MEASLES - INFECTION PREVENTION AND CONTROL MANAGEMENT

PRACTICE GUIDELINE ©

DOCUMENT SUMMARY/KEY POINTS

- SCHN Measles Management Practice Guidelines are developed following the NSW Health Infectious Diseases: Control Guidelines - Measles control guideline July 2019 - https://www.health.nsw.gov.au/Infectious/controlguideline/Pages/measles.aspx
- Measles is a highly contagious disease, spread by direct contact with respiratory secretions or by airborne spread[1]
- The incubation period is from 7 to 21 days (28 days if recently given immunoglobulin)
- Use of vaccination is the preferred strategy for preventing transmission of measles. MMR or MMRV vaccine is effective if given within 72 hours of exposure to susceptible, immunocompetent children ≥6 months old (corrected age).
- Measles vaccine is available in combination formulation, which include measles-mumps-rubella (MMR) and measles-mumps-rubella- varicella (MMRV).
- Normal human immunoglobulin (NHIg) can be given within 6 days of exposure to susceptible children who are:
  - a) <6 months old (corrected age)
  - b) immunocompromised
  - c) day 4 to day 6 (144hrs) post exposure who did not receive MMR(V)
- Implementation of this policy for **exposed patients** is the direct responsibility of appropriate clinical line managers and Treating Teams caring for affected patients.
- Implementation of this policy for **exposed staff** is the direct responsibility of appropriate line manager for those affected staff.
- In addition to standard precautions, Airborne Precautions **must** be implemented

Approved by:	SCHN Policy, Procedure and Guideline Committee	
Date Effective:	1st July 2021	**Review Period:** 3 years
Team Leader:	Clinical Nurse Consultant	**Area/Dept**: Infection Control

Date of Publishing: 15 June 2021 4:23 PM Date of Printing: 15 June 2021

K:\CHW P&P\ePolicy\Jun 21\Measles - Infection Prevention and Control Management.docx

immediately following the notification of suspected or confirmed measles.

- The index case should be discharged or, if admission is required, transferred to the Isolation Ward *(or PICU/CICU if indicated)* for five days following the onset of the rash, depending on the child's medical condition. Immunocompromised children will need isolation for the duration of illness.
- Children who have been in contact with the index case **must** be notified to Infection Prevention and Control and immunisation status ascertained.
- The child who has been in contact with measles and who is deemed not immune should be isolated at home if this is safe. If hospitalisation is required, patients must be transferred to the Isolation ward (C3W/Variety Ward) from day 7 to 21 day post exposure (7 to 28 days post-exposure if immunoglobulin has been given recently).
- In the Emergency Dept., if a child has suspected measles or is a known measles contact, the child must be placed in a negative pressure room (AusHFG Class N). If there is no negative pressure room available, a single room with the doors closed must be used.
- If staff have documented evidence of only one dose of MMR/MMRV, they need to receive a second dose to be considered fully vaccinated.
- If staff have *been exposed to measles* and have documented evidence of only one dose of MMR, they need to receive a second dose of MMR/MMRV within 72 hours post exposure, or have a positive measles IgG shown, to be considered immune. Pregnant staff (who are not considered immune) exposed to measles should seek immediate advice from Work Health Safety & Injury Management Department or the Infection Prevention and Control Team.

CHANGE SUMMARY

- Minor wording changes in the following sections:
  - Introduction
  - Mode of Transmission
  - Clinical Manifestations
  - Children exposed to measles
  - Emergency Department
- References updated.

READ ACKNOWLEDGEMENT

- Medical and Nursing staff working in clinical areas should read and acknowledge this document.

TABLE OF CONTENTS

1 Introduction

Measles is caused by *Measles morbillivirus*, a species in the genus *Morbillivirus* and the family *Paramyxoviridae*. Measles virus is an enveloped, negative-sense RNA virus.

