Exanthem infectious diseases are a popular topic in exams, especially in pediatrics. Get a brief overview of the most important diseases, including important distinctive characteristics.

Measles (Rubeola)
Measles is a typical childhood disease. The causative organism is the measles virus (morbillivirus) — an ribonucleic acid (RNA)-virus which can be passed on by droplets or airborne (flying infection) over a long distance. The high contagiousness and infectivity are characteristic of the disease. People who are not vaccinated and infect themselves regularly will contract the disease.

Firstly, the virus infects the lymphatic tissue of the upper respiratory tract (prodromal stage) before a viremic showing with an occurrence of the measles exanthema (exanthema stage) takes place.

Pathology of the Measles

After an incubation period of approx. 2 weeks, typical prodrome in the form of high temperature, pharyngitis (a sore throat), rhinitis, bronchitis, conjunctivitis, and
photophobia occur. At this point, patients are already infectious. By the end of the prodromal stage, which lasts for 2—3 days, the measles-characteristic Koplik’s spots at the buccal mucosa, located in the amount of the lower molars, occur.

The temperature decreases again initially and reaches another peak with the occurrence of the measles exanthema (twin-peaked increase in fever). The extensive brownish impressive exanthema characteristically starts behind the ears and spreads from this point over the whole body. The exanthema stage takes 7—10 days.

Note: Children infected with measles are seriously ill (high temperature). Pathognomic is a biphasic course of disease with a twin-peaked increase in fever.

Complications of the Measles

The measles virus is a lymphotropic virus which causes a weakening of the immune system. This can especially trigger grave consequences in the case of immune-compromised patients: besides bacterial superinfections (otitis media, pneumonia, and laryngotracheitis) the virus itself can cause serious after-effects. This includes measles pneumonia and the measles encephalitis. The latter stands for 1 of the most feared complications and can be divided into 3 forms according to its occurrence and course of the disease:

Post-infectious measles encephalitis occurs approx. 1 week after the start of the exanthema and accompanies neurological symptoms (disturbed consciousness and seizures amongst others). The lethality of the disease is very high at a rate of approx. 25%.

Subacute sclerosing panencephalitis (SSPE): The SSPE is a late complication of the measles which rarely proceeds lethally and occurs typically after 6-8 years of an undergone measles infection.

Measles inclusion body encephalitis (MIBE): The MIBE is a measles complication which only occurs in the case of immunocompromised patients and is afflicted with a high lethality (30%).

Note: Typical measles complications are evoked by bacterial superinfections. In the case of immune-deficient patients, the measles virus can especially cause grave lethal courses.

Diagnosis of the Measles

The diagnosis is made with the aid of the clinic and the virus-specific immunoglobulin M (IgM) antibodies in the serum.

Therapy and Prevention of the Measles

As no causal therapy is available, the prevention of measles in early childhood is crucial. The Standing Vaccination Committee at the Robert-Koch-Institute (STIKO), therefore, recommends a basic immunization against measles (live vaccine) from the completed 11th month of life, which should be followed by a 2nd vaccine during the 2nd year of the child’s life (15th-23rd month).

In the meantime, vaccines against mumps, and rubella, as well as varicella, should be administered as part of most countries’ vaccine schedules. For this purpose, combination vaccines are available for which the STIKO pronounced the following recommendation:
Vaccination date (11-14th month): 3-fold combination vaccine against mumps, measles, and rubella (MMR) + varicella vaccination on another body part (contralateral arm). If both vaccinations are not executed after the 1st vaccination date, a minimal period of 4 weeks until the next vaccination should be maintained.

Vaccination date (15th–23rd month): 4-fold combination vaccine (MMR-V) possible.

**Note:** Live vaccines should either be executed simultaneously or consecutively, provided that a minimal period of 4 weeks is maintained!

**Post-exposition prevention:** After the exposition of unvaccinated persons, an immunization within the 1st 3 days after the initial contact is appropriate. In the case of a person at risk (pregnant women, immunocompromised patients, infants < 6 months), passive immunization with human Ig within a period of 2-6 days can be considered following the post-exposure.

**Rubella (German Measles)**

Rubella is a viral childhood disease which is communicated via droplet infection. The disease is especially dangerous for pregnant women as a diaplacental transmission on the unborn child with the following grave organ complications (rubella embryopathy) that may occur.

**Pathology of Rubella**
The 1st symptoms occur after an **incubation period of 2-3 weeks**. As the virus initially spreads in the lymph nodes, at 1st, **painful lymphomas** impress in the **cervical, retro-auricular, and occipital lymph nodes**.

A headache and a general feeling of malaise can occur collaterally but are not obligatory. **Five to seven days** after the 1st symptoms (lymph node disease), a **rubella exanthema** appears which starts like the measles **behind the ears** and spreads from this point over the whole integument.

**Note:** The **painfully swollen lymph nodes at the outset** of the infection are typical for a rubella infection!

**Complications of Rubella**

Complications arise especially for the unborn child as far as the mother contracts from rubella **for the 1st time during the pregnancy**. The danger of malformations is especially high in early pregnancy (the 1st 2 months of the pregnancy). Typical organ damages are summarized as **Gregg-Trias** according to the 1st person to describe them: **labyrinthine deafness, cataract, heart defect** (septal defects among others).

In the case of a person who fell ill in the postnatal stage, self-limiting **arthritides** can occur. Complications of the nervous system (**encephalitis, encephalomyelitis**) and/or the hematopoietic system (**thrombocytopenic purpura**) are very rare.

