

Aim: To standardize management of patients with suspected/confirmed measles infection.

Patient with confirmed measles OR symptoms suspicious for measles (see testing algorithm pages 6–7 for detail of whom to test)

- Mask patient + others present (e.g., caregiver, siblings)
- Isolate in an airborne infection isolation room (AIIR; negative pressure). If AIIR is not available, isolate in private room with door closed; patient (+ others) should remain masked.
- Order Airborne Precautions
- Notify Infection Prevention and Control (Amion or 952-260-9012); available 24/7

MEASLES SIGNS/SYMPTOMS

- **Prodrome (~2–4 days):** fever, malaise, and anorexia, followed by conjunctivitis, coryza, and cough.
 - **Enanthem (~48 hr before rash, NOT seen in all patients):** Koplik spots; 1–3 mm whitish, elevations with an erythematous base “grains of salt on a red background” on buccal mucosa or palate.
 - **Exanthem (2–4 days after fever):** erythematous, maculopapular, blanching rash, which classically begins on the face and spreads down. Begin as blanching then don't blanch. Rash may not appear in immunocompromised patients.
- * Fever beyond the third to fourth day of rash may suggest a measles-associated complication (note 5).

EXCLUSION GUIDELINES

- Patients **excluded** from this guideline:
- Pregnant patients

Obtain history and perform exam

Vaccine status (specify MMR), contacts/exposures (note 1), travel history. Signs/symptoms (including date of rash onset), vital signs, hydration, respiratory status. Consider also alternate etiologies for illness (note 2).
Assess level of illness (note 3)

Mild

Symptomatic but not needing hospitalization for support.

- Obtain labs: “Measles for Suspected Disease (Rubeola) to MDH” in Cerner, “MEASLES PCR to MDH (UMSP)” in eCW.
- Give vitamin A (note 4).
- Evaluate/treat suspected coinfections based on symptoms (note 5).

Discuss with parent/caregiver the need for exclusion from school/daycare for other household members who have not received at least one MMR.

Moderate/Severe

Signs or symptoms requiring hospital admission. Refer to Children's Minnesota ED for evaluation if in clinic (612-343-2121).

- Consider ID consult if questions about clinical management. Other specialists if indicated (e.g., optho if significant eye findings beyond conjunctivitis).
- Obtain labs: “Measles for Suspected Disease (Rubeola) to MDH,” CBC+diff, CRP, CMP, and serum to save (≥ 3 mL).
- Give vitamin A (note 4).
- Hydrate with IV fluids if indicated and/or consider NG tube if oral lesions preventing PO intake.
- 2-view CXR if respiratory symptoms to evaluate for infiltrate.
- Evaluate/treat suspected coinfections per symptoms (note 5) Antibiotics per suspected sepsis orderset if sepsis is present.

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NOTE 1

Contact/exposure factors: Incubation period for measles is 6 to 21 days (median 13 days). Period of contagiousness is ~5 days before the appearance of rash to ~4 days afterward.

NOTE 2

Differential diagnosis of measles: Broad, includes for example viruses (enteroviruses, adenovirus, COVID-19, etc), Rocky Mt. Spotted Fever, scarlet fever, toxic shock, meningococemia, HSP, Kawasaki Disease, mono, MIS-C, etc.

NOTE 3

Severity of illness levels

- **Mild:** No respiratory distress or oxygen requirement; able to self-hydrate (may be after initial fluid support).
- **Moderate:** Requiring ongoing IVF support OR requiring respiratory support including low flow nasal cannula for hypoxia or HFNC for increased WOB.
- **Severe:** Hypoxia or work of breathing requiring non-invasive or invasive ventilation or concern that patient status is worsening on high flow nasal cannula OR SIRS/Sepsis/Shock OR rapidly worsening.

NOTE 4

Vitamin A is recommended for all patients with measles regardless of nutritional status or country of origin *unless extreme vitamin A supplementation has recently been given*. As measles can decrease serum vitamin A (retinol) levels, checking levels before treatment is not recommended.

- **Infants < 6 months:** Enteral: 50,000 units/day (15,000 mcg RAE/day) for 2 days.
- **Infants 6 to 11 months:** Enteral: 100,000 units/day (30,000 mcg RAE/day) for 2 days.
- **Children ≥ 12 months:** Enteral: 200,000 units/day (60,000 mcg RAE/day) for 2 days.
- If severe malnutrition or ophthalmologic evidence of vitamin A deficiency is present, administer a third dose 2–4 weeks after the 2nd dose.

Unfortunately vitamin A comes in softgel capsules. Children with measles who are not requiring hospitalization should be prescribed vitamin A at the above dosing if they can swallow capsules (note: this may be up to 25 capsules to achieve the required dose). If the child cannot swallow capsules and the pharmacy (e.g., outpatient pharmacy) is unable to draw up sufficient dose effectively, then the provider may defer on vitamin A prescription. All hospitalized patients should receive vitamin A regardless of ability to swallow capsules.