Measles is one of the most highly contagious infectious disease of humans and is spread by the airborne route and/or direct contact with respiratory secretions. Patients are considered to be infectious from 24 hours prior to onset of prodromal symptoms until 4 days after the onset of rash. Where the prodrome is undefined, the onset of the infectious period should be considered to be 4 days before the onset of the rash. The incubation period is 7 to 21 days.

A clinical diagnosis of measles is not always reliable, so laboratory confirmation should be sought in all sporadic cases. Vaccination is the preferred strategy for preventing transmission of measles. MMR/MMRV vaccine is effective if given within 72 hours of exposure in susceptible, immunocompetent children ≥6 months old (corrected age).

Note: Measles vaccine is available in combination formulation, which include measles-mumps-rubella (MMR) and measles-mumps-rubella- varicella (MMRV).

Normal human immunoglobulin (NHIg) can be given within 6 days of exposure to susceptible children who are[1, 2]:

a) <6 months old (corrected age)

b) immunocompromised

c) day 4 to day 6 (144hrs) post exposure who did not receive MMR

2 Command and Control

- Implementation of this policy for exposed patients is the direct responsibility of appropriate clinical line managers and Treating Teams caring for affected patients and will take advice and direction from Infection Prevention and Control (IPC)/ Infectious Diseases (ID)Team.
- Implementation of this policy for exposed staff is the direct responsibility of appropriate line manager for those affected staff with the support of IPC Team and Staff Health
- Issues of dispute between clinical line managers and Infection Control / Infectious Diseases team will be referred to the Deputy Director of Clinical Operations (DCO) who in turn will refer any issues to the DCO/Chief Executive (CE), if required, for resolution based on best evidence and expert advice.
- If there is no policy on a particular issue or the policy needs updating then there needs to be further discussion between clinical line managers, IPC, ID team, Work Health and Safety (if required) and the Deputy/DCO to develop a consensus agreement based on best evidence. If a dispute arises about policy it is to be referred to the CE for resolution.
- Measles is a reportable infection to Public Health Units (PHU). Note: sometimes PHU may notify IPC/ID teams

- A Reportable Incident Brief (RIB) will be prepared and sent to NSW Health relating to any potential media interests or problems. The Executive Support Manager is responsible for the decision and actions.
- When a provisional diagnosis of measles has been made the ID team or/and IPC will determine the type and level of response and provide advice for the implementation of this policy.
- ID team or IPC will notify the Deputy/DCO of identification of any cases of measles. The DCO will in turn notify the CE.
- A report on management of any measles will be made to the next IPC Committee meeting.

3 Mode of Transmission

Measles is transmitted by airborne droplets and direct contact with discharges from respiratory mucous membranes of infected persons and less commonly by articles freshly soiled with nose and throat secretions.

4 Clinical Manifestations

Seven to 18 days after exposure, measles classically presents as a prodrome of fever, cough, coryza and conjunctivitis. A fine, 'morbilliform' rash appears 7-21 days after exposure and typically starts on the face and descends down the body, involving the palms and soles last. Koplik spots may be present briefly on the buccal mucosa are pathognomonic of measles but are not always present [1, 10].

Returned travellers account for most cases of measles in Australia. Local transmission can occur after reintroduction from overseas.

Measles can be confirmed by ordering a measles virus PCR on urine and nasopharyngeal specimens. Results are often available in a matter of hours. Any suspected case should be tested.

Interpretation of measles tests in the weeks after MMR/MMRV vaccination can be challenging, as the vaccine is a live attenuated vaccine. Recent NHIg administration also makes serological tests challenging to interpret. Discuss with a microbiologist or ID Team.

5 Notification of Measles

IPC and ID Physician must be notified if a child has confirmed or suspected measles. See Appendix 1.

