MEASLES (RUBEOLA)
SPECIFIC DISEASE PROTOCOL

Measles (Rubeola) is an acute, highly communicable (can be easily spread) viral infection spread by the airborne route. (14.1) (14.3) (14.4) (14.5) (14.6)

Note: Measles / Rubeola is sometimes referred to as "Red Measles" and should not be confused with Rubella, which is sometimes referred to as "German Measles"

Humans are the only reservoir and source: An asymptomatic carrier state has not been documented. The primary site of infection is the respiratory epithelium of the nasopharynx.

Measles cases can be easily imported by unvaccinated travelers and can spread in under-immunized communities.

Infection Prevention & Control Measures

ELEMENT	ACUTE CARE	LONG TERM CARE	COMMUNITY	
			CLINIC SETTING	HOME SETTING
ROUTINE PRACTICES	*Measles (Rubeola)* transmission may be prevented by following good hand hygiene, and other Routine Practices at all times. Refer to the Routine Practices section of the Infection Prevention and Control Manual and/or the Routine Practices Policy for specific information.			

ELEMENT	ACUTE CARE	LONG TERM CARE	COMMUNITY	
			CLINIC SETTING	HOME SETTING

Airborne Precautions

USE ROUTINE PRACTICES AT ALL TIMES
At all times in all areas.

Use Point of Care Risk Assessment (PCRA) to determine if other personal protective equipment (gloves, gown, eye/face protection) is required.

PROBABLE/CONFIRMED (showing signs and symptoms)

Airborne Precautions*
Implement Airborne Precautions immediately for a patient/resident/client (PRC) with Measles/Rubeola. Maintain Airborne Precautions until 4 days after start of rash; or for the duration of symptoms in immune compromised PRCs. (14.1) (14.4)

SUSCEPTIBLE CONTACT

Airborne Precautions*

Implement Airborne Precautions for a PRC who is a susceptible contact to Measles from day 5 after their first exposure to day 21 after their last exposure regardless of post-exposure prophylaxis. Susceptible contacts should receive immunoprophylaxis unless contraindicated.

Note: All HCWs regardless of presumptive immunity to measles must wear a fit-tested, seal-checked N95 respirator when providing care to a PRC with probable or confirmed measles. (14.6)

Only health care workers (HCWs) with presumptive immunity to measles should provide care to PRCs with probable/confirmed measles due to increased risk of transmission of measles to susceptible individuals. (14.6)

Non-immune, susceptible staff may only enter the room in exceptional circumstances (i.e., no immune staff are available and PRC safety would be compromised otherwise). (14.6)

ELEMENT	ACUTE CARE	LONG TERM CARE	COMMUNITY	
			CLINIC SETTING	HOME SETTING
PERSONAL PROTECTIVE EQUIPMENT (PPE)	Fit tested N95 Respirator for all staff regardless of presumptive immune status. (14.6) Faith or cultural head covering do not require covering or removing			
TRIAGE	Upon arrival: If the probable/confirmed PRC is not wearing a medical mask, instruct the PRC and Accompanying Individuals (AIs) to clean their hands and put on a medical mask if tolerated. Immediately show the PRC and any AIs to a private room, preferably an AIR and close the door.	**N/A**	When scheduling appointment by phone and person has signs and symptoms of measles, provide instructions for arrival: Come to clinic wearing a mask if possible. If PRC and AIs are not wearing a medical mask tell PRC to immediately clean their hands and put on a medical mask as soon as they arrive.	**N/A**

ELEMENT	ACUTE CARE	LONG TERM CARE	COMMUNITY	
			CLINIC SETTING	HOME SETTING
Accommodation	Airborne Isolation Room (AIR) If not available, place PRC in single room with the door shut. Door must remain shut while the PRC is in the room and for the required time after PRC has left the room upon transfer or discharge. If not in an AIR PRC must wear a medical mask as much as possible (e.g.: can remove for eating and drinking). Persons known to be infected with measles may share a room For more details refer to Airborne Precautions Protocol.		Airborne Isolation Room (AIR) If AIR not available, place PRC in a single room with the door shut. Door must remain shut while the PRC is in the room and for the required time after PRC has left the room upon transfer or discharge. If not in an AIR PRC must wear the mask as much as possible (e.g.: can remove for eating and drinking). Persons known to be infected with measles may share a room For more details refer to Airborne Precautions Protocol.	Confirmed cases of measles should be excluded from child care facilities, schools, post-secondary educational institutions, work places, anywhere health care is provided and other group settings. They should stay away from non-household contacts for four days after the appearance of the rash.

