MMR)</td>
<td>1</td>
</tr>
<tr>
<td>7-8 years (2nd grade)</td>
<td>Diphtheria, tetanus, whooping cough and poliomyelitis (DTP-IPV)</td>
<td>1</td>
</tr>
<tr>
<td>11-12 years (6th grade)</td>
<td>Measles, mumps, rubella (MMR)</td>
<td>1</td>
</tr>
<tr>
<td>12-13 years – girls (7th grade)</td>
<td>Human papillomavirus (HPV), (vaccine against cervical cancer) 3 doses in total</td>
<td>1 per dose</td>
</tr>
</tbody>
</table>
| 15-16 years (10th grade) | Poliomyelitis (up to children born in 1997)  
Diphtheria, tetanus and poliomyelitis (from children born in 1998) | 1                 |
|            | Tuberculosis (BCG), 1 dose *                             |                   |
|            | Hepatitis B, 3 or 4 doses                                 |                   |

* For children in defined risk groups (normally given in infancy). Booster doses may be required for adults subjected to conditions involving an increased risk of infection, e.g. when travelling abroad.
Before vaccination

The public health nurse will ask whether the child is healthy and if there has been a reaction to any previous vaccines. Remember to inform the public health nurse if the child has recently taken any form of medication or has any allergies or other health problems.

Vaccinating a child who has a cold or is slightly under the weather is completely safe. However, it is normal to postpone the vaccination in the event of an acute illness or if the child has a fever over 38 degrees.

After vaccination

Most children will experience little or no reaction after vaccination. If the patient has a fever above 39 degrees and/or is experiencing a decline in their general condition, it may be a sign of a serious illness and is not necessarily a reaction to the vaccine. Always contact a doctor if you are concerned about the child's health. Most children either experience a mild reaction or no reaction at all following vaccination.

POSSIBLE REACTIONS TO VACCINES (SIDE EFFECTS)

- Redness, swelling and pain around the site of the injection may occur after any vaccine and may last a few days.

- 1 in 10 children experience a mild fever, restlessness, crying, drowsiness, feeling unwell or loss of appetite for 1-2 days after vaccination. A temperature of more than 39 degrees is unusual.

- A rapid rise in body temperature can lead to harmless “fever cramps” in small children. Contact a doctor to rule out any acute illness.

- Pallor, feeling unwell or fainting after vaccination is more common in older children than in infants, and is nearly always due to the child reacting to the injection/pain or the situation.

- Rarely, vaccination may trigger an allergic reaction. The most dangerous allergic reactions occur shortly after vaccination. For this reason the child must remain at the public health centre for at least 20 minutes after the vaccination has been administered. health centre for at least 20 minutes after the vaccine has been administered.
Vaccine against diphtheria, tetanus, whooping cough, poliomyelitis and Hib infection

**DIPHTHERIA**
is an nose and throat infection caused by the diphtheria bacteria. The bacteria produce toxins which attack the heart, kidneys and nerve tissue. The illness can be fatal. During and just after the second world war there were diphtheria epidemics in Norway. After the introduction of a vaccination in 1952 only a few cases of the illness have been reported, caused by infection abroad. Diphtheria still exists in some places in Europe and other parts of the world.

**TETANUS**
is caused by bacteria found in soil. Infection occurs when the bacteria come into contact with an open wound. The disease is not transmitted from person to person. The bacteria produce toxins which attack the nervous system, causing muscle stiffness and painful cramps. Tetanus has a high mortality rate. It is less common in the Nordic region than in warmer climates.

**WHOOPING COUGH**
is a long-lasting (6-12 weeks) respiratory infection characterised by severe coughing fits. The disease is highly contagious; almost 100 per cent of people contracted the disease before vaccination was introduced. It can be dangerous for small children, particularly infants. Whooping cough can lead to brain damage due to a lack of oxygen during coughing fits, and in rare cases it can be fatal.

**POLIOMYELITIS**
is a virus which normally results in cold-like symptoms, body aches or diarrhoea. It can also lead to meningitis (encephalitis) and result in permanent paralysis. It can sometimes be fatal. Before vaccination was introduced in 1957 there were annual polio epidemics in Norway, with several hundred children and adolescents being left permanently paralysed. Up to 10 per cent died. After the introduction of vaccination, the illness has been brought under control in Norway and a number of other countries. Europe was declared polio-free in 2002. However, the disease still exists in several countries in Africa and Asia. Unvaccinated people can become infected while travelling and can infect other unvaccinated people on their return.