**Diagnosis of Rubella**
The diagnosis of the rubella infection happens serologically according to the detection of rubella immunoglobulin M (IgM) in blood samples which are taken at 2 different points in time where the increase in titer is proving. Used methods are the hemagglutination-inhibition test (method of choice) or the ELISA.

In the case of pregnant women, direct pathogen detection in the maternal blood, as well as in the amniotic fluid (amniocentesis), or rather in the fetal blood (cordocentesis), should be striven for.

**Therapy and Prevention of Rubella**

There is no therapy for rubella infection. The STIKO, therefore, recommends the vaccination of all infants at the vaccination proficient age. The general immunization takes place as an injection of the **attenuated live vaccine** which is done twice from the **completed 11th month of life** at the same time as the measles and mumps vaccination (see measles).

If the vaccination is not successful in infancy, it is meant to be fetched later in the case of girls and child-bearing women. If the 2nd vaccination dose was not administered, it is meant to be fetched later preferably until the age of 18 according to the recommendation of the STIKO. For child-bearing women, a catch-up is generally possible at a later point in time as well.

In the course of pregnancy, the examination of the rubella titer is part of the initial
examination. Demonstrable immunity exists at a rubella IgM titer > 1:32 in the hemagglutination-inhibition test (HAH), but is also assumed at a titer of 1:16.

**Chickenpox (Varicella)**

Causative organisms of chickenpox are the varicella-zoster virus (VZV), a deoxyribonucleic acid (DNA) virus which is part of the group of the human herpesviruses (HHV3). The communication happens via contact with the infectious (virus-containing) content of blisters or airborne. Like the measles virus, the VZV has high contagiousness as well.

**Pathology of Chickenpox (Varicella)**

The varicella typical skin eruptions, which show a stage-like development of reddish papules up to blisters filled with pathogens and pustules, occur after an incubation period of about 14 days. The blisters finally scab and heal by crust formation. As new efflorescences recurrently occur, there is a "colorful picture" of efflorescences of different ages (so-called Heubnersche-Sternenkarte).

The exanthema is accompanied by a prominent itching and affects the skin as well as the hairy scalp. Additionally, there is an enanthem of the mucosas. High temperature can occur as an attendant symptom; however, there usually is no dominant feeling of malaise.

**Complications of Chickenpox (Varicella)**

In general, there is a danger of bacterial superinfections which affect primarily the skin and result from the scratching of the blisters. Beyond that, bacterial inflammations of the middle ear (otitis media) and pneumonia can occur.

Viral complications are rare. Pneumonia is as depicted as meningitides and encephalitides. The chickenpox disease is marked with complications in the pregnancy as the virus can be communicated diaplacentarily onto the fetus. If the mother falls ill within the 1st and 2nd trimester, a grave infection of the fetus with malformations of the limbs (extremity hypoplasia), as well as damages of the skin and the organs, can occur (varicella syndrome). Furthermore, newborns can fall severely ill if the mother falls ill 5 days before until 2 days after the birth (neonatal varicella).

**Shingles of Chickenpox (Varicella)**
The varicella typical skin eruptions, which show a stage-like development of reddish papules up to blisters filled with pathogens and pustules, occur after an incubation.

The VZV persists after a previous infection within the spinal ganglions and can be reactivated by transient (e.g. stress) or a continuous immune impairment.

The clinical appearance complies with the 1 of chickenpox but is restricted to the dermatome of the affected skin nerves. Neuralgiform pain is typical which precedes the efflorescences and can continue after the subsidence of the exanthema (postzosterneuralgy). Occasionally, high temperature and a general feeling of malaise arise.

**Diagnostics of Chickenpox (Varicella)**

Chickenpox is a visual finding. A pursuing diagnosis is regularly not necessary. The intrauterine varicella infection in early pregnancy constitutes an exception (until the 21st week of pregnancy) for which detection of pathogens (PCR) in the amniotic fluid (amniocentesis) should be strived for.
Therapy of Chickenpox (Varicella)

**Zinc mixtures**, which can be combined with systemically effective antihistamines, are applied to the skin in order to reduce the itching. An administering of **acyclovir** is indicated in the case of neonatal varicella infection.

A birth should generally not take place in the exanthema stage of the mother. Per the exposition of pathogens, an early delivery should be strived for.

In the case of shingles, an administering of acyclovir, in relation to the gravity of the complaints, can be considered. A pain management therapy, according to the World Health Organization (WHO) level scheme, is to be introduced for the treatment of the neuralgia.

Prevention of Chickenpox (Varicella)

The varicella vaccination takes place analogous to the measles and rubella vaccination (see above) by an **attenuated live vaccine**. The **STIKO** recommends for the 1st vaccination to carry out the varicella vaccination separately to the triple vaccination (MMR). For the 2nd vaccination, the available 4-fold combination vaccine (MMR-V) can be used.

The general immunization should be fetched up if the vaccination did not take place in infancy.

For un-vaccinated persons, a vaccination can take place post-expositional after the contact to infected persons.

Passive **immunization** with varicella-zoster immunoglobulin (VZIG) should take place within a period of 96 hours after the contact with an infected person in the case of at-risk patients. These include:

- Un-vaccinated pregnant women without varicella in the anamnesis
- Immunodeficient people
- Newborn babies without symptoms, as long as the mother falls ill within the critical period around the birth (5 days before until 2 days after the birth)

References


**Legal Note**: Unless otherwise stated, all rights reserved by Lecturio GmbH. For further legal regulations see our legal information page.