ELEMENT	ACUTE CARE	LONG TERM CARE	COMMUNITY	
			CLINIC SETTING	HOME SETTING
ENVIRONMENT / EQUIPMENT CLEANING	Follow airborne precautions when cleaning and disinfecting occupied rooms. No special cleaning and disinfection procedures are required. Clean and disinfect as usual using an IP&C approved disinfectant cleaner.			Follow Airborne Precautions when cleaning the home. No special cleaning and disinfection procedures are required.
After Transfer/discharge:	After PRC leaves the room, ensure the door remains closed until required air exchanges have occurred. Use signage to indicate how long the door should remain closed. If air exchanges of a room are not known keep the room door closed for a minimum of 2 hours to allow for air clearance before cleaning. If the air exchanges are known allow adequate time for air clearance according to the Air Exchange Table Appendix A. If a room must be cleaned and disinfected before the air clearance is completed airborne precautions must be used (i.e., staff must wear an N95 respirator regardless of presumptive immunity).			

<table>
<tr><th>ELEMENT</th><th>ACUTE CARE</th><th>LONG TERM CARE</th><th colspan="2">COMMUNITY</th></tr>
<tr><td></td><td></td><td></td><td>CLINIC SETTING</td><td>HOME SETTING</td></tr>
<tr><td rowspan="2">PRC TRANSPORT

Transport within Facilities</td><td colspan="2">Perform as much of the care as possible in the original clinic room where the PRC was placed.

If the PRC requiring Airborne Precautions must go to another area (e.g., lab) in the facility, advise the area that Airborne Precautions are required and ask the person to wear a medical mask.

Use transport routes that minimize contacts.
Clear all hallways and elevators along the route.</td><td rowspan="2">N/A</td><td rowspan="2">N/A</td></tr>
<tr><td>Staff transporting the PRC requiring Airborne Precautions must wear an N95 respirator.

PRC to wear a medical face mask and follow respiratory hygiene during transport if able.

For more details refer to Airborne Precautions Protocol and Transporting PRC on Additional Precautions Highlights.</td><td>N/A</td></tr>
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ELEMENT	ACUTE CARE	LONG TERM CARE	COMMUNITY	
			CLINIC SETTING	HOME SETTING
PRC TRANSPORT cont'd Transport between Facilities	Transport staff should follow Airborne Precautions Protocol. All transport staff should wear an N95 respirator regardless of immune status. PRC should wear a medical mask during entire transport and at destination unless put in an AIR. Notify receiving facility that Airborne Precautions are required.			
Transport outside Facilities	PRC and accompanying individuals should not take public transport with multiple passengers (e.g., bus) **Preferred option**: Use private vehicle with "previously exposed" contacts (e.g., family members) or immune individuals. ○ If not possible use a taxi, with PRC masked for full trip duration and windows opened if possible. ○ **Facility, clinic, area discharging:** ▪ Provide the taxi driver with N95 if possible. ▪ Instruct on its use and limitations.			
PREVENTION	Prompt identification and management of cases and contacts. (14.4) Immunization is the best way to protect against measles. Immunization according to recommendations in the most current *Canadian Immunization Guide.* Refer to the Manitoba Health Seniors and Active Living website: https://www.gov.mb.ca/health/publichealth/cdc/vaccineeligibility.html for information on eligibility criteria for publicly-funded measles immunization.			

