

## Fever and rash in children

Van Biljon G

Paediatric Nephrologist, Department of Paediatrics, University of Pretoria

Correspondence to: Prof Ida van Biljon, e-mail: ida.vanbiljon@up.ac.za

Many childhood illnesses present with fever and a rash. In most cases the cause is infectious, but rheumatological diseases and drug reactions may also present with fever and a rash. With some clinical experience and core knowledge of the incubation period, symptoms and signs of the common childhood infectious diseases, it is possible to differentiate between most of the skin rashes associated with these and life threatening conditions.

### Measles

Measles is an acute, highly contagious viral disease with an incubation period (time from exposure to 1st symptoms) of 8–14 days. The disease begins with a high fever and the classic triad of cough, coryza (runny nose) and conjunctivitis (“the three C’s”). Koplik spots which are pathognomonic for measles, appear on the buccal mucosa in the prodromal phase. They are tiny white spots surrounded by a red ring. A confluent erythematous, maculopapular exanthem follows three to five days later, starting from behind the ears or forehead and spreading to the trunk and extremities over three days. It begins to fade after three days. If fever is still present after the third day of the rash, a complication should be suspected.

### Complications include

- Pneumonia
- Laryngotracheobronchitis (croup)
- Otitis media
- Severe diarrhoea and secondary malnutrition
- Encephalitis
- Subacute sclerosing panencephalitis is a rare long-term complication

### Management

Early identification, respiratory isolation and supportive care are the most important aspects in the treatment. Measles is a notifiable disease (for notification and management of contacts see National Institute for Communicable Diseases [NICD] website). High risk patients (children < 6 months old, immune compromised and severely malnourished children

and those with complications) require hospital admission. Supplemental Vitamin A is recommended to decrease the risk of complications.

### Management of contacts

- Immunise children > 6 months if unvaccinated and less than 72 hours have expired since exposure.
- Between three and six days after exposure intramuscular immunoglobulin is indicated for immunodeficient patients and children < 6 months old.
- Immunise all children > 6 months of age if an outbreak occurs.

### Rubella (German measles)

Compared to measles, rubella is a much milder disease. The clinical features are not typical, making clinical diagnosis unreliable. Rubella-like illnesses can be caused by several other viruses, specifically parvovirus B19 infection. Rubella is teratogenic therefore laboratory investigation is essential when a pregnant woman has been in contact with a patient with suspected rubella.

The incubation period of rubella is 10 to 21 days. Patients develop fever, malaise, tender suboccipital lymph nodes and arthralgia, followed by the appearance of a mild pinkish rash which starts in the face and spreads to the trunk. Symptoms persist for 3–4 days, but the virus may continue to be excreted for 1–2 weeks. Occasionally arthralgia lasts for up to one month.

### Fifth disease (erythema infectiosum)

Erythema infectiosum is characterised by bright red cheeks and circumoral pallor, the “slapped cheek” appearance. It is caused by parvovirus B19. The incubation period is 13–18 days. Symptoms, which begin 8–10 days before the rash appears, are mild and include a low-grade fever, headache, sore throat, nausea, vomiting, diarrhoea and arthralgia. Once the rash appears the patient is no longer contagious. Parvovirus infections are associated with an increased incidence of miscarriage in the second trimester of pregnancy.

**Figure 1:** Erythema infectiosum: “slapped cheek” appearance**Roseola infantum (exanthem subitum)**

Roseola infantum is a mild disease occurring predominantly in children younger than two years. It is caused by human herpes virus 6 (HHV-6). Patients present with a high spiking fever for three to five days, followed by the onset of the rash which appears as the fever resolves. It consists of discrete pink macules and papules starting on the trunk and spreading to the extremities. The rash resolves within two days. No treatment is necessary.

**Coxsackie and other enteroviruses**

Many enteroviruses cause maculopapular rashes in children. Hand-foot-mouth disease is a more easily recognisable enterovirus infection, presenting with fever and a painful papular-vesicular eruption involving the mouth, hands and feet and sometimes buttocks. No specific treatment is available. Paracetamol is used for fever and pain.

**Chicken pox (varicella)**

Chicken pox is an acute, highly contagious, disease caused by varicella-zoster virus. It spreads by infective droplets or fluid from vesicles. The incubation period is 10 to 21 days. It is contagious from about two days before the onset of the

rash until the crusts begin to disappear. Symptoms include fever, headache and malaise followed by the appearance of the characteristic intensely pruritic rash. The rash starts with a macula, progresses to form vesicles in 24–48 hours and ends with crusting. Crops of vesicles appear over three days, predominantly on the trunk and proximal limbs. At the height of eruption, all stages (macules, vesicles and crusts) are present at the same time. Vesicles may also develop on mucous membranes. The rash lasts 8–10 days and heals without scarring, unless secondarily infected.

**Figure 2:** Chicken pox: note different stages of lesions – papules, vesicles and ruptured vesicles**Complications**

Complications are uncommon but are more frequently seen in immuno-compromised patients and include:

- Secondary bacterial skin infection, most commonly by staphylococcus and streptococcus strains
- Pneumonia
- Encephalitis
- Haemorrhagic varicella associated with disseminated intravascular coagulation
- Reactivation of the virus may later manifest as herpes zoster (shingles)

**Management**

The patient should be isolated. Pruritis is managed symptomatically with calamine lotion or oral promethazine. Paracetamol may be used for fever. Avoid aspirin because of its associated risk with Reye's syndrome. Immunocompromised patients should be treated with acyclovir.

