



Section: Infection Prevention and Control

Subject: Prevention and Management of Measles

I. Purpose

Measles is most commonly acquired from persons in the household or community but spread of measles can also occur in healthcare settings. While the most important measure to prevent measles transmission in all settings is ensuring community immunization, core measles prevention in healthcare settings requires a multi-faceted approach including but not limited to ensuring healthcare personnel have presumptive evidence of immunity to measles, rapidly identifying and isolating patients with known or suspected measles, adhering to Standard and Airborne Precautions for patients with known or suspected measles, and managing exposed and ill HCP.

II. Procedure

A. Rapidly identifying patients with known or suspected measles

1. See Appendix A for Provider Guide to Clinical Presentation and Complications
2. Before arriving to a healthcare setting:
 - a. Appointments scheduled by phone: For persons with signs or symptoms of measles, provide instructions for arrival, including which entrance to use and the precautions to take (e.g., how to notify hospital staff, don a facemask upon entry, follow triage procedures).
 - b. Instruct Emergency Services to notify the receiving facility/accepting physician in advance when transporting a patient with known or suspected measles
3. Upon arrival to healthcare setting:
 - a. Utilize existing triage stations for rapid identification and isolation of patients with measles
 - b. Persons with signs or symptoms of measles should be identified, provided a facemask (procedural or surgical) to wear, and separated from other patients prior to or as soon as possible after entry into a facility
 - i. Provide persons with signs or symptoms of measles with instructions on all relevant infection control expectations
 - c. Post visual alerts (e.g., signs, posters) in appropriate languages about respiratory hygiene, cough etiquette, and hand hygiene at the facility entrance and in common areas (e.g., waiting areas, elevators, cafeterias)
4. Measles Testing
 - a. There are 2 options for measles testing depending on indication or specimens included:

	Quest	Florida Department of Health (DOH)	JHS In-House
Indication	Diagnostic: rule-out active infection; excludes urine testing	Diagnostic: rule-out active infection; includes urine testing	Determine pre-existing immunity; do not use to rule-out active infection
Test Name to Order	Miscellaneous Test x2:	Measles Panel DOH	Measles Ab IgG
Tests Included	1. Measles Antibodies (IgG, IgM) to Quest 2. Measles Virus Qual PCR Note: Lab is working on combining both tests into 1 order, document will be updated once new order name available	Measles IgG Measles IgM Measles PCR	Measles IgG
Specimens To Be Collected	1 Tiger top tube 1 nasopharyngeal swab in UTM	1 urine sample in sterile container 1 Tiger top tube 1 nasopharyngeal swab	1 Tiger top tube
Pre-approval Required	No	Yes; patient's provider should contact Miami-Dade FDOH at 305-470-5660	No



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- b. Walk specimens directly to Microbiology Laboratory and hand directly to supervisor or person in charge. Specimens will be sent for processing to DOH.
- c. Contact Infection Prevention and Control immediately for DOH reporting: 786-266-0624

JMH/HCH/LRC/Ambulatory	JNMC	JSMC	JWMC
JM Micro Lab 305-585-6508 Ask to speak with supervisor (Clara, Safoura) or person-in-charge Back-up: Huy Dinh, Senior Manager (305) 297-6827	JNMC Lab 305-654-5020	JSMC Lab 305-256-5060 Ask for shift supervisor Back up: Marie Josee Danois, Director	JWMC Lab phone number 786-466-1015 Yanisleydis Garcia, Assistant Manager (305) 202-2283 Back-up: Natacha Vega, Director (305) 710-9894

B. Adhering to Standard and Airborne Precautions for patients with known or suspected measles

1. Patient placement:
 - a. All patients with known or suspected measles should be placed in a private airborne isolation room (AIIR) with the door closed
 - b. If AIIR is not available, transfer the patient as soon as possible to a unit or facility where an AIIR is available.
 - i. Pending transfer, place patient in a private room with the door closed. If feasible, patient should wear a facemask for the duration of time spent in the non-AIIR room.
 - ii. After the patient leaves the room, it should remain vacant for at least 2 hours.
2. Personal Protective Equipment (PPE):
 - a. All healthcare personnel caring for patients with known or suspected measles should don a fit-tested N95 respirator before entering the room and only remove respirator once they have exited the room and the door is closed
3. Patient Transport:
 - a. Limit transport of patients with known or suspected measles to essential purposes, such as diagnostic and therapeutic procedures that cannot be performed in the patient’s room or in the facility
 - b. When transport within the facility is necessary:
 - i. The patient should wear a facemask if tolerated
 - ii. Use a transportation route and process that includes minimal contact with persons not essential for the patient’s care
 - iii. Notify HCP in the receiving area of the impending arrival of the patient and of the precautions necessary to prevent transmission
 - c. When transport outside the facility is necessary, inform the receiving facility and the transport vehicle HCP in advance about airborne precautions being used