When a case of measles occurs in a ward, the following procedures should be followed:

Index Case - (the patient with measles)

The index case should be discharged or, if admission is required, transferred to the Isolation Ward (C3W/Variety or CSSU if appropriate) (or PICU/CICU if clinically indicated). Duration of isolation should be determined by the ID team. In general, immunocompetent children should be isolated until five days after the appearance of the rash, and immunocompromised children for the duration of illness.

Children exposed to measles

All children in the same ward as a confirmed case of measles should be considered potentially exposed. The index case should be presumed infectious from:

a) one day prior to the onset of prodromal symptoms, OR

b) four days before the appearance of a rash; **whichever is earlier**.

The index case should be presumed infectious until five days after the appearance of the rash.

Children who have been in contact with the index case must be notified to IPC and immunisation status ascertained. Check the child's blue book or call the Australian Immunisation Register on 1800 671 811.

Any child who has not received 2 doses of MMR/MMRV should be considered susceptible. A past history of measles is not reliable.

Post-exposure prophylaxis (PEP) is a based on a child's age, immunisation history and immune status. PEP for children exposed within 72 hours is summarised below:

Table 1: Post-exposure guidelines – within 3 days (72 hours) of first exposure to infectious case
(refer to: https://www.health.nsw.gov.au/Infectious/controlguideline/Pages/measles.aspx#11)

Age	MMR vaccination history - 0 doses MMR or unknown	MMR vaccination history - 1 dose MMR	MMR vaccination history - 2 doses MMR
Birth to 5 months	Normal Human Immunoglobulin 0.2 mL/kg only if mother has had <2 doses MMR and no history of past measles infection or negative maternal IgG (otherwise, no NHIG)	Not applicable	Not applicable
6 to 11 months	MMR now, then repeat dose at 12 months of age or 4 weeks later (whichever is later) and the usual dose at 18 months.	Not applicable	Not applicable
12 months to < 18 months	MMR	MMR or MMRV (at least 4 weeks after initial dose of MMR)	Nil necessary
≥18 months and born after 1965	MMR if not pregnant. If pregnant: • consult with obstetrician or GP;	MMR or MMRV (based on age) if not pregnant. If pregnant: • consult with	Nil necessary

	• check IgG if time; • offer NHIG (0.2 mL/kg to a maximum of 15mL)	obstetrician or GP; • check IgG if time; • offer NHIG (0.2 mL/kg to a maximum of 15mL)	
Immunocompromised* (any age)	Normal Human Immunoglobulin 0.5 mL/kg to max of 15 mL	Normal Human Immunoglobulin 0.5 mL/kg to max of 15 mL	Normal Human Immunoglobulin 0.5 mL/kg to max of 15 mL

Table 2: Post-exposure guidelines – from 3 days (72 hours) to within 6 days (144 hours) of first exposure to infectious case
(refer to: https://www.health.nsw.gov.au/Infectious/controlguideline/Pages/measles.aspx#11)

Age	MMR vaccination history - 0 doses MMR or unknown	MMR vaccination history - 1 dose MMR	MMR vaccination history - 2 doses MMR
Birth to 5 months	Normal Human Immunoglobulin 0.2 mL/kg only if mother has had <2 doses MMR and no history of past measles infection or negative maternal IgG (otherwise, no NHIG)	Not applicable	Not applicable
6 to 11 months	Normal Human Immunoglobulin 0.2 mL/kg	Not applicable	Not applicable
12 months to <18 months	Normal Human Immunoglobulin 0.2 mL/kg	Nil necessary	Nil necessary
≥18 months and born after 1965	Normal Human Immunoglobulin 0.2 mL/kg to max of 15 mL Prioritise for immunocompromised people, pregnant women, healthcare workers and close personal (e.g. household) contacts. Wider use is not routinely recommended, but should be judged in relation to the relative risks and benefits.	Nil necessary – consider MMR or MMRV (depending on age) if not pregnant. If pregnant, check IgG if time allows and offer NHIG if IgG is not detected (0.2 mL/kg to a maximum of 15 mL) and inform obstetrician or GP	Nil necessary
Immunocompromised* (any age)	Normal Human Immunoglobulin 0.5 mL/kg to max of 15 mL	Normal Human Immunoglobulin 0.5 mL/kg to max of 15 mL	Normal Human Immunoglobulin 0.5 mL/kg to max of 15 mL