Prophylactic varicella-zoster immunoglobulin (VZIG) must be given to:

- neonates whose mothers develop varicella from five days before delivery to two days after delivery
- immunocompromised patients who were in contact with a patient with chicken pox

**Scarlet fever**

Scarlet fever is caused by group A b-hemolytic streptococci (GAS), releasing pyrogenic erythrogenic toxins. The incubation period ranges from 1–7 days. The onset is acute and characterised by fever, chills, vomiting, headache, toxicity

and sore throat. The fever peaks on the second day and returns to normal by day 5–7 without antibiotic treatment, or within 24 hours with antibiotic treatment. The tonsils are red and oedematous and may be covered with a grey white exudate. During the first days of the infection the tongue has a white coat with projecting red papillae (“white strawberry” appearance) and becomes a “red strawberry” tongue after desquamation of the coat.

The exanthem is red, punctate or finely papular, having the texture of gooseflesh or coarse sandpaper and blanches on pressure. It appears in the axillae, groin and neck and becomes generalised in 24 hours. The forehead and cheeks appear flushed, but the area around the mouth is pale (circumoral pallor). Desquamation begins towards the end of the first week.

Scarlet fever needs to be differentiated from other exanthems especially Kawasaki disease, drug eruptions and toxic shock syndrome because treatment with penicillin is curative. Non-suppurative longterm complications include rheumatic fever and glomerulonephritis.

**Figure 3:** Scarlet fever: coarse sandpaper-like erythematous rash



### Meningococcal septicaemia

The spectrum of meningococcal disease can vary from fever and occult bacteraemia to sepsis, shock and death within hours. The disease is caused by *Neisseria meningitidis* which disseminate from the upper respiratory tract through the bloodstream. It can mimic a viral-like illness starting with non specific features like fever, sore throat, poor feeding, myalgia and headache. The presence of abnormal skin colour, cold hands and feet, which are early signs of shock, and leg pain (refusal to walk) were reported to be important early warning signs of this life threatening disease. The rash may rapidly progress from macular, maculopapular, or urticarial to petechiae and purpura, or ecchymosis. The skin lesions may eventually evolve into large areas of necrosis involving skin, digits and limbs. Most deaths occur in the first 48 hours of the disease. The case fatality rate may be as high as 50%. Clinical signs which predict a poor outcome include young age, fever < 38°C, hypotension, the absence of meningitis and the presence of coma.

Immediate treatment with isotonic fluid for shock and a dose of ceftriaxone or cefotaxime should be given before arranging transfer to a hospital. Treatment should under no circumstances be delayed to perform investigations and definitely not until the child arrives at the hospital.

Meningococcal infection is a notifiable disease which requires immediate telephonic notification.

**Figure 4:** Meningococcal septicaemia: rapidly evolving purpuric rash due to vasculitis



### Kawasaki disease

Kawasaki disease is a self limiting febrile condition which occurs predominantly in children less than five years of age. It causes vasculitis of the small and medium arteries, including coronary arteries.

There is no specific diagnostic test. The diagnosis is confirmed by the presence of fever lasting for <sup>3</sup> 5 days and the lack of another known disease process to explain the illness. Four of the five criteria listed below should be present:

- Bilateral non-suppurative conjunctival injection
- Changes of the mucous membranes of the upper respiratory tract: reddening of the pharynx and lips, fissured lips, reddening of the oral mucosa and strawberry tongue
- Polymorphous rash, primarily on the trunk
- Cervical lymphadenopathy
- Changes of the extremities, including reddening of the palms and soles, oedema of the hands and/or feet or both and desquamation of the finger tips

### Treatment includes

- Tepid sponging for fever
- Copious oral fluid to maintain hydration
- Administration of intravenous immunoglobulin within the first 10 days of fever
- Oral aspirin for its anti-inflammatory and anticoagulant effects

### Tick bite fever

In South Africa the disease is caused by *Rickettsia africae* and *R. conorii* with the tick as vector. Tick bite fever is a clinical diagnosis. The classic findings include the presence of an eschar at the site of the tick bite, regional lymphadenopathy, fever and a rash. Other symptoms include a severe headache, malaise, myalgia and arthralgia. The rash, which is not always present, appears on days 3–5 of the illness. It spreads from the extremities to the trunk, neck, face, palms, and soles within 36 hours. The lesions progress from macular to maculopapular and may persist for 2–3 weeks.

**Figure 5:** Tick bite fever: rash involving palms and soles



### Complications include

- Vasculitis
- Thrombosis
- Encephalitis
- Myocarditis
- Kidney injury
- Pneumonitis
- Thrombocytopenia

### Management

Remove the tick as soon as possible after detection on the body. Although not usually recommended for children < 8 years of age, most experts regard doxycycline as the drug of choice for all children because the risk of morbidity is regarded more important than the risk for dental staining. Paracetamol is used for headache and fever.

### Juvenile idiopathic arthritis (JIA)

Systemic onset JIA is a rare auto-immune disease that may mimic viral exanthems because the extra articular features are the most striking. The disease begins with systemic symptoms, including high fever and chills which occur daily or twice daily. Patients seem alarmingly ill during the period of the fever and surprisingly well when the fever subsides. The rheumatoid rash consists of small pale red-pink macules with central pallor, which may coalesce. The rash is most frequently found on the trunk and proximal extremities, but may be anywhere on the body and is most pronounced during fever spikes. Systemic manifestations of the illness (which differentiate this condition from most other viral illness), include: serositis, i.e. pericarditis and pleuritis, hepatosplenomegaly and lymphadenopathy. Joint involvement is usually present or develops within a few months of onset of the disease. The diagnosis is clinical and depends on the persistence of arthritis or typical systemic manifestations. Children with suspected JIA should be referred for confirmation of the diagnosis and treatment.

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