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4. Duration of Airborne Precautions
 - a. Discontinuation of airborne precautions must be executed with consultation from the Infection Prevention department; on-call phone number: 786-266-0624
 - b. Patients with measles should remain in Airborne Precautions for 4 days after the onset of rash (with onset of rash considered to be Day 0)
 - c. Immunocompromised patients with measles should remain in Airborne Precautions for the duration of illness due to prolonged virus shedding in these individuals
5. Visitation Guidelines
 - a. Visitors without acceptable presumptive evidence of immunity should not enter the room of a patient with known or suspected measles
 - b. Limit visitors to patients with known or suspected measles to those who are necessary for the patient's well-being and care.
6. Environmental Infection Control
 - a. Standard cleaning and disinfection are adequate for measles virus environmental control in all healthcare settings
 - b. Manage used, disposable PPE and other patient care items for measles patients as regulated medical waste according to federal and local regulations

C. Management of Measles Exposure

1. Exposure Definition:

Regardless of measles immunity status:

Not wearing an N95 respirator while in a shared air space* with an infectious measles patient **at the same time** or in a shared air space* vacated by an infectious measles patient **within the prior 2 hours**

*Shared air space includes:

- Smaller spaces, such as the patient compartment of an ambulance, a single patient room, or a clinic waiting area, are shared air spaces, or
- Different areas in a larger space or rooms that share a common air handling system, such as a large emergency department with patient waiting, triage, HCP work areas, or multiple individual patient rooms that share a common unfiltered air source, are also shared airspaces

2. Exposure Evaluation Process
 - a. Notify Infection Prevention and Control (on-call phone number: 786-266-0624)
 - b. Complete Communicable Disease Exposure Form for all HCP and patients that meet exposure definition and email to HealthOffice@jhs.miami.org
3. Management of Exposed Healthcare Personnel (HCP)
 - a. For HCP **with presumptive evidence of immunity to measles** who have had an exposure to measles:
 - i. Postexposure prophylaxis is not necessary
 - ii. Work restrictions are not necessary
 - iii. Implement daily monitoring for signs and symptoms of measles infection for 21 days after the last exposure; have awareness that previously vaccinated individuals may have a modified disease presentation
 - b. For HCP **without presumptive evidence of immunity to measles** who have had an exposure to measles:



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- i. Refer employee to JHS Employee Health department and immediately exclude from work until cleared by Employee Health
 - c. For HCP **infected with measles**:
 - i. HCP must be cleared by Employee Health prior to returning to work
 4. Management of Exposed Patients
 - a. For patients **with evidence of immunity to measles** who have had an exposure to measles:
 - i. Airborne precautions and postexposure prophylaxis is not recommended
 - ii. If evidence of immunity is uncertain, assume patient does not have immunity until it is determined (see next bullet point)
 - b. For patients **without presumptive evidence of immunity to measles** who have had an exposure to measles:
 - i. Place the exposed patient without presumptive evidence of measles immunity on Airborne Precautions for 21 days after the last exposure, or until discharge, if earlier
 - ii. Assess for immunity, and administer postexposure prophylaxis in accordance with CDC and ACIP recommendations
 5. See Appendix B for Measles Post-Exposure Prophylaxis (PEP) Recommendations

III. References

Centers for Disease Control and Prevention. (2019, July 23). *Interim measles infection prevention recommendations in healthcare settings*. Centers for Disease Control and Prevention. <https://www.cdc.gov/infectioncontrol/guidelines/measles/index.html>



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Appendix A: Provider Information for Clinical Presentation and Complications

Provider Information for Measles Clinical Presentation and Testing

Overview: Measles is a highly contagious viral illness spread by measles virus (Paramyxoviridae family). It spreads via respiratory droplets and airborne transmission.

Incubation Period: 7 to 14 days (average 10-12 days) from exposure to initial symptoms. Patients are contagious from 4 days before to 4 days after rash onset.

