

## Epidemiology and Outbreak Response Unit

Ref: COM0909f

### Frequently asked questions on:

Measles –  
A laboratory and public health  
perspective

#### What is Measles?

Measles is a highly contagious disease that is usually seen in children, but can affect adolescents and adults as well. It is caused by a rubeola virus which belongs to the genus *Morbillivirus* of the family Paramyxoviridae.

#### What are the clinical features of Measles?

- The incubation period is 10 to 14 days (often longer in adults than in children).
- The prodromal phase begins after the incubation period and lasts for several days. It is characterized by malaise, fever, loss of appetite, and 'the three C's': conjunctivitis (red, watery eyes), cough and coryza (runny nose); the illness may resemble a severe respiratory tract infection. Towards the end of the prodrome, just before the appearance of the rash, Koplik's spots may appear on the buccal mucosa. These are tiny white spots with bluish-grey centres and are pathognomonic for measles, but may easily be overlooked.
- The rash of measles usually appears 3 – 5 days after the start of the prodrome. It begins on the face and spreads down the body to involve the neck, trunk, and lastly the arms and legs, including the palms and soles. It is erythematous and maculopapular and becomes confluent as it progresses, especially on the face and the neck. During the healing phase, the involved areas (except palms and soles) may desquamate. The rash usually lasts about 5 days. The patient with measles is usually most ill during the first or second day of the rash. Several days after the appearance of the rash the fever abates and the patient begins to feel better.
- The duration of the uncomplicated illness from late prodrome to resolution of the fever and rash, is 7 to 10 days.

**The case definition for a suspected measles case:** any individual presenting with

- fever ( $\geq 38^{\circ}\text{C}$ ) and
- rash and
- one or more of the following: cough, coryza (runny nose) or conjunctivitis (red eyes)

## **How is infection acquired?**

Measles is airborne and is spread by droplets from respiratory secretions of infected persons; it is transmitted by breathing, coughing or sneezing, and also by direct contact with infected nasal or throat secretions. It is one of the most communicable of the infectious diseases. Nosocomial (hospital acquired) infections are well described, particularly amongst children.

## **When are patients with measles most infectious?**

Patients with measles are most infectious during the late prodromal phase of the illness when the cough and coryza are at their peak. The disease is contagious from about 4 days before until about 4 days after the onset of rash.

## **What specimens should be submitted?**

Urine and blood specimens should be collected from all cases that meet the suspect case definition of measles. Throat swabs may be sent instead of urine specimens. Specimens should be taken as soon as possible after admission, preferably within 48 hours of the onset of rash.

Concerning throat swabs:

- Use only Dacron or Rayon swabs. Wooden swabs are not suitable for testing.
- Place swab into a container of viral transport medium (VTM).
- Where available, swabs with gel plugs may be used. These don't have to be placed into VTM.

## **Procedure for referral of specimens to NICD:**

1. The blood and urine (or throat swab) specimens should be wrapped in absorbent material (paper towel/ cotton wool) in case of leakage during transport, and placed in a plastic bag. Ensure that urine specimen containers are adequately sealed.
2. The specimens **MUST** be accompanied by the Measles Case Investigation Form (see attached appendix). This should be completed by the health care worker submitting the specimens.
3. Place the specimens together with the case investigation form into a cooler bag with ice packs.
4. Transport cooler bag to NICD as soon as possible.
5. Specimens may be refrigerated whilst awaiting transport if there is a delay, but must **NOT** be frozen.

## **What are the recommended diagnostic tests for measles?**

The recommended serological test is a measles IgM test. This confirms the diagnosis of acute measles infection. Measles IgG testing is not recommended for the diagnosis of acute measles because IgG remains positive for many years after vaccination or disease, and a positive IgG cannot tell you if the patient has acute measles. Another common cause of rash in South Africa is rubella. For this reason specimens from suspected measles cases are often tested for rubella IgM. Measles IgM testing is offered free of charge at the NICD measles laboratory for all suspected measles cases. It is essential that blood specimens from patients testing positive for measles IgM in the private sector should urgently be forwarded to the NICD for confirmation and additional molecular testing.

Urine specimens from patients testing positive for measles IgM are tested by reverse transcriptase polymerase chain reaction (RT-PCR) at the NICD. This allows us to confirm the presence of measles virus and to do additional tests such as genotyping. Throat swabs may be used as an alternative to the urine specimen.

## **What is the treatment for Measles?**

Treatment is supportive, including antipyretics and fluids as indicated. Bacterial superinfection should be promptly treated with appropriate antimicrobials. Vitamin A, 200 000IU should be administered orally to all children with suspected measles for two days as this may decrease the severity of measles complications.

## **Complications of measles:**

The most common complications are pneumonia (either due to the measles virus or as a result of secondary bacterial or viral infection), diarrhoea, croup, otitis media, mouth ulcers and eye pathology (leading to blindness). Rarely, encephalitis may complicate measles resulting in permanent brain damage. Myocarditis, pneumothorax, pneumomediastinum, appendicitis and sub-acute sclerosing panencephalitis (SSPE), a fatal chronic infection of the brain, have all been reported but are uncommon complications.

## **What is the differential diagnosis of Measles?**

The differential diagnosis includes other infections presenting with a fever and rash:

- Rubella
- Scarlet fever (*Streptococcus pyogenes*)
- Erythema infectiosum (parvovirus B19)
- Meningococcaemia
- Typhoid fever
- Varicella

## **How is measles prevented in SA?**

Childhood vaccination is the most important preventive strategy against measles. In South Africa, children are vaccinated against measles as part of the SA-EPI (Expanded Program on Immunisation) schedule at 9 months of age and receive a booster at 18 months of age. The measles vaccine is safe and effective. After these 2 doses of vaccine the protection rate is 95%. Immunity persists for many years after vaccination.

During outbreaks, vaccination campaigns often target schools and other institutions (crèches, orphanages etc) to immunize children. Adolescents and adults who are unsure if they have been vaccinated during childhood can also receive vaccine, especially if they may be in contact with measles cases (e.g. health care workers, school teachers).

## **What is the recommended public health response in SA to a case of Measles?**

Measles is a notifiable disease in SA. It is a vaccine-preventable disease. As part of the Expanded Programme on Immunisation (EPI) measles elimination programme and requirements for surveillance, all patients presenting with a rash and fever and at least one of the 'three C's' must have blood and urine (or throat swab) specimens sent to the laboratory for measles testing. All suspected cases must be reported immediately by telephone to the Department of Health. The Department of Health follows the cases up, and vaccination is offered to at-risk contacts. Standardised case investigation forms are used to facilitate contact tracing and establish links between confirmed cases.

Measles is highly infectious and spreads rapidly amongst people who are not immune, leading to significant morbidity and mortality. All patients presenting at health facilities with suspected measles should be isolated on admission to prevent nosocomial spread. Prevention of nosocomial infections is aided by strengthening compliance with standard infection control precautions, and ensuring "fast-tracking" and isolation of all suspected cases. During a measles outbreak it is recommended that hospitals introduce routine vaccination of all children > 6 months of age admitted to hospital irrespective of vaccination history to reduce the risk of nosocomial transmission. Depending on the size of the outbreak, the Department of Health may also decide to institute mass vaccination programmes at schools and other institutions where children congregate.