

Measles Guidance for Health Providers

The following document is intended to guide the management of measles, in order to prevent further regional spread and to decrease transmission in the current outbreak (2009). Please note that aspects of this guidance differ from that outlined in the Immunisation Handbook 2006.

Active recall of patients aged 12 months to 20 years for a first dose of MMR and opportunistic immunisation of those aged 21-40 years

The immunisation schedule recommends offering two doses of MMR vaccine to all children (without contraindications) at 15 months and 4 years of age. Where dose/s have been delayed or missed, catch-up vaccination is recommended. This would include all children and adults born during or since 1969. Those born earlier are assumed to have immunity from exposure to wild measles.

In addition, as a measure to reduce the spread of the current measles outbreak, the Ministry of Health is advising all primary care providers to actively recall and immunise all patients aged 1-20 years old who have no documented history of immunisation against measles. The Ministry also requests that adults aged 21-40 be offered MMR immunisation opportunistically, where possible.

Infants (children under one year of age) may be offered MMR if they are considered to be at high risk of contracting measles. This includes living in an area where there is active community transmission (the local Medical Officer of Health will communicate this to GPs) or being contacts of a case (this will be done by GPs and local Medical Officer of Health in liaison). As efficacy cannot be guaranteed in this age group, these children will still need to be offered two further doses (one at one year of age and another at 13 months if measles is still prevalent in the community or if not, at 4 years of age). As part of the response to the measles outbreaks, please be advised that people who are not otherwise eligible for publicly funded health care in New Zealand can be given free measles immunisation and this can be claimed in the usual way.

The electronic claiming system can be used for first and second doses given to children and adults. The system may not work for doses given to infants between 6 months and 12 months old and has not been fully tested with all the different Practice Management Systems. We advise:

- For children over one year and adults receiving their first dose use the indicator of 15m (MMR1) and electronically claim the Immunisation Benefit Subsidy (IBS) as usual.
- For children and adults receiving their second dose, which can be given any time from one month after the first dose. The indicator of 4yr (MMR2) can be used to electronically claim the IBS as usual.
- Any MMR given to those under 1 year (MMR0) can be manually recorded on both the NIR3 and on an IBS claim form.

Measles Case definition

Confirmed case

A confirmed case is defined as a person with a clinically compatible illness that is epidemiologically linked to a confirmed case OR has laboratory definitive evidence.

Probable case

A probable case is defined as a person with a clinically compatible illness with all of the following:

1. a fever $\geq 38^{\circ}\text{C}$
2. a generalised maculopapular rash lasting three or more days
3. cough, OR coryza, OR conjunctivitis, OR Koplik spots.

Laboratory definitive evidence

At least one of the following:

1. Isolation of measles virus, OR
2. Detection of measles virus by nucleic acid testing (PCR), OR
3. Detection of measles virus antigen, OR
4. IgG seroconversion or a significant increase in antibody level or a fourfold or greater rise in titre to measles virus EXCEPT if the case has received a measles-containing vaccine 8 days to 8 weeks before testing. (Note: paired sera collected 10-14 days apart), OR
5. Detection of measles virus-specific IgM antibody confirmed in an approved reference laboratory EXCEPT if the case has received a measles-containing vaccine 8 days to 8 weeks before testing.

Epidemiological evidence

An epidemiological link is established when there is:

1. Contact between two people involving a plausible mode of transmission at a time when:
 - one of them is likely to be infectious (approximately five days before to 4 days after rash onset), AND
 - the other has an illness that starts within 7 to 18 (usually 10) days after this contact, AND
 - At least one case in the chain of epidemiologically linked cases (which may involve many cases) has laboratory definitive evidence of measles.

Case management (see Figure 1)

Notification

All cases of measles should be notified to the public health unit immediately *on suspicion*. (i.e. without awaiting laboratory definitive evidence)

Case investigation and diagnosis

Please refer to guidance on laboratory testing (page 11). If acute measles is suspected it is important to perform PCR in addition to serology. In vaccinated persons, to diagnose measles with PCR is essential.

The response to a notification will normally be carried out by the local public health unit. Case details will be entered into EpiSurv, ESR's national infectious disease surveillance database.