Exposed children considered not immune should be isolated at home if clinically safe. Those who need to remain in hospital, must be transferred to the Isolation ward (C3W/Variety Ward). Isolation should occur from day 7 after exposure to day 21 (or day 28 if immunoglobulin has been recently given).

6 Infection Prevention and Control Precautions

The IPC Team should be contacted to advise and assist with the implementation of the infection control precautions.

- **Adherence to precautions is our best defence against the transmission of measles**
- Standard Precautions **must** be maintained at all times, whether or not the patient is known to have measles.
- Airborne Precautions must be commenced immediately following the notification of a suspected or confirmed measles. These precautions apply to all persons entering the room (Medical staff, Nurses, Physiotherapists, Pathology collectors, Cleaning Services, patient relatives and visitors, etc.).

Personal Protective Equipment (PPE)

- Standard and Airborne Precautions apply.
- Note: Staff who are non-immune should not enter the room (refer to above)

Standard Precautions

Standard Precautions **must** be maintained at all times, whether or not the patient is known to have measles. Standard precautions include the following:

- Performing hand hygiene **before and after** patient contact,
- Wearing the appropriate Personal Protective Equipment (PPE) based on patient's current symptoms and risk assessment.

Airborne Precautions

Airborne precautions apply to patients known or suspected to be infected with measles which is transmitted by airborne droplets.

- Preform hand hygiene **before and after** patient contact,
- Don a P2/N95 mask prior to entering the room. Protective eyewear may also be considered
- Protective eyewear and P2masks **must** be worn during intubation and suction.

Take note of Doffing of PPE procedure.

Patient Placement

Place a patient with suspected or confirmed measles in a AusHFG "Class N" room. If this is unavailable, use a single room with en-suite bathroom that has:

1. air conditioning with 6 to 12 air changes per hour, and
2. 100% exhaust
    - Keep the room door closed at all times and the patient in the room. When a single room is not available, cohort the patient with confirmed measles in a room with a patient who has active infection with measles, unless otherwise recommended, but not with any other infection. When a single room is not available and cohorting is not desirable, consultation with IPC/ID is advised before patient placement.

NOTE: Children with measles cannot be nursed at Bear Cottage or discharged to Ronald McDonald house.

Patient Care Equipment

The patient should have his/her own equipment such as stethoscopes, observation equipment while an inpatient. Upon discharge, the equipment should be wiped over with either a neutral detergent or 70% Isopropyl alcohol or alcohol impregnated wipes, before being returned into general circulation.

Room Management

- Minimal essential items should be kept in the room.
- Unused consumable stock (e.g. tissues, nappies) is to be discarded when the patient has been discharged from the room. All equipment to be cleaned/wiped over as per Cleaning of the Healthcare Environment.
- IPC to be notified of any patient who has shared a hospital room with the child with measles for contact tracing and isolation if required
- The immunisation status of the contact is to be ascertained
- The contact is then given MMR/MMRV or immunoglobulin as appropriate
- If the contact has been discharged then it is reported to the Public Health Unit for follow up.
- Infectious (terminal) cleaning of the room and bathroom is required, with attention to the bed locker, all surfaces and fixtures. Bed screen and shower curtains are to be changed. Contact Cleaning/Domestic Services.

Note: Room needs to be left for 30 minutes with the door closed upon patient discharge prior to Cleaning. Room can be used following cleaning

7 Other Departments for Diagnostic Tests

- If a child with measles requires a diagnostic test (e.g. x-ray), this must be negotiated with relevant staff in conjunction with IPC
- The receiving department must be notified in advance of the patient's positive measles status.
- All surfaces, such as the chair and x-ray table used by the patient, must be cleaned thoroughly with standard cleaning products following completion of the test. Cleaning must be performed before the equipment is used for another patient.