Symptoms/Disease Progression: 2 main stages

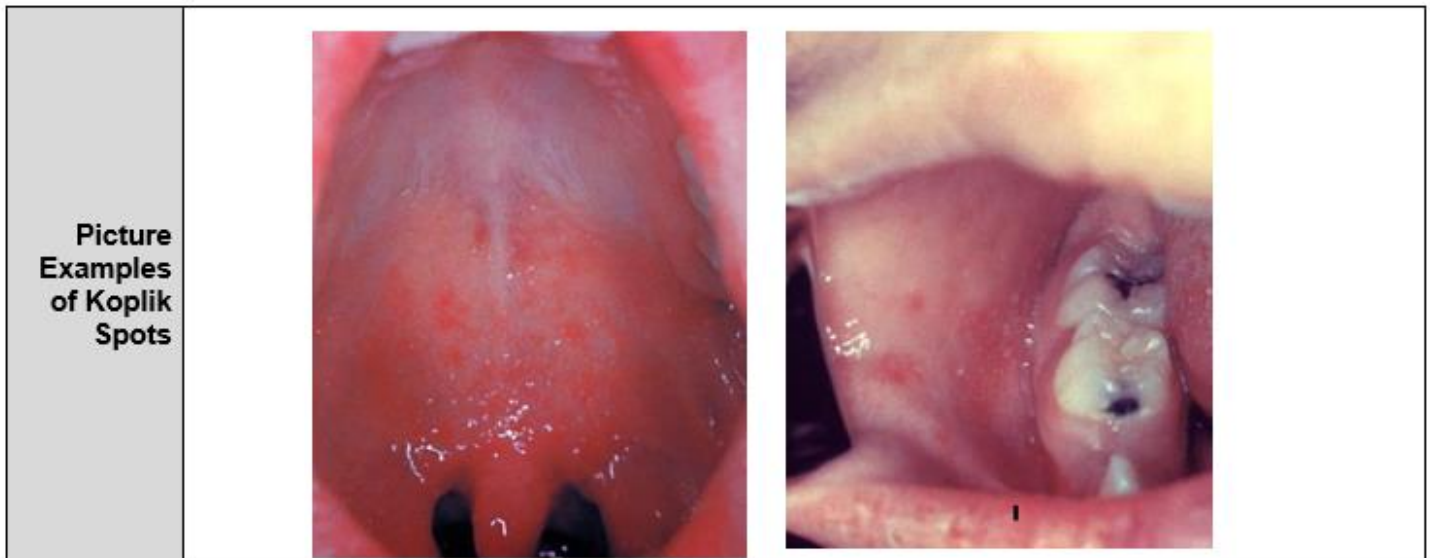
Picture Examples of Measles Rash





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When to Highly Suspect Measles:

- Unvaccinated individuals with compatible symptoms
- Patients with known exposure to a measles case.
- Patients with fever, cough, coryza, and/or conjunctivitis, followed by a rash.
- Patients with Koplik spots.
- Patients with a history of recent travel to areas with measles outbreaks.

What Should You Do if Suspect Measles in a Patient?

1. *Isolate:* mask patient and place on airborne precautions in a negative air pressure room.
2. *Test:*

	Quest	Florida Department of Health	JHS In-House
Indication	Rule-out active infection; excludes urine testing	Rule-out active infection; includes urine testing	Determine pre-existing immunity; do not use to rule-out active infection
Test Name to Order	Miscellaneous Test x2:	Measles Panel DOH	Measles Ab IgG
Tests Included	1. Measles Antibodies (IgG, IgM) to Quest 2. Measles Virus Qual PCR Note: Lab is working on combining both tests into 1 order, document will be updated once new order name live	Measles IgG Measles IgM Measles PCR	Measles IgG
Specimens To Be Collected	1 Tiger top tube 1 nasopharyngeal swab in UTM	1 urine sample in sterile container 1 Tiger top tube 1 nasopharyngeal swab	1 Tiger top tube
Pre-approval Required	No	Yes; patient's provider should contact Miami-Dade FDOH at 305-470-5660	No

3. *Report:* contact Infection Prevention and Control immediately; 786-266-0624



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Appendix B: Measles Post-Exposure Prophylaxis (PEP) Recommendations

Background: Patients who are **not fully immune** to measles **are at risk** of contracting the disease