NOTE 5

Acute complications from measles

- **GI:** Diarrhea and stomatitis are common and may lead to poor PO and dehydration.
- **Neuro:** Encephalitis (~ day 5), acute disseminated encephalomyelitis (~week 2).
- **ENT/Resp:** Otitis media, tracheitis, croup, and respiratory distress are well-described. Measles pneumonia may cause symptoms and radiographic findings that overlap with bacterial pneumonia. However, co-infections may occur including with Strep pneumoniae, Strep pyogenes, H. influenzae, Staph aureus and viruses. Use antibiotics if strong suspicion for a pneumonic bacterial process due to both clinical exam and imaging findings. CXR findings for measles includes: mixed reticular opacities, air space consolidation and hilar lymph node enlargement.
- **Ophtho:** Purulent conjunctivitis, keratitis, xerophthalmia (risk of blindness). Evaluate for pain, photophobia, erosion or opacity.

*Treatment Recommendations for Pneumonia (CAP) felt to have bacterial component:

- **Age ≤ 28 days OR preterm infant (less than 37 weeks gestation) with post-menstrual age less than 41 weeks:**

Follow febrile infant guideline for workup, use Ampicillin plus Cefotaxime; Cefdinir for ongoing enteral CAP treatment

- **> 28 days OR preterm infant (less than 37 weeks gestation) with post-menstrual age ≥ 41 weeks – 4 months:**
Ceftriaxone/Cefdinir

- **> 4 mo and fully immunized for age (for Hib and Pneumococcus):**

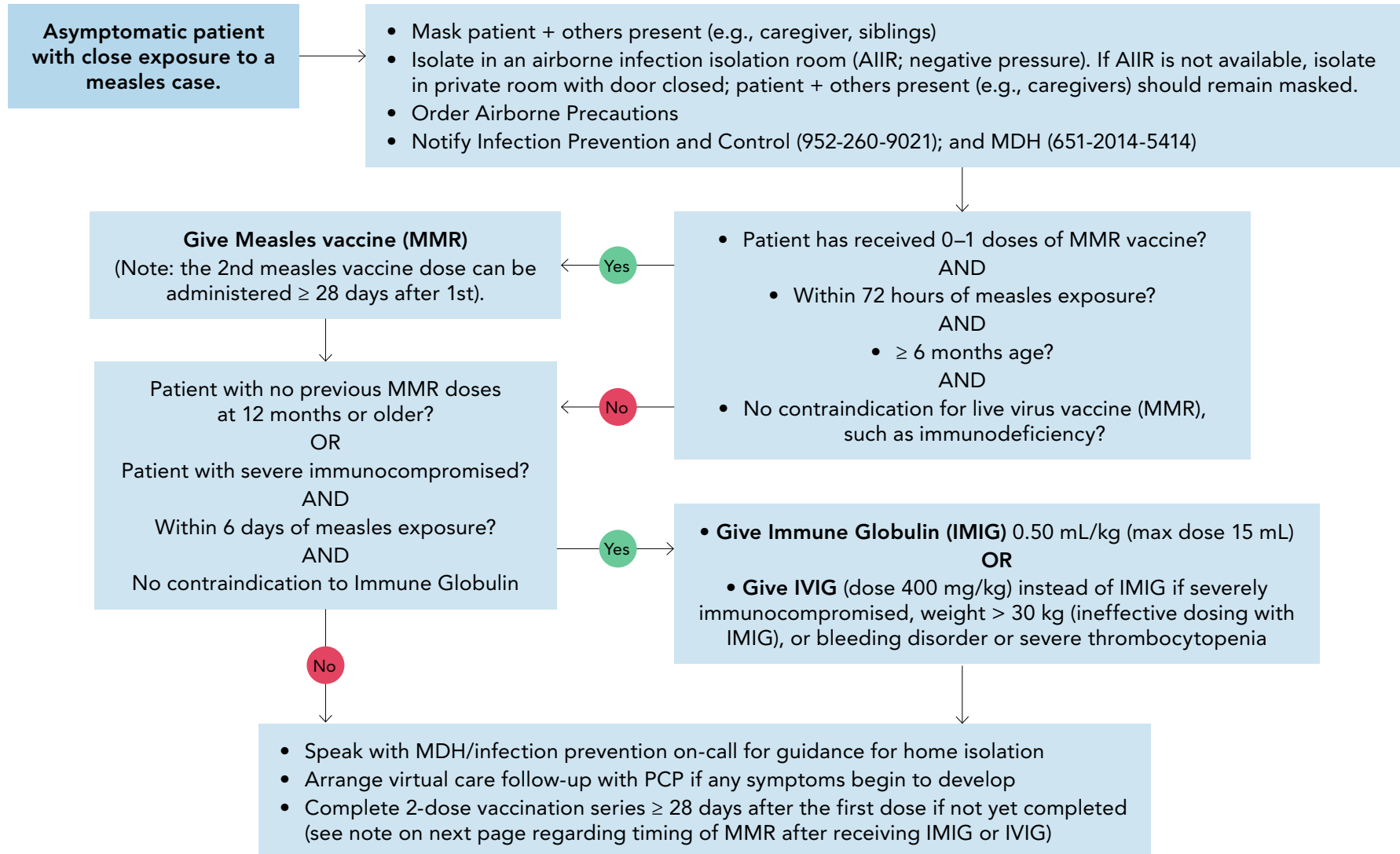
Ampicillin/Amoxicillin (PCN exposure or allergy *not anaphylaxis* – Cefuroxime/Cefprozil)