Case treatment

In general, treatment for those with measles in older age groups is of a supportive nature only. The Ministry of Health is considering the use of high dose vitamin A for infants and children hospitalised with measles. As there is no suitable preparation of vitamin A currently available in New Zealand, recommendations for its use will be made once a source is located.

The role of vitamin A supplementation in adults is unclear and is not recommended during pregnancy. Very high doses of preformed Vitamin A have been associated with congenital abnormalities and the use of Vitamin A supplements is strongly discouraged from at least one month before conception and during gestation.

Case isolation

If measles is suspected, where possible, patients should be examined in a separate waiting area to avoid infecting other patients. That area should be ventilated after the case has left and not used by potentially susceptible people for a minimum of 2 hours afterwards.

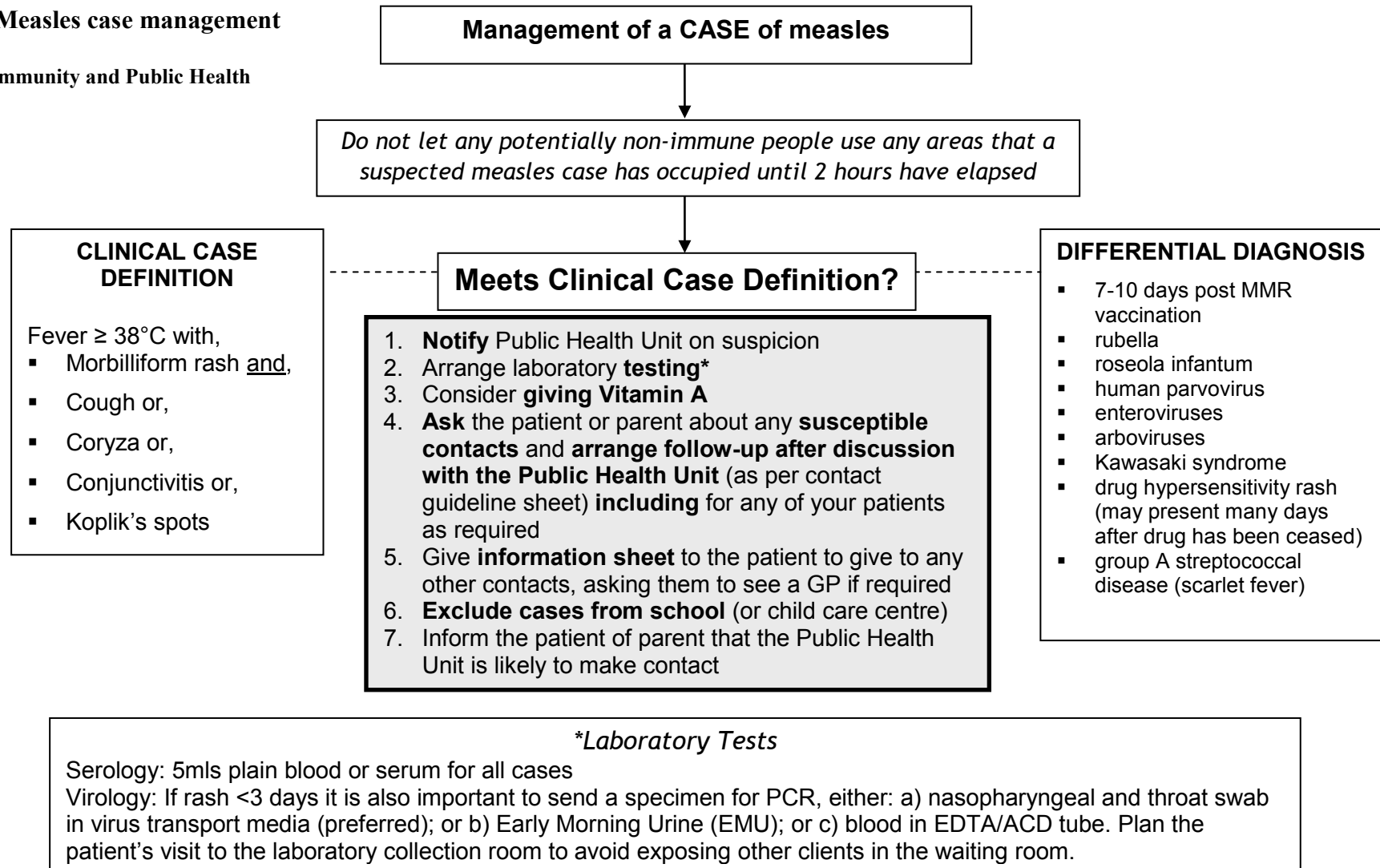
Exclude cases from work, school, preschool or child care, advise them to stay in isolation and specifically advise against contact with susceptible people (defined below) until at least 4 days after the onset of the rash.