- Not vaccinated (< 2 Measles-Mumps-Rubella (MMR) vaccines), either by choice or too young
 - Vaccination schedule: First dose is 12 to 15 months of age; second dose at 4 to 6 years of age, recommended prior to entering kindergarten or first grade and may be administered at any time ≥ 28 days after the first dose, following AAP recommendations
- Immunocompromised (see definitions below)
 - Severe primary immunodeficiency
 - Bone marrow transplant until >12 months after finishing all immunosuppressive treatment, and maybe longer in patients who have developed graft-versus-host disease;
 - On treatment for acute lymphoblastic leukemia (ALL) within and until >6 months after completion of immunosuppressive chemotherapy
 - On cancer chemotherapy
 - Post solid organ transplantation
 - Receiving daily corticosteroid therapy with a dose >20mg (or >2 mg/kg/day for patients who weigh <10kg) of prednisone or equivalent for >14 days
 - Receiving certain biologic immune modulators, such as tumor necrosis factor-alpha (TNF- α) blockers or rituximab**
 - After hematopoietic stem cell transplant, duration of high-level immunosuppression is highly variable and depends on type of transplant (longer for allogenic than autologous), type of donor and stem cell source, and post-transplant complications such as graft vs. host disease and their treatments**
 - AIDS or HIV with severe immunosuppression defined as CD4 <15% (all ages) or CD4 count <200 lymphocytes/mm³ (aged >5 years)

Action: Patients who are exposed to measles and are not fully immune (fully immune = IgG positive, 2 MMR vaccine doses) are recommended to receive post-exposure prophylaxis (PEP)

- It is recommended the patient either receive **MMR vaccine, IVIG, and/or quarantine** at home depending on time of presentation, age, immune status, and if the patient is pregnant
- Patients **should not receive both MMR vaccine and IVIG concurrently**, IVIG will inactivate the vaccine
 - If patients receive IVIG, they need to wait 8 months prior to receiving MMR or varicella vaccines
- Any nonimmune person exposed to measles who received IVIG should subsequently receive MMR vaccine, which should be administered no earlier than 8 months after IGIV administration, provided the person is then aged ≥ 12 months and the vaccine is not otherwise contraindicated
- Please see the guidance on the next page from the American Academy of Pediatrics and IDSA for recommendations on what PEP is recommended based on age, immune status, and exposure period
- Consult with Infectious Diseases and Infection Prevention as needed



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Post-exposure prophylaxis (PEP) for measles exposures who are NOT pregnant or immunocompromised

Age range	Measles immune status	PEP type depending on time after initial exposure		
		≤3 days (≤72 hours)	4-6 days	>6 days
All ages	Immune <i>(IgG positive, 2 MMR vaccine doses, or born before 1957^a)</i>	<ul style="list-style-type: none"> PEP not indicated. Exposed person has documented immunity 		
<6 months	Non-immune <i>(due to age)</i>	<ul style="list-style-type: none"> Give intravenous immunoglobulin (IVIG) 400mg/kg^b Home quarantine^d for 28 days after last exposure 		<ul style="list-style-type: none"> PEP not indicated (<u>too late</u>)^e Home quarantine^d for 21 days after last exposure
6-11 months	Non-immune <i>(due to age)</i>	<ul style="list-style-type: none"> Give MMR vaccine (MMR vaccine preferred over IVIG) No quarantine needed 	<ul style="list-style-type: none"> Give intravenous immunoglobulin (IVIG) 400mg/kg^b Home quarantine^d for 28 days after last exposure 	<ul style="list-style-type: none"> PEP not indicated (<u>too late</u>)^e Home quarantine^d for 21 days last after exposure
≥12 months	Non-immune <i>(0 doses MMR vaccine or IgG negative)</i>	<ul style="list-style-type: none"> Give MMR vaccine No quarantine needed^d 	<ul style="list-style-type: none"> PEP not indicated (<u>too late</u>)^e Home quarantine^d for 21 days after last exposure, then give MMR vaccine to protect from future exposures 	
≥12 months	1 dose of MMR vaccine ^a	<ul style="list-style-type: none"> Give 2nd MMR vaccine dose if ≥28 days from last dose of live vaccine No quarantine needed (patient had 1 dose when exposed) 	<ul style="list-style-type: none"> PEP not indicated (<u>too late</u>)^e <p><u>Household member of a confirmed/suspected case</u></p> <ul style="list-style-type: none"> Obtain IgG titers to determine immunity. Home quarantine^d while awaiting results; if IgG negative, quarantine for 21 days after last exposure (<u>too late for PEP</u>)^e <ul style="list-style-type: none"> PEP not indicated (<u>too late</u>)^e <p><u>Not a household member of a confirmed/suspected case</u></p> <ul style="list-style-type: none"> Age 1-3 years: Less likely to get sick because has 1 dose of MMR Age ≥4 years: Less likely to get sick because has 1 dose of MMR, and give 2nd MMR to protect from future exposures 	
Adults	Unknown measles immune status	<ul style="list-style-type: none"> Give MMR vaccine No quarantine needed^d 	<ul style="list-style-type: none"> PEP not indicated (<u>too late</u>)^e <p><u>Household member of a confirmed/suspected case</u></p> <ul style="list-style-type: none"> Obtain IgG titers to determine immunity. Home quarantine^d while awaiting results; if IgG negative, quarantine for 21 days after last exposure (<u>too late for PEP</u>)^e <ul style="list-style-type: none"> PEP not indicated (<u>too late</u>)^e <p><u>Not a household member of a confirmed/suspected case</u></p> <p>Does contact work in setting with children (daycare/school) or healthcare facility</p> <ul style="list-style-type: none"> <u>Yes</u>: Obtain titers to determine immunity. Home quarantine^d while awaiting results; if IgG negative, quarantine for 21 days after last exposure (<u>too late for PEP</u>)^e <u>No</u>: Contact can reach out to their own provider to obtain measles IgG titers^e 	

