# 10. **Childhood fevers** (Measles Mumps and Rubella)

**Fever**, also known as **pyrexia** and **febrile response**, is defined as having a temperature above the normal range due to an increase in the body's temperature set-point. There is not a single agreed-upon upper limit for normal temperature with sources using values between **37.5 and 38.3 °C (99.5 and 100.9 °F)**. Rarely a fever may trigger a **febrile seizure**. This is more common in young children. Fevers do not typically go higher than **41 to 42 °C (105.8 to 107.6 °F)**. Fever is one of the most common medical signs. Treatment of associated pain and inflammation, however, may be useful and help a person rest. Medications such as ibuprofen or paracetamol may help with this as well as lower temperature. Children younger than three months require medical attention.

Viral infections are common among people of all ages but often seem to be concentrated in infants and children. Most childhood viral infections are not serious and include such diverse illnesses as colds with a sore throat, vomiting and diarrhea, and fever with a rash. Some viral illnesses that cause more serious disease, such as measles, are less common now due to widespread immunization. Most children with viral infections get better without treatment, and many viral infections are so distinctive that a doctor can diagnose them based on their symptoms. A doctor usually does not need to have a laboratory identify the specific virus involved.

**Some common viral infections in infants and children causing febrile illness are:**

1. **Measles**
2. **Mumps**
3. **Rubella**

**MMR stands for Measles Mumps & Rubella.**

**MUMPS: febrile illness with Parotitis. i.e. swelling of parotid and submaxillary glands.**

**MEASLES: fever with maculopapular rash (2-5days). Characteristic spots called Kopliks spots inside the cheek and mouth which are diagnostic features.**

**RUBELLA is a mild disease but severe if contracted in pregnancy.**

**MMR vaccine is given to eradicate Measles Mumps and Rubella in 2nd year of life.**

**Measles:**

**Measles** is a highly contagious infection caused by the measles virus. Initial signs and symptoms typically include **fever, often greater than 40 °C (104.0 °F), cough, runny nose, and inflamed eyes**. Two or three days after the start of symptoms, small white spots may form inside the mouth, known as **Koplik's spots.** A red, flat rash which usually starts on the face and then spreads to the rest of the body typically begins three to five days after the start of symptoms. **Symptoms usually develop 10–12 days after exposure to an infected person and last 7–10 days**.

**Measles is an airborne disease** which spreads easily through the coughs and sneezes of those infected. It may also be spread through contact with saliva or nasal secretions. Nine out of ten people who are not immune and share living space with an infected person will catch it. People are infectious to others from four days before to four days after the start of the rash. People usually do not get the disease more than once. Testing for the virus in suspected cases is important for public health efforts.

The measles vaccine is effective at preventing the disease. Vaccination has resulted in a 75% decrease in deaths from measles between 2000 and 2013 with about 85% of children globally being currently vaccinated. No specific treatment is available. Supportive care may improve outcomes. This may include giving oral rehydration solution (slightly sweet and salty fluids), healthy food, and medications to control the fever. Antibiotics may be used if a secondary bacterial infection such as pneumonia occurs. Vitamin A supplementation is also recommended in the developing world.

# Signs and symptoms

Koplik's spots on the third pre-eruptive day

The classic signs and symptoms of measles include four-day fever.

# Cause

**Measles is caused by the measles virus, a single-stranded, negative-sense, enveloped RNA virus of the genus *Morbillivirus* within the family *Paramyxoviridae*.** The virus was first isolated in 1954 by Nobel Laureate John F. Enders and Thomas Peebles, who were careful to point out that the isolations were made from patients who had Koplik's spots. Humans are the only natural hosts of the virus. **This highly contagious virus is spread by coughing and sneezing via close personal contact or direct contact with secretions.**

# Diagnosis

**Clinical diagnosis of measles requires a history of fever of at least three days, with at least one of the three C's (cough, coryza, conjunctivitis). Observation of Koplik's spots is also diagnostic of measles.**

## Laboratory testing

Alternatively, laboratory diagnosis of measles can be done with **confirmation of positive measles IgM antibodies or isolation of measles virus RNA from respiratory specimens.** For people unable to have their blood drawn, saliva can be collected for salivary measles-specific IgA testing. Positive contact with other patients known to have measles adds strong epidemiological evidence to the diagnosis. Any contact with an infected person, including semen through sex, saliva, or mucus, can cause infection.