Note: Room needs to be left for 30minutes with the door closed following patient's procedure prior to Cleaning. Room can be used following cleaning.

8 Operating Theatres

- If a child with measles requires emergency surgery, this must be negotiated with staff in conjunction with IPC or ID Physician.
- The operating theatre suite must be notified in advance of the patient's measles status.
- All surfaces such as the bed and theatre table used by the patient must be cleaned. The cleaning must be attended before the equipment is use for another patient.

Note: Room needs to be left for 30minutes with the door closed following patient's procedure prior to Cleaning. Room can be used following cleaning.

9 Patient Activity Outside Room

- The child cannot use the outside areas in the hospital grounds.
- The child cannot visit the common food outlet areas.
- The child cannot visit the Starlight Room or library.
- The child cannot visit Ronald McDonald House.
- The child cannot attend the schoolroom.
- The child cannot visit other inpatients.
- Activities and school can be organised ONLY in the room.
- All other activities must be negotiated with IPC.

10 Room and Environmental Cleaning Requirements

- Daily cleaning as per the Cleaning Services guidelines. Cleaning/Domestic Service Staff to don appropriate PPE.

11 Linen and Waste

- Used linen and waste should be managed as per Standard Precautions. Linen and waste bags should be removed from the room and taken directly to the collection area.

12 Pathology Specimens

- Pathology personnel must comply with Standard and Airborne Precautions when entering and leaving the room.
- Non-immune pathology staff should not enter the room.
- Seal specimen receptacles correctly and label accurately.
- Place specimen and pathology form into a plastic biohazard specimen bag for transport.
- Tourniquet is to be cleaned before use on any other patient (may be left in room for the duration of patient stay and then cleaned or discarded).

13 Food Services

- Used eating utensils should be returned to the Food/Domestic Services Department on the food trolleys for appropriate cleaning processes.
- Preform hand hygiene after moving food tray

14 Parents, Carers, Relatives and Visitors

- Visitors other than parents or carers are not allowed to visit the patient unless considered to be immune. This must be ascertained before entering the room.
- Encourage parents, carers or visitors to preform hand hygiene upon entering and existing the patient's room
- There are no restrictions for the parents, careers, relatives or visitors after leaving the room.

15 Infectious Status

Clearance that the patient/s are no longer infectious must be obtained from IPC or ID Team before de- isolating and changing precautions.

16 Patient and Family Education

Education and support for the patient and parents/carers is fundamental to the compliance and understanding of the management of measles.

- Discussion should take place before discharge to ensure the patient and family is fully informed about care at home, immunisation and any follow-up required.
- A Measles Fact Sheet should be printed as a handout for the patient and parents/carers https://www.health.nsw.gov.au/Infectious/factsheets/Pages/measles_factsheet.aspx

17 Staff Precautions

- Standard Precautions must be implemented at all times.
- Staff can be allocated to care for other children if required.

Staff exposed to measles:

- Staff Health are to be notified immediately by the IPC team that there has been staff exposure to measles. Completion of an ims+ will provide notification details to Work Health and Safety (WHS).
- Staff born before 1966 are considered to be immune. Surveys suggest that 95% to 98% of those born before 1966 are immune to measles due to exposure to the disease.
- Staff born since 1966 are considered to be susceptible to measles, unless serological evidence indicates immunity, or they have documented evidence of having had 2 doses of a measles containing vaccine in the past. Staff members without evidence of immunity will need to follow the same procedure as an unimmunised person (see Tables 1 and 2).
- The vaccine can be administered by the Staff Health or IPC immunisers if available. At other times the staff member should visit the Emergency Department or their General Practitioner to obtain a MMR/MMRV vaccine.
- A list of staff exposed to measles will be complied by the relevant area managers (e.g. Emergency, Clinical area, OPD, etc.) in conjunction with IPC, and will be sent to Staff Health as soon as possible. Report of incident will be tabled at the IPC Committee.
- Staff should be followed up as per Appendix 2.