^a Birth before 1957 or 1 dose of MMR should not be considered sufficient for household members of confirmed measles cases or healthcare workers exposed to measles; without documented positive measles IgG titers or 2 MMR doses, consider them to have unknown immunity. Furlough non-immune healthcare workers for 21 days even if they get MMR PEP.

^b For patients who receive IG, provide these instructions: www1.nyc.gov/assets/doh/downloads/pdf/imm/stay-home-non-cases.pdf

^d When instructing home quarantine, ensure that all household members of the exposed individual are immune to measles. IG prolongs the incubation period extending quarantine to 28 days.

^e For patients who do not receive PEP, provide these instructions: www1.nyc.gov/assets/doh/downloads/pdf/imm/stay-home-cases.pdf



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Post-exposure prophylaxis (PEP) for measles exposures who ARE pregnant or immunocompromised

Category	Age range	Measles immune status ^a	PEP type depending on time after initial exposure		
			≤3 days (≤72 hours)	4-6 days	>6 days
Severely Immuno-compromised ^b	<12 months	Will need IVIG regardless of measles immune status	<ul style="list-style-type: none"> Give intravenous immunoglobulin (IVIG) 400mg/kg^{cd} Home quarantine^e for 28 days after last exposure 		<ul style="list-style-type: none"> PEP not indicated (too late)^f Home quarantine^e for 21 days after last exposure
	≥12 months		<ul style="list-style-type: none"> Give intravenous immunoglobulin (IVIG)^{cd} Home quarantine^e for 28 days after last exposure 		
Pregnant	n/a	Immune (IgG positive or 2 MMR vaccine doses)	<ul style="list-style-type: none"> PEP <u>not indicated</u>, exposed individual has documented immunity^f 		
		Non-immune (IgG negative)	<ul style="list-style-type: none"> Give intravenous immunoglobulin (IVIG) 400mg/kg^{cd} Home quarantine^e for 28 days after last exposure 	<ul style="list-style-type: none"> PEP not indicated (too late)^f Home quarantine^e for 21 days after last exposure 	
		Unknown immunity	<ul style="list-style-type: none"> Draw titers (measles IgG) STAT to determine immunity; proceed as above based on titer results 	<ul style="list-style-type: none"> PEP not indicated (too late)^f Home quarantine^e for 21 days after last exposure 	

^a All persons exposed to measles must be notified of their exposure, regardless of their evidence of immunity to measles.

^b Management of immunocompromised persons can be challenging and may require individualized decisions with provider based on immunocompromising condition or medications.

^c For patients who receive IG, provide these instructions: www1.nyc.gov/assets/doh/downloads/pdf/imm/stay-home-non-cases.pdf

^d Dosing of intramuscular IG for infants aged <12 months: 0.5 mL/kg of body weight (max dose 15mL). Dosing of intravenous IG for pregnant women not immune to measles and immunocompromised persons: 400 mg/kg. MMR or varicella vaccine administration must be delayed by 6 months and 8 months after intramuscular and intravenous IG, respectively.

^e When implementing home quarantine, ensure that all household members of the exposed individual are immune to measles. IG prolongs the incubation period extending quarantine to 28 days.

^f For patients who do not receive PEP, provide these instructions: www1.nyc.gov/assets/doh/downloads/pdf/imm/stay-home-cases.pdf

* References: CDC. Prevention of Measles, Rubella, Congenital Rubella Syndrome, and Mumps, 2013. MMWR. 2013:62(4);

Rubin et. al. 2013 IDSA Clinical Practice Guideline for Vaccination of the Immunocompromised Host. CID. 2014:58.

** Check guidance/discuss with treating provider as duration of immunosuppression during or following chemotherapy, transplants, or biologic immune modulators may vary.