**HIB INFECTION**
Before a vaccine became available the Haemophilus influenzae type b (Hib) bacteria was the most common cause of meningitis in children under the age of five in Norway. Hib can also result in other serious infections, such as pneumonia and inflammation of the joints and epiglottis. After the introduction of the vaccine in 1992, Hib infections have become almost non-existent in Norway.
FIVE-COMPONENT VACCINE AGAINST DIPHTHERIA, TETANUS, WHOOPING COUGH, POLIO AND Hib

The vaccines against diphtheria and tetanus are based on toxins produced by the bacteria, but with the toxic effect removed. The whooping cough vaccine is made of purified portions of the whooping cough bacteria. The polio vaccine contains inactivated (dead) polio virus molecules deriving from the three strains that cause illness in humans. The Hib vaccine is made by bonding a portion of the bacteria’s polysaccharide (sugar) capsule to a protein. None of the vaccine components are live.

After receiving the three doses as specified in the child vaccination programme, children have permanent immunity against Hib infection, at least 10 years’ immunity against tetanus, diphtheria and polio, and around 5-6 years’ immunity against whooping cough.

Side effects

One in ten of those vaccinated experience restlessness, irritability, crying, drowsiness, loss of appetite or feeling unwell for 1-2 days after vaccination. It is sometimes difficult to know if such symptoms are due to the vaccine or some other cause.

Redness, swelling and pain around the site of the injection also occurs after 1 in 10 vaccinations, and can last for several days. Major, painful reactions are rare.

One in 10 of those vaccinated may experience brief episodes of mild fever, but less than 1 in 100 cases have a fever of more than 39 degrees. If this happens, contact a doctor because the fever may be due to a different cause.

FOUR-COMPONENT VACCINE AGAINST DIPHTHERIA, TETANUS, WHOOPING COUGH AND POLIO

The combined vaccine against diphtheria, tetanus, whooping cough and poliomyelitis is offered as a booster dose to young schoolchildren, normally in 2nd grade. Immunity lasts until a new dose is given in 10th grade.
Vaccine against pneumococcal disease

PNEUMOCOCCAL DISEASE
There are more than 90 different strains of Streptococcus pneumoniae bacteria. Several of these can cause illnesses in humans, most commonly pneumonia, sinusitis and otitis media (middle-ear infection). Sometimes an infection can take a more serious turn, resulting in blood poisoning (septicaemia) or meningitis. Pneumococcus can cause illness in both adults and children, with different strains more prevalent in different age groups. The majority of cases of serious pneumococcal-related illness occur among the youngest children, people over the age of 65 and those suffering from particular risk factors.

Before vaccination was introduced 60-80 children under the age of two became seriously ill from pneumococcal infections each year. The majority of these children had previously been healthy and not particularly susceptible to illness.

THE PNEUMOCOCCAL VACCINE
The vaccine administered through the child vaccination programme has been specially developed for infants. It is made by bonding part of the bacterium’s polysaccharide (sugar) capsule to a protein. The vaccine provides immunity to seven strains of pneumococcus, which together cause 70 per cent of the serious pneumococcal infections in children under the age of two. The vaccine is also expected to lead to fewer cases of otitis media caused by these strains of bacteria. The vaccine does not provide any immunity against other strains of pneumococcus than the seven included in the vaccine, nor does it provide immunity against illnesses caused by other bacteria or viruses.

The infant vaccine against pneumococcus is administered at the same time as the combination vaccine against diphtheria, tetanus, whooping cough, poliomyelitis and Hib.

Side effects
More than 10 per cent of those vaccinated experience redness, swelling, tenderness or pain around the site of the injection, which can last for several days.

Some children experience restlessness, irritability, crying, drowsiness, loss of appetite or feeling unwell for 1-2 days after vaccination. It is sometimes difficult to know if such symptoms are due to the vaccine or some other cause.

A mild fever may occur.
Vaccine against measles, mumps and rubella (The MMR vaccine)

MEASLES
is the most serious childhood illness. It is extremely contagious. More than 99 per cent of those who grew up before the advent of vaccination caught the disease. It starts with cold-like symptoms and a high temperature, followed by a rash. Measles often results in complications such as pneumonia, bronchitis and middle ear infection. Serious complications such as meningitis (encephalitis), permanent brain damage and death can occur. Globally, some 350,000 children die of measles every year. Outbreaks of potentially fatal measles also occur among unvaccinated people in our part of the world.

MUMPS
is a viral infection resulting in a high temperature and swollen salivary glands. The most common complication is mumps meningitis, from which the patient generally recovers without permanent damage. A more serious complication is permanent deafness. If a boy catches mumps after puberty the virus can affect the testicles and lead to reduced fertility, but sterility is unlikely.