- **> 4 mo and has not received 2 Hib and Pneumococcal vaccine doses:**
Ceftriaxone/Cefdinir

- **Consider adding Azithromycin for patients ≥ 5 yrs:**

Antibiotics per suspected sepsis orderset if sepsis is present. Consult ID for empiric antibiotic recommendations if hospital-acquired infection suspected.

Aim: To standardize management for asymptomatic patients with measles exposure.



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FOLLOW-UP NOTES

Follow-up should be with PCP within 1–2 days of diagnosis (if managed as outpatient) or discharge (if hospitalized).

- Consider use of virtual care visits if applicable.
- Assess hydration status. Consider use of Gastroenteritis “Oral Rehydration Therapy” guideline, with patient instructions available on Clinical Guidelines website including in multiple languages.
- Complete 2-dose MMR vaccination series \geq 28 days after the first dose if not yet completed. See note below regarding timing of MMR after receiving IMIG or IVIG.

Later complications from measles

- **Neuro:** Acute disseminated encephalomyelitis (~ week 2). and subacute sclerosing panencephalitis (SSPE, years later). SSPE is a rare, but fatal degenerative CNS disease characterized by behavioral and intellectual deterioration and seizures that generally develop 7 to 10 years after measles infection.
- **Immune “amnesia”:** Patients with measles are at higher risk for infectious diseases in the 2–4 years after measles infection, including for diseases they may have been previously immunized against or immune to. Maintain a lower threshold for testing/treating and refer to ID/immunology if there are concerns.

