



Laboratory diagnosis of Measles

Insight – September 2014

- The Department of Health requires suspected cases of Measles to be notified immediately without waiting for laboratory confirmation (1800 651 160).
- Measles is a highly contagious Group A notifiable infectious disease. Secondary infections occur in 75 – 90% of susceptible household contacts.
- Transmission of Measles virus is by respiratory droplets and direct contact with respiratory secretions.
- Serological testing and PCR are the mainstays of laboratory diagnosis.

Background

Measles is a highly contagious disease with secondary infections occurring in 75 – 90% of susceptible household contacts.¹ With suboptimal vaccination coverage in some areas, Measles outbreaks remain an unfortunate reality in Australia.² A single case therefore has significant public health implications.

72 confirmed cases of Measles have occurred in Melbourne from 1 January to 9 September 2014. This is the highest level since 2001.³

Clinical features

Transmission of Measles virus is by respiratory droplets and direct contact with respiratory secretions. It can also survive on inanimate objects in the patient's environment for at least 30 minutes. After an incubation period of 10 days (range 7 – 18 days) patients develop a prodrome consisting of fever, malaise, cough, coryza and non-purulent conjunctivitis. Koplik's spots may develop during this time. These are whitish spots on an erythematous background on the buccal mucosa classically arising opposite the molar teeth. After around 4 days, a morbilliform rash appears on the head and then extends to the trunk and limbs (Figure 1). The rash lasts 3 – 7 days.

Patients usually make a full recovery, but complications including otitis media, pneumonia, seizures, and rarely encephalitis (subacute sclerosing panencephalitis) can occur. The case fatality rate in stable populations is estimated at around 2%, but rates up to 32% have been seen in refugee and displaced populations.⁴



Figure 1 – Morbilliform rash of Measles
(Photo courtesy of Dr HF Eichenwald, CDC)



Figure 2 – Koplik's spots on the buccal mucosa (Photo courtesy of CDC)

Laboratory testing

Serological testing and PCR are the mainstays of laboratory diagnosis.

In the early stages of infection, a single serology result demonstrating negative measles IgG and positive IgM in the context of the clinical picture outlined above provides strong evidence for a case of Measles. It is important to note that serology can be negative in early infection, in a minority of patients IgM may not develop for up to 4 days after the rash onset.⁵

Definitive serological diagnosis can be established with acute and convalescent sera, usually taken 10 – 14 days apart. A diagnostic rise in Measles specific IgG is a reliable indicator of recent infection. If advice regarding the interpretation of serology results is required, the medical microbiologist can be contacted at Melbourne Pathology (9287 7700).

In early infection, PCR is performed on nose and throat swabs. Nose and throat swabs are usually pooled and analysed together in the testing laboratory. Swabs sent in viral or universal transport media are acceptable for testing, as are 'dry' swabs (no transport media). Swabs using bacterial transport media should be avoided as rates of viral detection may be lower. If using COPAN® swabs, either orange top, flocked swabs or white top swabs are appropriate.

Other specimens that can be used for PCR are first pass urine and anticoagulated blood. When positive, PCR provides rapid confirmation of the clinical picture.

Unfortunately, PCR testing for Measles is not currently rebated under Medicare. An additional charge for these tests is levied by the state reference laboratory where the tests are performed (at the time of printing this is a single charge of \$95.40 for pooled processing of nose and throat swabs). The Victorian Department of Health may cover the cost of PCR in selected cases. This should be discussed prior to testing.

Initial investigation of suspected Measles

- Immediate Notification to the Department of Health (1300 651 160)
- Serology: serum tube with request for Measles IgG and IgM
- Nose and throat swabs (orange top, flocked swabs [COPAN®] or white top swabs [COPAN®], both sent in dry tubes) with request for Measles PCR

Case definition for Measles

Initial investigation of suspected Measles

- Generalised maculopapular rash usually lasting three or more days **and**
 - Fever (at least 38° if measured) present at the time of rash onset **and**
 - Cough, coryza, conjunctivitis and Koplik's spots
- <http://ideas.health.vic.gov.au/bluebook/measles.asp>

Notify DHS immediately. Ph 1300 651 160

If DHS approves Measles PCR testing
Swab – throat and nose

Specimen sent to VIDRL
(Record approval on pathology referral)
URGENT transit
No charge to patient

If DHS does not approve Measles PCR testing

SWAB
Measles PCR
Sent to VIDRL for testing
Patient fee of \$95.40

BLOOD
Measles IgG&IgM serology
Performed at Melbourne Pathology
Medicare rebatable

Treatment and prevention

Treatment of Measles remains supportive and infection control measures are important in order to avoid secondary cases. In the clinic, the receptionist receiving patients should be alert to possible Measles cases. Those presenting with fever and rash should be given a single use mask and isolated from other patients. Consultation rooms used for assessment of suspected Measles cases should be left vacant for at least thirty minutes after the consultation.³

Measles vaccination as part of the routine immunisation schedule for clinic patients is of the utmost importance. Also important is ensuring that clinic staff vaccinations are kept up to date.

Due to its public health importance, by law the **Department of Health requires all suspected cases of Measles to be notified immediately without waiting for laboratory confirmation (1800 651 160)**. This will help facilitate timely follow-up of the contacts, vaccination where required and will help prevent further transmission of the virus.

Further information

1. Lester R, Chief Health Officer Alerts – Measles in Melbourne's North Western Suburbs. Available at: <http://health.vic.gov.au/chiefhealthofficer/alerts/alert-2014-09-measles-cases.htm>

References

1. Perry RT, Halsey NA. The Clinical Significance of Measles: A Review. *Journal of Infectious Diseases*, 2004;189(S1):S4-16.
2. Victorian Department of Health, Blue Book, Infectious Diseases Epidemiology and Surveillance, Measles. [Accessed 8.9.2014] Available at: <http://ideas.health.vic.gov.au/bluebook/measles.asp>
3. Lester R, Chief Health Officer Alerts – Measles in Melbourne's North Western Suburbs. [Accessed 9.9.2014] Available at: <http://health.vic.gov.au/chiefhealthofficer/alerts/alert-2014-09-measles-cases.htm>
4. Kouadio IK, Kamigaki T, Oshitani H. Measles outbreaks in displaced populations: a review of transmission, morbidity and mortality associated factors. *BioMed Central International Health and Human Rights* 2010;10:5 [Accessed 8.9.2014] Available at: <http://www.biomedcentral.com/1472-698X/10/5>
5. Moss WJ, Griffin DE. Measles. *Lancet* 2012; 379:153-64.



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