RUBELLA
often called German measles, is a mild disease causing fever and a rash in both adults and children. However, if a pregnant woman who is not immune to the disease catches rubella it may seriously harm the unborn baby. There is a more than 80 per cent risk of deformity if the mother catches rubella in early pregnancy.

The most common method of infection is through contact with children who have the disease. In some outbreaks unvaccinated men have been the source of infection. It is therefore important that all children are vaccinated.

THE MMR VACCINE
The vaccine against measles, mumps and rubella is known as the MMR vaccine. It is a combination vaccine made up of live, weakened measles, mumps and rubella viruses. The first MMR inoculation, which is normally administered when the child is 15 months old, gives over 90 per cent of those vaccinated many years of immunity, possibly life-long. A new dose is administered when children are 12 years old, to ensure immunity for the remaining 10 per cent and to ensure long-term protection. It is not harmful to vaccinate a person who has already had one or more of the diseases.

Parents/guardians must inform the clinic if the child’s health is poor or they are taking medication.

Side effects
In 1997 it was suggested that the MMR vaccine could cause autism. A number of wide-ranging studies have subsequently been carried out, none of which found any evidence that the MMR vaccine causes autism or any other form of brain damage.
Vaccine against cervical cancer (HPV vaccine)

Cervical cancer is a serious illness. Every year in Norway 250-300 women are diagnosed with this disease and 75-100 of die of it. In addition around 3,000 women each year undergo surgery after the discovery of changes in cervical cancer cells that, if left untreated, would lead to cancer. Pregnant women who have previously had such an operation will have an increased risk of miscarriage or premature birth.

Cervical cancer is caused by a virus called human papillomavirus (HPV). There are many different strains of HPV. Each strain is designated by a different number. At least 12 strains of HPV can cause cervical cancer. The two most common ones are HPV 16 and HPV 18. In Norway these two strains together cause around 70 per cent of cervical cancer cases. Other types of HPV can cause warts around the genitals/anus, but do not cause cancer. Almost all genital warts are caused by HPV 6 or HPV 11.

HPV is transmitted extremely easily through sexual contact and normally produces no symptoms. Most people will get an HPV infection at some time in their lives, most commonly at a young age. The HPV infection disappears by itself in most cases. A long-lasting infection with a cancer-causing HPV strain can result in cell changes that may lead to cervical cancer. This process normally takes 10 to 30 years.

THE HPV VACCINE

The vaccine is made of synthetic particles which mimic part of the surface of a real HPV virus molecule. The vaccine is not live. The HPV vaccine provides immunity against HPV 16 and 18 and the pre-stages to cervical cancer caused by these two HPV strains. The HPV vaccine that is included in the child vaccination programme also prevents the development of genital warts caused by the HPV strains 6 and 11.

The vaccine offers more than 95 per cent immunity to HPV 6, 11, 16 and 18. Experience shows that the vaccine continues to have a protective effect 5-6 years after vaccination. The length of time that immunity lasts is being closely monitored by the regulatory authorities for medicines. If necessary, a booster dose will be recommended.

The HPV vaccine was first offered to girls in 7th grade in the 2009/2010 school year. The vaccine is administered as an injection in the upper arm. Full immunisation is achieved after three doses of the vaccine given over a period of 6-12 months.

Since the HPV vaccine has a preventive effect, girls should be vaccinated before they are exposed to infection. The vaccination programme therefore offers the HPV vaccine to girls well before the average age at which girls in Norway become sexually active.

Side effects

The most common side effect of the HPV vaccine is swelling and tenderness in the arm in which the vaccine was given. This disappears after a few days. A brief, mild fever, headache, nausea, vomiting, diarrhoea and stomach pains have also been reported.

Like any other vaccine the HPV vaccine may in rare cases trigger an allergic reaction in the form of a rash and itching shortly after vaccination. In extremely rare cases more serious allergic reactions may occur. Healthcare professionals who administer the vaccine are prepared to deal with any such eventuality.
Vaccine against tuberculosis

**TUBERCULOSIS**
Tuberculosis (TB) is an infection caused by tuberculosis bacteria. The disease is transmitted by inhalation of droplets released into the air when an infected person coughs or sneezes. TB generally affects the lungs, but can also infect other organ systems such as the meninges (the membranes enveloping the brain and spinal cord), lymph nodes, intestines, bones, joints and kidneys. TB is rare in Norway. Up until 1997 the number of cases was falling, but there has been a slight increase in recent years due to a rise in immigration from countries with high rates of tuberculosis. Today, Norway has one of the lowest rates of tuberculosis infection in the world, with 250-300 new cases each year.