ELEMENT	ACUTE CARE	LONG TERM CARE	COMMUNITY	
			CLINIC SETTING	HOME SETTING
REPORTING	**Measles is a reportable disease.** Manitoba Health requires same day reporting for measles cases. All probable and confirmed cases must be reported on the same day to WRHA IP&C on weekdays, and Manitoba Health on weekends/evenings/nights. During business hours, on-site IP&C staff will complete the Clinical Notification of Reportable Diseases and Conditions form on behalf of the diagnosing physician if promptly notified. During weekends/evenings/nights, contact the Manitoba Medical Officer of Health on call at 204-788- 8666. Clinical Notification of Reportable Diseases and Conditions form and fax to Manitoba Health at 204-948-3044		Probable (clinical) cases of **measles are reportable** to the Public Health Surveillance Unit by telephone (204-788-6736) during regular hours (8:30 a.m. to 4:30 p.m.) AND by secure fax (204-948-3044) on the **same day** that they are identified. After hours telephone reporting is to the Medical Officer of Health on call at (204-788-8666). Clinical Notification of Reportable Diseases and Conditions (gov.mb.ca) should be used.	**N/A**

ELEMENT	ACUTE CARE	LONG TERM CARE	COMMUNITY	
			CLINIC SETTING	HOME SETTING
CONTACT FOLLOW - UP	Notify site Infection Prevention and Control of positive cases and any susceptible contacts. Contact follow up should be done in collaboration with Infection Prevention and Control and the involvement of Population Public Health as required.		Contact follow up and management in the community will be coordinated by Public Health. Cooperation in Public Health investigation is required.	
DISCHARGE TEACHING	Advise PRC, visitors, Designated Caregivers (DC), Accompanying Individuals (AI): The person with measles is to stay home (self-isolate) from school, post-secondary educational institutions, child care facilities, workplaces and other group settings for four days after rash onset. Stay away from non-household contacts for four days after the appearance of the rash. Avoid contact with high risk individuals (pregnant individuals, infants < 12 months of age and immunocompromised individuals) If identified as a susceptible contact follow Public Health guidance Practice Respiratory Hygiene Perform Hand Hygiene Avoid sharing drinking glasses, eating utensils, lip balm/gloss or cigarettes/vapes. Children may get exposed by sharing soothers, bottles or toys that have been in contact with infected children[(14.7)]			

ELEMENT	ACUTE CARE	LONG TERM CARE	COMMUNITY	
			CLINIC SETTING	HOME SETTING
VISITORS, DESIGNATED CARE GIVERS AND ACCOMPANYING INDIVIDUALS	Only ***immune*** visitors, Designated Caregivers (DC), and Accompanying Individuals (AI) shall enter the room. N-95 respirators are required for non-immune persons who ***must*** enter the room (e.g., end of life). In this scenario staff shall inform the non-immune visitor/DC/AI that protection is limited: ○ When using a non-fit tested N95 respirator, the protection afforded by this respirator is at a reduced level.[(13.5)] The user will still be exposed to measles. ○ Staff shall show the visitor/DC/AI how to seal check an N95 respirator.			
EPR	Implement Airborne Precautions for persons with "RESP RISK" EPR Health Issue flag . Specific **dates for precautions** are indicated in the **Description Box of the Health Issue.** Patients identified as susceptible measles contacts will be flagged in the EPR with the **Respiratory Risk Present** health issue. This will be displayed in the patient header as **RESP RISK.** **RESP RISK** health issues are only resolved by an ICP or ICA. It is essential to check the description field prior to resolving to identify any previous health issue needing reinstating.	If your facility has access to EPR please see guidance in the "Acute" column to the left.	**N/A**	

1. EPIDEMIOLOGY / CAUSE

Measles virus is an enveloped RNA virus with only one serotype (14.7), classified as a member of the genus *Morbillivirus* of the family Paromyxoviridae. (14.2) (14.4)There are different genotypes of the virus. (14.2)

2. RISK FACTORS

All persons who have not had the disease or have not been successfully immunized are at risk. (14.4)

Persons at greatest risk of *exposure* to measles include:

- travelers to destinations experiencing measles outbreaks
- health care workers
- military personnel
- students in post-secondary educational settings.