# Prevention

**In developed countries, it is recommended that children be immunized against measles at 12 months, generally as part of a three-part MMR**

**vaccine (measles, mumps, and rubella).** The vaccine is generally not given before this age because such infants respond inadequately to the vaccine due to an immature immune system. A second dose of the vaccine is usually given to children between the ages of four and five, to increase rates of immunity.

In developing countries where measles is endemic, WHO doctors recommend two doses of vaccine be given at six and nine months of age.

### Treatment

There is no specific treatment for measles. Most people with uncomplicated measles will recover with rest and supportive treatment.

## Mumps

**Mumps is a viral disease caused by the mumps virus. Initial signs and symptoms often include fever, muscle pain, headache, and feeling tired. This is then usually followed by painful swelling of one or both parotid salivary glands**. Symptoms typically occur 16 to 18 days after exposure and resolve after seven to ten days. Symptoms in adults are often more severe than in children. About a third of people have mild or no symptoms.

Mumps is highly contagious and spreads rapidly among people living in close quarters. **The virus is transmitted by respiratory droplets or direct contact with an infected person**. Only humans get and spread the disease. People are infectious to each other from about seven days before the start of symptoms to about eight days after. Once an infection has run its course, a person is typically immune for life. Diagnosis is usually suspected due to parotid swelling and can be confirmed by isolating the virus on a swab of the parotid duct. Testing for IgM antibodies in the blood is simple and may be useful; however, it can be falsely negative in those who have been immunized.

Mumps is preventable by two doses of the mumps vaccine. Most of the developed world includes it in their immunization programs, often in combination with measles, rubella, and varicella vaccine. Countries that have low immunization rates may see an increase in cases among older age groups and thus worse outcomes. There is no specific treatment. Efforts involve controlling symptoms with pain medication such as paracetamol. About one per ten thousand people who are infected die.

### Signs and symptoms

Mumps is usually preceded by a set of prodromal **symptoms including low-grade fever, headache, and malaise.** This is followed by progressive

swelling of one or both parotid glands. **Parotid gland swelling** usually lasts about one week. Other symptoms of mumps can include dry mouth, sore face and/or ears and some patients find it difficult to talk. A vaccine has been available since the 1960s.


## Cause

**The mumps virus is an enveloped single-stranded, linear negative-sense RNA virus of the *Rubulavirus* genus and *Paramyxovirus* family**. Humans are the only natural host for the virus.

Mumps is **spread from person to person through contact with respiratory secretions, such as saliva from an infected person. When an infected person coughs or sneezes,** the droplets aerosolize and can enter the eyes, nose, or mouth of another person. Mumps can also be spread by sharing eating utensils or cups. A person infected with mumps is contagious from approximately seven days before the onset of symptoms until about eight days after symptoms start. The incubation period (time until symptoms begin) can be from 12–25 days, but is typically 16–18 days.

### Diagnosis

During an outbreak, a diagnosis can be made by determining recent exposure and parotitis.

**A physical examination confirms the presence of the swollen glands.** Usually, the disease is diagnosed on clinical grounds, and no confirmatory laboratory testing is needed. If there is uncertainty about the diagnosis, a test of saliva or blood may be carried out; a newer diagnostic confirmation, using real-time nested polymerase chain reaction (PCR) technology, has also been developed.

### Prevention

The most common preventative measure against mumps is a vaccination with a mumps vaccine. The vaccine may be given separately or as part of the MMR immunization vaccine that also protects against measles and rubella. In the US, MMR is now being supplanted by MMRV, which adds protection against chickenpox (varicella, HHV3).

The American Academy of Pediatrics recommends the routine administration of MMR vaccine at ages 12–15 months and at 4–6 years. In some locations, the vaccine is given again between four and six years of age, or between 11 and 12 years of age if not previously given.

## Rubella

**Rubella**, also known as **German measles** or **three-day measles**, is an infection caused by the rubella virus. This disease is often mild with half of people not realizing that they are infected. A rash may start around two weeks after exposure and last for three days. It usually starts on the face and spreads to the rest of the body. The rash is sometimes itchy and is not as bright as that of measles. Swollen lymph nodes are common and may last a few weeks. A fever, sore throat, and fatigue may also occur. In adults joint pain is common. Complications may include bleeding problems, testicular swelling, and inflammation of nerves. Infection during early pregnancy may result in a child born with congenital rubella syndrome (CRS) or miscarriage. Symptoms of CRS include problems with the eyes such as cataracts, ears such as deafness, heart, and brain. Problems are rare after the 20th week of pregnancy.