Preventing Transmission of Measles

All employees of SCHN should be aware of their immune status to measles. Staff who are seronegative should receive MMR/MMRV vaccination before contact or within three days of exposure[1]. Staff born after 1966 should have documentation of having received two doses of a measles vaccine (including MMR or MMRV), or documented measles seropositivity[1]. If staff have documented evidence of only one dose of MMR, they need to receive a second dose of MMR/MMRV to be considered fully vaccinated[1] (and compliant with the current NSW Health PD 2020_017 *Occupational Assessment, Screening and Vaccination Against Specified Infectious Diseases (https://www1.health.nsw.gov.au/pds/Pages/doc.aspx?dn=PD2020_017)*. Pregnant staff who are exposed to measles should seek immediate advice from the Staff Health or the IPC Team.

18 Cleaning of Room and Bathroom after Discharge

- Cleaning as per Cleaning of the Healthcare Environment Policy 2018-180 http://webapps.schn.health.nsw.gov.au/epolicy/policy/5453

Note: Room needs to be left for 30minutes with the door closed following patient's procedure prior to Cleaning. Room can be used following cleaning.

19 Emergency Department

Identifying a patient with measles

Airborne Precautions are to be instigated immediately following identification of a patient with suspected or confirmed measles.

When a case of measles occurs in the Emergency Dept., the following procedures should be followed:

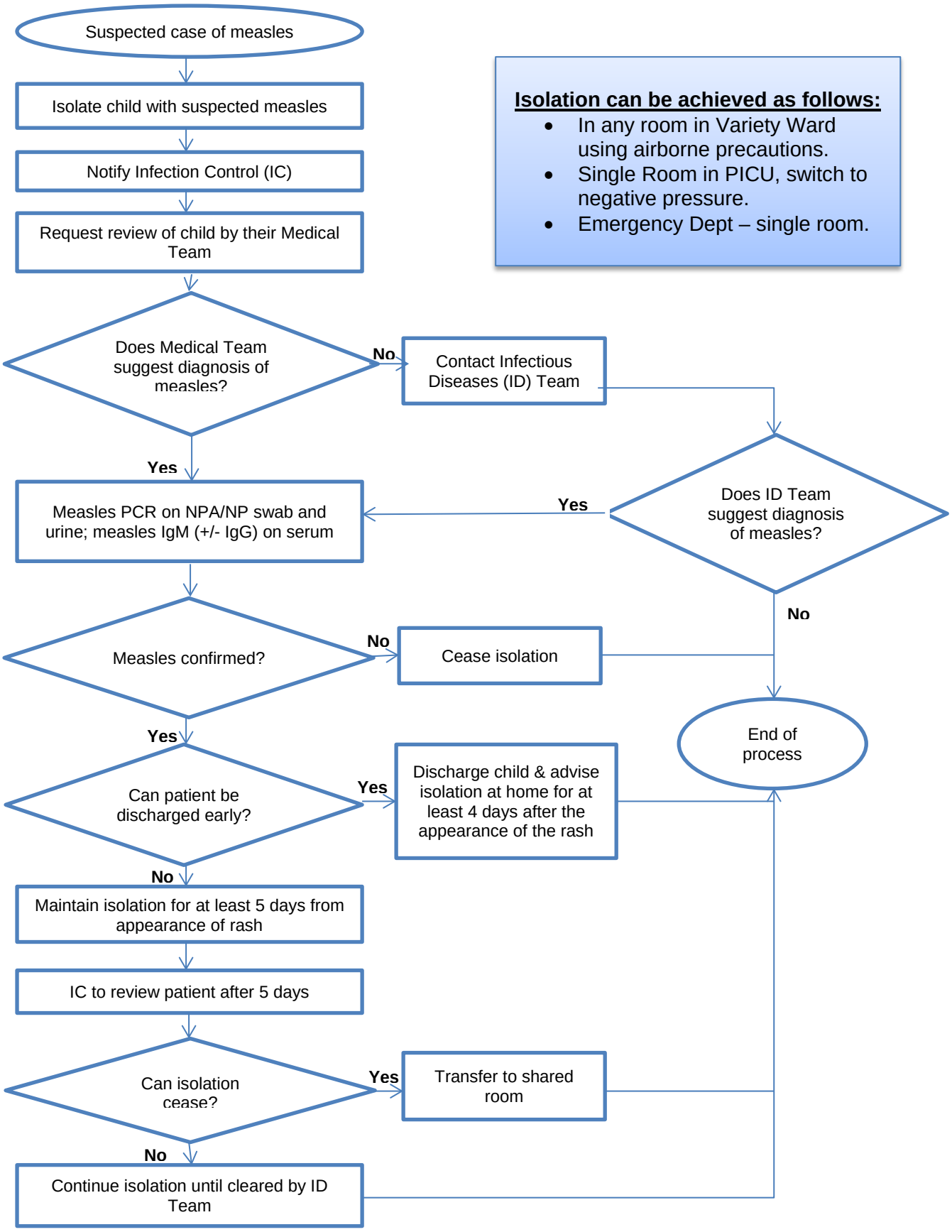
- If a child has suspected measles or is a known measles contact, the child must be placed in a negative pressure (AusHFG "Class N") isolation room, or a single room if a "Class N" room is unavailable.
- Patient placement
  - Require an isolation room with ensuite bathroom to ensure the child does not leave that room.
  - Standard and Airborne Precautions are to be implemented immediately.
  - Risk assess for other symptoms and don appropriate PPE for staff protection as part of Standard precautions principles.
  - Depending on the patient's clinical status, the most senior doctor on duty is to negotiate with the admitting team for the patient to be transferred directly to isolation room in the appropriate ward (C3W/Variety/CSSU/CICU or PICU) for admission or assessed / admitted in ED.