3. DEFINTIONS (14.4)

3.1 Contact

Someone who shared the same airspace (no minimum length of time) with a measles case during the infectious period from the time of entering a facility/admission until two (2) hours after the measles case either left the area or was isolated.

3.2 Susceptible Contact

Is a Contact (defined above) that was born during or after 1970 and **DOES NOT** meet the following criteria for immunity:

- Adults who have received at least two doses of Measles, Mumps, Rubella vaccine (MMR)
  OR
- Children 12 months to 17 years of age who have received two doses of MMR
  OR
- Laboratory documentation of antibodies to measles.

3.3 High Risk Susceptible Contact

A Susceptible Contact (as defined above) who meets one or more of the following criteria:

- Immunocompromised
- Pregnant
- Infant less than 12 months of age

3.4 Criteria for immunity in HCWs and military personnel [(14.8)]

An individual in these categories is considered immune if there is:

- Documentation of vaccination with 2 doses of a measles containing vaccine (regardless of their year of birth)
  OR
- History of laboratory confirmed infection
  OR
- Laboratory evidence of immunity

4. CLINICAL PRESENTATION (SIGNS and SYMPTOMS)

4.1 Prodromal phase

4.1.1 On average the prodromal phase begins 7 – 21 days after exposure in a susceptible person and may resemble a severe respiratory infection [(14.4)]

4.1.2 Initial symptoms include: [(14.2) (14.3) (14.4) (14.5) (14.6)]

- Prodromal fever (≥ 38.3° C – oral)
- Cough
- Coryza (runny nose)
- Conjunctivitis
- Malaise [(14.4) (14.6)]
- Anorexia [(14.4)]

4.1.3 Koplik Spots

A symptom specific (pathognomonic) to measles, Koplik spots are small (1mm) bluish white spots which may be seen on the oral mucosa (14.4) (14.5) and may appear 2 to 3 days after the onset of symptoms. (14.5)

These spots are often confused with other lesions in the mouth.

Their suspected presence is an unreliable marker of measles. (14.3)

Koplik Spots
Image courtesy of: the National Health Service (NHS)

4.2 Rash

Red maculopapular rash appears 3-7 days after initial symptoms (14.5) (14.6)or 14 days after exposure. (14.4) (14.5)

The rash first appears on the face at the hairline spreads downward to the neck, trunk, arms, legs and feet and lasts 4 to 7 days. (14.5)

Measles rash appears brown or red and blotchy on white skin but may be hyperpigmented or harder to detect on black or brown skin. (14.3)

The rash fades in the same sequence as it appears, from head to extremities. (14.4)

The characteristic rash may not develop in immunocompromised PRCs. (14.4)

On lighter skin: maculopapular rash (small, flat, red areas and small, red raised lesions)
Image courtesy of: Centers for Disease Control and Prevention

On darker skin: measles appears to look hyperpigmented rather than erythematous looking OR may be harder to see
Image courtesy of: Black & Brown Skin

4.3 Resolution

Uncomplicated illness from late prodrome to resolution of the fever and rash, lasts seven to 10 days. (14.4)

5. ROUTE OF TRANSMISSION

Measles is spread by airborne transmission, and/or direct (close personal) contact with nasal or throat secretions of infected persons. Transmission can occur from person to person by coughing, sneezing or sharing food or drinks.

Airborne measles particles can remain suspended in the air for up to two (2) hours depending on the air exchanges of the room/area. All persons who have not had the disease or who have not been successfully immunized are susceptible. Acquired immunity after the illness is permanent.

Measles is one of the most highly communicable diseases in humans. It is most infectious during the late prodromal phase when cough and runny nose are at their peak. The virus can spread for approximately four days before the onset of rash (i.e., one to two days before onset of fever) until approximately four days after rash onset (longer in immunocompromised PRCs).