When measles is suspected, hospitalised cases should be kept in strict respiratory isolation (preferably in a negative pressure room) until at least 4 days after the onset of the rash. Only healthcare workers who are immune should care for these patients.

When a case is isolated at home he or she should not mix with people who may be susceptible.

Figure 1 Measles case management

Source: Community and Public Health



Contact management (See Figure 2)

Identification of contacts

Measles is highly infectious: a single case of measles can generate a further 13 infected persons. The public health unit will work with health providers to identify contacts, and where appropriate facilitate post-exposure prophylaxis. Where a large number of contacts have resulted, there may be the need to prioritise public health resources to settings where there is the greatest risk of transmission or of measles complications (e.g. among the immune compromised).

A person is **susceptible** to measles if they do not meet one of the following criteria:

- Persons born prior to 1969 are assumed to be immune due to infection.
- Persons born between 1969 and 1975, need documented evidence of two doses of MMR vaccination, *not* including MMR vaccinations given prior to 12 months of age
- Documented evidence of two doses of MMR vaccine (or comparable measles vaccine)
- Documented evidence of immunity eg positive IgG and negative IgM on serology

For the purposes of isolation, susceptible contacts can be categorised as 1) **non-immune** - those who have not received any doses of MMR and 2) **partially immune** – those who have received one dose of MMR (or two doses of MMR where the first dose was administered when they were under one year of age) and 3) **immune** – those who have received two doses of MMR vaccine after the age of 1 year; had laboratory confirmed measles; or were born before 1969.

MMR post-exposure vaccination

Vaccination offers the best protection against measles. The international literature on the effectiveness of post exposure MMR to prevent acute measles in contacts of cases is somewhat contradictory, however this strategy has been used for many years in the control of measles outbreaks and is recommended by the most authoritative health agencies. To prevent measles in non-immune contacts of measles cases, MMR needs to be given within 72 hours of **first exposure to the case** in the infectious period. This infectious period is defined as the time period from one day before the onset of the prodromal period (symptoms consisting of fever, cough, coryza, conjunctivitis, Koplik spots) until 4 days after the onset of the rash. Therefore measles cases can be infectious for up to 5 days before the onset of the rash.

Given measles' high infectivity, close contact may not be required for transmission to occur. Therefore a broad definition of contact should be used when contact tracing. The assessment and identification of contacts should be wider than just the house in which the case resides and should include an assessment of all social interaction undertaken by the case during their infectious period.

All non-immune contacts should be encouraged to receive a dose of MMR, even if outside the 72 hour window since first contact with the case.

Those who are enrolled in preschool or child care, primary school, secondary school or attend a tertiary institution should be excluded as follows:

- Non-immune contacts (including teachers) should be excluded from the facility until 14 days after last contact with a case during their infectious period.
- Immunosuppressed children, students or staff should be excluded (regardless of their measles vaccination status) until 14 days **after their last contact with the case** unless they receive NHIG within 6 days of first measles exposure.

Non-immune contacts should be excluded from schools and early childhood centres as soon as possible after a measles case has been identified and offered MMR immunisation if aged over 6 months (Table 1). Partially immune contacts should be immunised with one dose of MMR without delay and can then return to a school setting.