**TUBERCULIN TEST**
A tuberculin skin test is performed before BCG vaccination to people who may have been exposed to tuberculosis infection. Anyone who has become infected, and the majority of those who have already been vaccinated, will, after 2-3 days, experience a red swelling of the skin around the site of the test. This is called a *positive reaction*. Those who are tuberculin positive should not have the BCG vaccine. Those who have not previously been infected, and have not already been vaccinated with BCG, do not react to the tuberculin test. These people are tuberculin *negative*, and can be given the BCG vaccine. If it is not likely that the person concerned has come into contact with the tuberculosis bacteria, the BCG vaccine can be administered without the tuberculin test being performed beforehand.

**THE TUBERCULOSIS VACCINE**
The vaccine is made of live, attenuated (weakened) bacteria, Bacille Calmette Guérin, hence the name BCG. The vaccine is administered by an injection in the upper left arm. Normally, after a couple of weeks a pimple or small, weeping sore will appear at the site of the injection. At the same time the lymph nodes under the arms may become swollen. The sore does not hurt and will heal quickly.

Around 80 per cent of those who are vaccinated become immunised to tuberculosis. Immunity occurs 1-3 months after vaccination and is long-lasting.

The BCG vaccine is offered to children from families with links to countries where tuberculosis is common. It is recommended that the vaccine be given to infants shortly after birth. If someone in the immediate vicinity is diagnosed with TB, those who are tuberculin negative will be vaccinated.

Parents or guardians must notify the clinic if a child is in poor health or is taking medication. Those with HIV should not normally be given the BCG vaccine.

**Side effects**
Local reactions which are more intense or last longer than expected are rare. Swollen lymph nodes near the site of the injection can occur. This may feel unpleasant, but is not dangerous. In extremely rare cases, medication may be prescribed.
Vaccine against hepatitis B

**HEPATITIS B**

is an inflammation of the liver that is caused by the hepatitis B virus. The virus is found in blood and other bodily fluids containing blood. The disease is transmitted through mucus membranes or skin lesions, e.g. puncture with a bloody syringe, blood transmission or sexual contact. The virus cannot penetrate undamaged skin. Over 90 per cent of infants who become infected go on to become carriers of the disease unless they receive preventive treatment. The risk of becoming a carrier falls rapidly through childhood and is less than 5 per cent for those infected as adults. Due to a weakness in their immune systems people with Downs syndrome have a high risk of becoming hepatitis B carriers if they become infected.

Carriers of hepatitis B face a long-term risk of developing cirrhosis of the liver or liver cancer. Carriers are also the most common source of hepatitis B infection. It is therefore important to reduce the number of carriers as much as possible.

**THE HEPATITIS VACCINE**

A portion of the hepatitis B virus gene is cloned into yeast, and the vaccine for hepatitis B is produced from cultures of this.

Under the child vaccination programme the hepatitis B vaccine is offered to children whose parents come from countries where there is a high rate of hepatitis B infection.

In addition, the hepatitis B vaccine is offered free of charge to other people who
- have an increased risk of becoming infected
- have an increased risk of becoming a carrier if they become infected.

The Ministry of Health and Care Services has issued guidelines specifying who should be offered the vaccine.

The hepatitis B vaccine can be administered at any time from birth to adulthood. Normally it is given in three doses with a gap of at least four weeks between the first and second doses, and at least five months between the second and third doses. Around 95 per cent of those vaccinated with three doses achieve long-term (often life-long) immunity.

**Side-effects:**
The hepatitis B vaccine produces few side effects. The most common are pain, redness and swelling around the site of the injection. Fever, rash, drowsiness, feeling ill, aching joints and muscles in the first few days after vaccination have also been reported.
National vaccination register (SYSVAK)

SYSVAK is a central, electronic vaccination register which covers vaccines administered through the child vaccination programme. The purpose of SYSVAK is to keep an overview of the individual person's vaccination status and monitor vaccination coverage nationwide. The register is also a tool to ensure that the health service can offer all children adequate vaccination coverage.

SYSVAK includes details of an individual's name, Norwegian personal identity number, address, vaccine given and vaccination date. For those without an identity number other identification details are recorded. Previous vaccinations not recorded in SYSVAK may be registered subsequently.

SYSVAK is regulated by the Personal Health Data Registration Act. It is not possible to refuse registration of vaccinations administered under the national child vaccination programme.

The person registered (and the child's parents/guardians) are entitled to know what information has been registered about them in SYSVAK. Vaccination details are collected and stored in accordance with the regulations applicable to the health service with respect to personal privacy and data security.

A complete vaccination certificate may be printed out on the basis of the data contained in the SYSVAK register. This is normally carried out by the school health service/local authority health service.

Do you have any questions?

If you have any questions which have not been answered in this brochure, please contact your nearest child health clinic.