- Advise Bed Management / AHNM of bed requirements as soon as known.
- Priority for appropriate bed placement is to be given to the patient with measles.
- Equipment must be dedicated for the sole purpose of the patient.

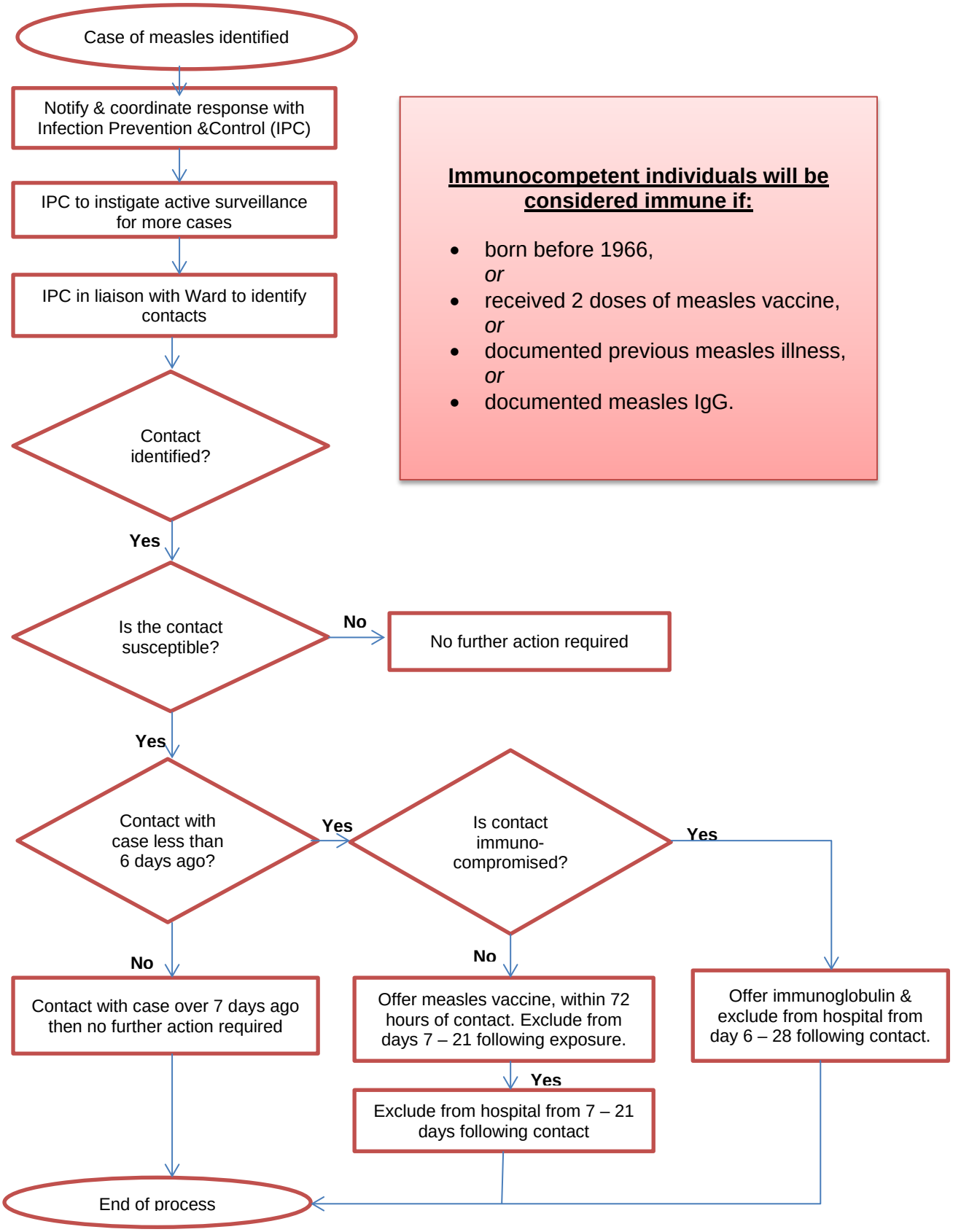
20 References

1. NSW Health Infectious Diseases: Control Guidelines - Measles control guideline July 2019 - https://www.health.nsw.gov.au/Infectious/controlguideline/Pages/measles.aspx accessed April 2021.
2. Australian Technical Advisory Group on Immunisation (ATAGI). Measles. Australian Immunisation Handbook, Australian Government Department of Health, Canberra, 2018, https://immunisationhandbook.health.gov.au/vaccine-preventable-diseases/measles
3. American Academy of Pediatrics. Measles. In: Kimberlin DW, Brady MT, Jackson MA, Long SS eds. *Red Book: 2018 Report of the Committee on Infectious Diseases.* 31st ed. Itasca, IL:: American Academy of Pediatrics; 2018 [pg. 537-550].
4. NHMRC (2019) Australian Guidelines for the Prevention and Control of Infection in Healthcare. Australian Government https://www.nhmrc.gov.au/about-us/publications/australian-guidelines-prevention-and-control-infection-healthcare-2019
5. CDNA National Guidelines for Public Health Units Measles July 2019 https://www1.health.gov.au/internet/main/publishing.nsf/Content/cdna-song-measles.htm

Appendix 1: Management of a Suspected Case of Measles



Appendix 2: Management of Staff Exposed to Measles



Immunocompetent individuals will be considered immune if:

- born before 1966,
  or
- received 2 doses of measles vaccine,
  or
- documented previous measles illness,
  or
- documented measles IgG.