**Rubella is usually spread through the air via coughs of people who are infected**. People are infectious during the week before and after the appearance of the rash. Babies with CRS may spread the virus for more than a year. Only humans are infected. Once recovered, people are immune to future infections. Testing is available that can verify immunity. Diagnosis is confirmed by finding the virus in the blood, throat, or urine. Testing the blood for antibodies may also be useful.

Rubella is preventable with the rubella vaccine with a single dose being more than 95% effective. Often it is given in combination with the measles vaccine and mumps vaccine, known as the MMR vaccine. When some, but less than 80% of the people are vaccinated, more women might make it to childbearing age without developing immunity by infection or vaccination and CRS rates could increase. Once infected there is no specific treatment.

Rubella is a common infection in many areas of the world. Each year about 100,000 cases of congenital rubella syndrome occur. **The name "rubella" is from Latin and means *little red*. It was first described as a separate disease by German physicians in 1814 resulting in the name "German measles."**

# Signs and symptoms

Young boy displaying the characteristic maculopapular rash of rubella

Rubella has **symptoms that are similar to those of flu**. However, the primary symptom of rubella virus infection is the **appearance of a rash (exanthem) on the face which spreads to the trunk and limbs and usually fades after three days (that is why it is often referred to as three-day measles).** The facial rash usually clears as it spreads to other parts of the body. Other symptoms include low grade fever, swollen glands, joint pains, headache, and conjunctivitis.

The swollen glands or lymph nodes can persist for up to a week and the fever rarely rises above 38 °C (100.4 °F). The rash of German measles is typically pink or light red. The rash causes itching and often lasts for about three days. The rash disappears after a few days.

Rubella can affect anyone of any age and is generally a mild disease, rare in infants or those over the age of 40. The older the person is the more severe the symptoms are likely to be. Up to 60% of older girls or women experience joint pain or arthritic type symptoms with rubella.

In children rubella normally causes symptoms which last two days and include:

- Rash beginning on the face which spreads to the rest of the body.
- Low fever of less than 38.3 °C (101 °F).

In older children and adults additional symptoms may be present including:

- Swollen glands
- Coryza (cold-like symptoms)
- Aching joints (especially in young women)

Rare problems can occur including the following:

- Brain inflammation
- Ear infection

Coryza in rubella may convert to pneumonia, either direct viral pneumonia or secondary bacterial pneumonia, and bronchitis (either viral bronchitis or secondary bacterial bronchitis).

**Congenital rubella syndrome**

Cataracts due to congenital rubella syndrome

Rubella can cause congenital rubella syndrome in the newborn. The syndrome (CRS) follows intrauterine infection by the rubella virus and comprises cardiac, cerebral, ophthalmic and auditory defects. The risk of major defects is highest for infection in the first trimester. CRS is the main reason a vaccine for rubella was developed.

Many mothers who contract rubella within the first critical trimester either have a miscarriage or a stillborn baby. For these reasons, rubella is included on the TORCH complex of perinatal infections.

## Cause

**The disease is caused by rubella virus, a togavirus that is enveloped and has a single-stranded RNA genome.** The virus is t**ransmitted by the respiratory route** and replicates in the nasopharynx and lymph nodes. The virus is found in the blood 5 to 7 days after infection and spreads throughout the body. The virus has teratogenic properties and is capable of crossing the placenta and infecting the fetus where it stops cells from developing or destroys them. During this incubation period, the patient is contagious typically for about one week before he/she develops a rash and for about one week thereafter.

## Diagnosis

**Rubella virus specific IgM antibodies are present in people recently infected by rubella virus**, but these antibodies can persist for over a year, and a positive test result needs to be interpreted with caution. The presence of these antibodies along with, or a short time after, the characteristic rash confirms the diagnosis.

## Prevention

Rubella infections are prevented by active immunisation programs using live attenuated virus vaccines. The vaccine is now usually given as part of the MMR vaccine. The WHO recommends the first dose be given at 12 to 18 months of age with a second dose at 36 months. Pregnant women are usually tested for immunity to rubella early on. Women found to be susceptible are not vaccinated until after the baby is born because the vaccine contains live virus.

Use of MMR vaccine is not recommended during pregnancy.

## Treatment

There is no specific treatment for rubella; however, management is a matter of responding to symptoms to diminish discomfort.

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