Table 1 Management of measles contacts in educational settings

Contact Susceptibility	Offer MMR?	Exclusion	Comments
Non-immune	Yes	14 days from last contact with the case during their infectious period	Those who receive MMR within 72 hours of first exposure may return to school without delay. Those who do not receive MMR may need repeat exclusion if re-exposed.
Partially immune	Yes	Not required	90 percent chance of immunity. Need to be counselled re symptoms and what to do if they become unwell
Immune	No	Not required	

Administering MMR should be considered from 6 months onwards among susceptible contacts in geographical areas where there is active measles transmission. MMR can be considered on a case-by-case basis for those less than 6 months of age, particularly if the child's mother has vaccine-induced immunity only.

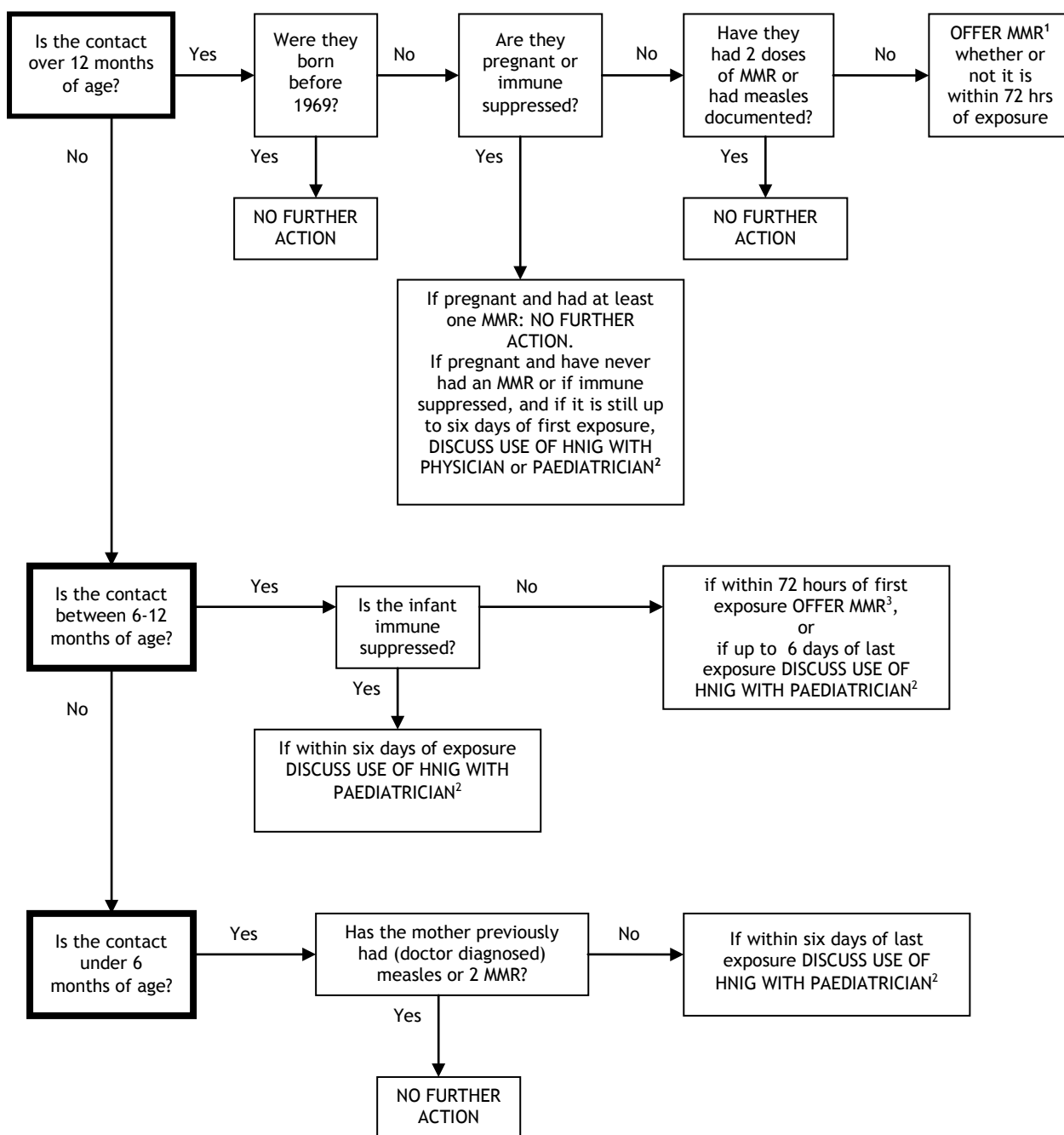
Early post-exposure prophylaxis may reduce the chance of developing illness due to measles, but there is no assurance of this, and individuals should be counselled accordingly.