6. INCUBATION PERIOD

The incubation period from exposure to rash averages 14 days, with a range of 7 to 21 days. (14.1) (14.3) (14.4) (14.5)

7. PERIOD OF COMMUNICABILITY

Measles is one of the most highly communicable diseases in humans. Cases are contagious from four (4) days before rash onset until four (4) days after rash onset. (14.1) (14.3) (14.4) (14.5) Person-to-person transmission of measles vaccine strains has not been documented. (14.4)

8. DIAGNOSIS

8.1 Measles can usually be diagnosed by the characteristic rash as well as the presence of Koplik's Spots on the inside lining of the cheek. Koplik spots can be difficult to see, their absence should not preclude a clinical diagnosis of measles. (14.2)

8.2 Laboratory Diagnosis - See MB Health – Communicable Disease Management Protocol for Measles (Rubeola) for details.

9. COMPLICATIONS

Complications disproportionately affect persons suffering from malnutrition, immunodeficiency and pregnant women. They are also more common among children younger than five years and adults 20 years and older.

Common complications can include: (14.1) (14.3) (14.4) (14.5) (14.6)

- Otitis media
- Diarrhea in young children

More severe complications include: (14.2)(14.3)

- Pneumonia
- Laryngotracheobronchitis (croup)
- Acute encephalitis, which may result in permanent neurologic damage, occurs in approximately 1 out of every 1,000 cases
- Spontaneous abortion, premature delivery in pregnant women.

10. OCCUPATIONAL & ENVIRONMENTAL SAFETY AND HEALTH (OESH)

Contact Occupational and Environmental Safety and Health (OESH) for staff assessment and/or concerns.

11. REFERENCES

11.1 Interim Infection Prevention and Control Recommendations for Measles in Healthcare Settings. Centers for Disease Control and Prevention (CDC). (July, 2019). Available at: https://www.cdc.gov/infectioncontrol/guidelines/measles/index.html

11.2 Control of Communicable Diseases Manual, 21st edition. (2022). Measles, pp. 405-414. American Public Health Association.

11.3 Guidance for risk assessment and infection prevention and control measures for measles in healthcare settings (January, 2024). National Health Service (NHS) England. Available at: https://www.england.nhs.uk/long-read/guidance-for-risk-assessment-and-infection-prevention-and-control-measures-for-measles-in-healthcare-settings/

11.4 Measles (Rubeola). Communicable Disease Management Protocol. Manitoba Health. (December, 2019). Available at: https://www.gov.mb.ca/health/publichealth/cdc/protocol/measles.pdf

11.5 Measles: For Healthcare Professionals. Government of Canada (February, 2024). Available at: https://www.canada.ca/en/public-health/services/diseases/measles/health-professionals-measles.html

11.6 Measles: Information for Health Care Providers. 2nd ed. Public Health Ontario (PHO). (March, 2024). Available at: https://www.publichealthontario.ca/-/media/Documents/M/24/measles-information-health-care-providers.pdf?rev=89f22e24634f4884b0450c599e43eea6&sc_lang=en

11.7 Measles: Public Health Fact Sheet. Manitoba Health. (March 2024). Available at: https://www.gov.mb.ca/health/publichealth/factsheets/measles.pdf

11.8 Measles vaccines: Canadian Immunization Guide (September, 2022). Government of Canada. Available at: Measles vaccines: Canadian immunization guide - Canada.ca

11.9 Red Book, 32nd edition (2021). Measles, pp.503-519. American Academy of Pediatrics.

11.10 Visitor use of N95 Respirators without fit test. Kelsey S. McCue, Legal Counsel, Health Law. Memo March 23, 2023.

Appendix A: Air Changes Table

**Time Needed (by Number of Air Changes per Hour)
to Remove Airborne Microorganisms**

Air changes per hour	Minutes Required for Removal of Airborne Microorganisms	
	99%	99.9%
2	138	207
4	69	104
6	46	69
12	23	35
15	18	28
20	14	21
50	6	8

This table was adapted from the CDC recommendations: Centers for Disease Control and Prevention. Guidelines for preventing the transmission of Mycobacterium tuberculosis in health-care settings. MMWR 2005;54:1-142. Available at: http://www.cdc.gov/mmwr/PDF/rr/rr5417.pdf.