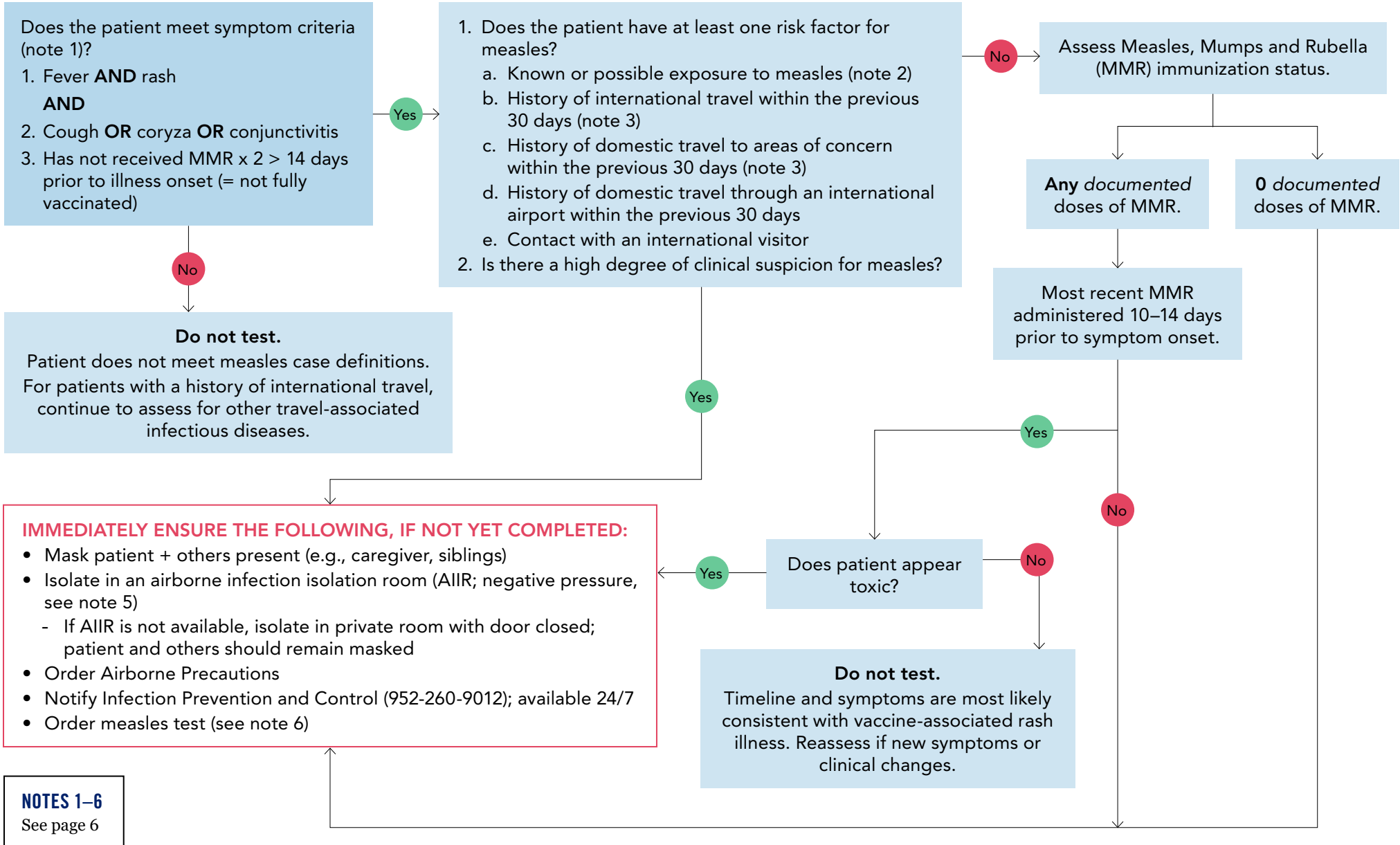
If patient received IVIG or IMIG

- No live-virus vaccines until 8 months after IVIG (recommendation based on receipt of 400 mg/kg dosing- timing may be variable if a different dose of IVIG was given, for example if patient was already on subcutaneous IG for another indication) or until 6 months after IMIG. *Note, patients at high risk of exposure may receive live-virus vaccines sooner and then should be reimmunized after 11 months if they have an inadequate serological response.*
- Risks of IVIG including: hemolytic anemia, aseptic meningitis.
- Most patients who receive IMIG have some discomfort and temporary mild swelling at the injection site.
- Note for patients weighing > 30 kg (66 lbs) IVIG is recommended over IMIG as they are unlikely to receive an effective dose via IMIG.

Post-exposure considerations (per CDC.gov)

- If a health care provider without evidence of immunity is exposed to measles, MMR vaccine should be given within 72 hours, or IG should be given within 6 days when available. Exclude healthcare personnel without evidence of immunity from duty from day 5 after first exposure to day 21 after last exposure, regardless of post-exposure vaccine.
- Infected people should be isolated for four days after they develop a rash; airborne precautions should be followed in healthcare settings.
- People without evidence of immunity who do not receive appropriate post-exposure prophylaxis within the appropriate timeframe should be excluded from affected institutions in the outbreak area until 21 days after the onset of rash in the last case of measles.

Aim: To guide appropriate testing for measles.



NOTES 1–6
See page 6

Aim: To guide appropriate testing for measles.

NOTE 1

- Fever must be present at the same time as the rash, even if fever is subjective.
- Rash should start on the head or neck if the rash origin is known.
- Patients who have received 2 doses of MMR at least 10–14 days prior to symptom onset are very unlikely to have measles. Strongly consider alternate diagnoses.

NOTE 2

- Consider the patient to have a known exposure if the patient/family reports being notified by a healthcare facility or health department that they were exposed to a confirmed measles case. Consider the patient to have a possible exposure if the patient/family reports contact with a measles case.

NOTE 3

- Whether or not a patient meets a measles case definition, follow [Screening for Travel-Associated Infectious Diseases](#) for all patients with a history of international travel within the past 30 days.

NOTE 4

- Consult with Infection Prevention and Control (952-260-9012) or compare patient's reported domestic travel to locations of [current U.S. measles cases and outbreaks](#).

NOTE 5

- To determine locations of airborne infection isolation rooms (AIIRs; negative pressure), refer to [Airborne Infection Isolation \(AII\) and Protective Environment \(PE\) Patient Rooms](#).
- If an AIIR is not immediately available, place the patient (and others with family, e.g., caregiver, siblings) in a regular room with masks on, place a portable HEPA filter unit (obtained from MESA) inside the room, and keep the door closed. Make arrangements to move the patient to an AIIR as soon as possible.

NOTE 6

- Refer to the [“Measles Lab Testing Instructions”](#) and order “Measles for [Suspected Disease \(Rubeola\) to MDH](#)” in Cerner OR “MEASLES PCR to MDH (UMSP)” in eCW.

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- www.nfid.org/measles
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- <https://starnet.childrenshc.org/departments/infectioncontrol/pdf/measles-post-exposure-prophylaxis.pdf>

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