Those aged 12 months and over at the time of post-exposure prophylaxis may be offered the second MMR vaccination 4 weeks later. Children aged 6 to 12 months of age who received post-exposure prophylaxis should be offered their first scheduled dose of MMR after 12 months of age (but not less than 4 weeks after the post-exposure MMR), and their second scheduled MMR dose 4 weeks later if measles continues to be transmitted in the community.

Powers of the Medical Officer of Health to exclude Cases and Contacts

The Medical Officer of Health has powers under the Health (Infectious and Notifiable Diseases) Regulations 1966 to exclude measles cases and their contacts in the setting of an outbreak in order to prevent the further spread of disease.

Figure 2 Algorithm for measles contact management



Notes:

- MMR = measles, mumps and rubella vaccination
- HNIG = human normal immunoglobulin
- HNIG is a blood derived product and parental consent is required for immunoglobulin to be given. Consent forms are available from the Ministry of Health and Transfusion Medicine Service (Blood Bank). GPs should have their own supply of the form.

¹ If this is to be the first MMR, give the second after one month.

² Subsequently require follow up to review when it may be appropriate to give MMR for long term measles immunity.

Source: Community and Public Health

Human Normal Immunoglobulin (HNIG) prophylaxis for contacts

In susceptible pregnant contacts and others where indicated (vide infra) HNIG is given to attenuate disease and can be considered up to 6 days from last exposure.

IG should be given to the following contacts of measles cases as soon as possible after exposure:

- Immunocompromised or immunodeficient children or adults
- Pregnant women
- Others in whom immunisation is contraindicated (see *Immunisation Handbook*).

IG may be given to:

- Immunocompetent children under 15 months beyond 72 hours from first exposure
- People outside the 72 hour window for MMR who have not had a history of measles infection or vaccination.

The recommended* doses of NHIG are:

- a) Immunocompetent infants (under 12 months) should receive 0.6mL/kg with a maximum volume of 5mL.
- b) Pregnant women and immune compromised or immune deficient contacts should receive 0.6mL/kg with a maximum dose of 15mL (recommended in three 5 mL injections).
- c) Immunocompetent contacts aged 12 months and over who have not received MMR within 72 hrs should receive 0.6mL/kg with a maximum volume of 15mL.

**Please note these doses differ for those outlined in the Immunisation Handbook*

The New Zealand Blood Service has determined that the level of measles-specific antibody in NHIG is significantly lower (between 14-16 IU/ml) than the minimum potency of 50 IU/ml identified in the British Pharmacopoeia. The current MedSafe-approved datasheet for NHIG indicates a dose of 0.2mL/kg for measles post exposure prophylaxis. This is likely to be amended following further testing of the level of measles-specific antibody in NHIG.

Prophylaxis with Intravenous Immunoglobulin

IVIG (Intragam®P) can be considered for immune suppressed and deficient measles contacts (who may for example have a central venous catheter), pregnant women, or in those where large doses are required. The recommended dose of intravenous immunoglobulin is 0.15g/Kg. See the revised guidance from the Health Protection Agency for further information: <http://www.hpa.org.uk/web/HPAwebFile>

If there are further queries, these can be directed to the New Zealand Blood Service medical team via the local district health board blood bank.

Health Education

Advise susceptible contacts (or parents/guardians) of the risk of infection and counsel them to watch for signs or symptoms up to 18 days after their last contact with an infectious case (or longer if the contact received NHIG). They should avoid contact with other susceptible people and immune compromised or deficient people during this period. If symptoms develop, they should also be advised to call ahead before visiting doctors' rooms, hospital EDs or pathology services so as to avoid mixing with other people, and to telephone the local PHU if measles is suspected.

Managing High Risk Settings for Transmission

Since the transmission of measles frequently occurs before diagnosis, the spread of the disease can be facilitated wherever susceptible individuals gather in groups.

Cases among children or staff at schools, tertiary institutions and child care

In addition to routine case and contact management, consider:

- Surveillance to detect further cases
- Thorough investigation of all suspected cases to manage secondary transmission
- Parents, staff and students should be provided with information about the disease and its prevention. Written information such as a fact sheet is recommended, but an information meeting for parents may also be useful
- Recommending the immunisation of all susceptible contacts.

Cases among staff or patients in a health care facility

For those under investigation, probable or confirmed cases among staff or patients in a health care facility, consult immediately with staff from infection control and staff health to institute a management plan appropriate to the facility. Consideration should be given to:

- Respiratory isolation of cases until at least 4 days after the appearance of the rash, and ensuring that susceptible individuals do not enter any room for 2 hours after an infectious case has used it. Susceptible people entering this room within the 2 hour period should be considered contacts.
- Ensuring that only staff who are immune provide direct care to infectious patients
- Vaccinating susceptible contacts (patients and staff).
- Susceptible patients should be isolated for 14 days from last known contact and discharged from hospital as soon as possible.
- Susceptible staff who are not vaccinated within 72 hours of first contact with the case during their infectious period or receive NHIG within 6 days of first exposure should be redeployed to duties not requiring direct patient care (for up to 14 days after the rash onset in the last case at the facility)
- Carrying out active surveillance for measles
- Investigating staff members presenting with prodromal symptoms and ensuring that the affected person stays away from work until 4 days have elapsed after the onset of the rash (or until measles diagnosis is excluded).

Laboratory testing

The availability of laboratory testing for measles may vary by region. For region specific guidance please refer to the local public health unit. In an established outbreak, laboratory confirmation may not be required for all cases. For further information on testing cases linked to an outbreak of measles please discuss with the local PHU.

Who do I test?

In general, laboratory confirmation should be sought for all suspected cases of measles. Virus is more likely to be present at the time of rash onset or within the first week after rash onset. Testing of asymptomatic contacts is generally not recommended. However, this may be considered in persons who are immune suppressed or pregnant women to determine if they need HNIG on a case by case basis, and in discussion with an infectious diseases physician.

Which test to use?

The timing and choice of sample is important for accurate diagnosis. (Figure 3)
Blood for serology should be collected from *all suspected measles cases*, regardless of the time since appearance of rash.

Specimen required: 5 ml plain blood or serum.

In addition to a blood test for serology, patients seen within 3 weeks of onset of rash should have respiratory samples collected for direct detection (immunofluorescence or PCR) and culture. On a case-by-case basis, the diagnostic laboratory may not perform PCR if the diagnosis is clear following serology.

Specimen required: Combined nasopharyngeal and throat swab in virus transport media

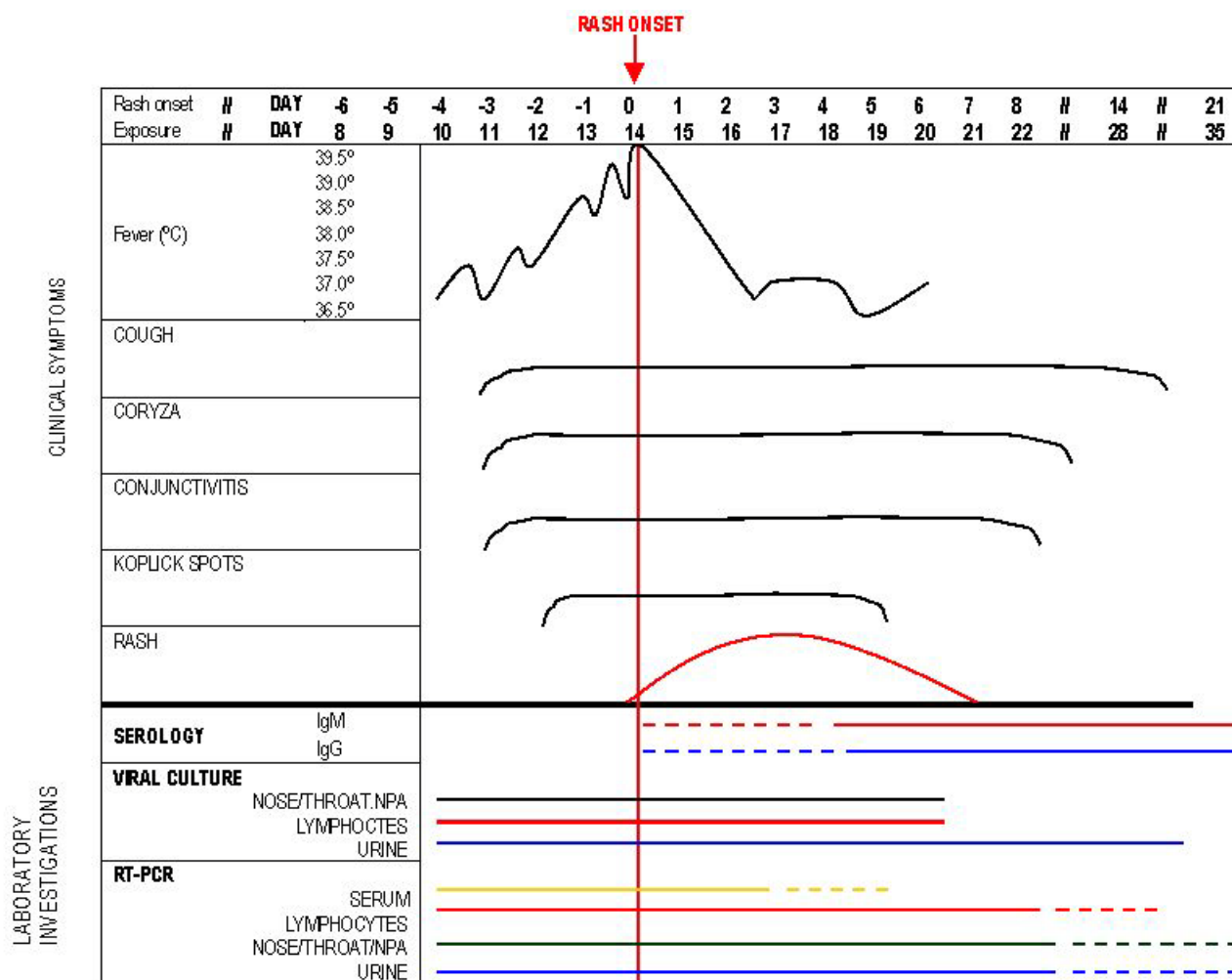
Other samples for virological investigation should be only be collected in consultation with the local public health unit, and testing laboratory. This may include:

- Blood in EDTA/ACD tube
- Urine - first passed, morning specimen preferred, collected as soon as possible after rash onset and at least within 5 days of rash onset.

Specimen Collection

Instructions to optimise sampling are available at the Canterbury Health Laboratory website:
<http://www.cdhb.govt.nz/measles>

Figure 3 Timeline of clinical symptoms and laboratory investigations for measles



Source: Canterbury Health Laboratories (adapted from VIDRL)

Interpretation of laboratory results

The effect of recent vaccination

- Vaccine-induced "measles" is a modified form of measles occurring 5-12 days after measles vaccination. It is not transmissible and should NOT be classified as measles.
- Serologically-diagnosed cases who received a measles-containing vaccine 8 days to 8 weeks before testing may be classified as confirmed measles ONLY if they are also epidemiologically linked to a confirmed case.

Measles-specific IgM

This is a sensitive and specific marker of recent measles infection, but can also be detected for 1 to 2 months following immunisation. A negative result does not rule out a diagnosis of measles if the sample was taken earlier than 72 hours after onset of the rash. When no measles IgM or IgG antibody is detected in a sample collected within 3 days of rash onset from a suspected case of measles, repeat testing is recommended after 7 days. Alternatively, a measles PCR could be requested, please discuss with the local public health unit.

Where a false negative or false positive IgM result is suspected, testing for measles specific IgG seroconversion by EIA on paired sera collected 10-14 days apart is helpful.