







Measles (Rubeola)

Investigation Guideline

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Attachments can be accessed through the Adobe Reader's navigation panel for attachments. Throughout this document attachment links are indicated by this symbol ; when the link is activated in Adobe Reader it will open the attachments navigation panel. The link may not work when using PDF readers other than Adobe.

Revision History:

Date	Replaced	Comments
05/2018	03/2015	Updated Notification sections and Isolation, Work and Daycare Restrictions sections with updated regulations. Updated Laboratory Analysis section with additional information on false positives. Updated fact sheet and letter templates. Edits to rapid assesment worksheet.
03/2015	01/2013	Updated laboratory section with KHEL testing information and specimen collection information. Updated Contact Investigation: clarification on air handling systems and airspaces, removed comments on passive maternal antibodies, and added Table 1. Contact management: edits to Box 1 and Box 2 to agree with ACIP 2013 recommendations for IG administration and incorporated information on HIV-infected persons and preschool aged children. Removed HIV infection from "Managing Special Situations." Updated data management section.
01/2013	07/2012	Updated case definition and rapid assessment form.
07/2012	07/2011	Updated factsheet and sample letters. Removed references to KS-EDSS. Removed physician-diagnosed measles from presumptive immunity. Added KDHE measles reporting form.
07/2011	09/2008	Updated case definition to 2010 CDC version; format changes; edits to Laboratory Analysis, Contact Investigation, Isolation and Restrictions, and Managing Special Situations. Added Notification section and Rapid Assessment Worksheet

Measles (Rubeola)

Disease Management and Investigative Guidelines

CASE DEFINITION (CDC 2013)

Clinical description:

- An acute illness characterized by:
 - Generalized, maculopapular rash lasting ≥ 3 days; and
 - Temperature $\geq 101^{\circ}\text{F}$ or 38.3°C ; and
 - Cough, coryza, or conjunctivitis. A

Confirmed:

- An acute febrile rash illness[†] with:
 - isolation of measles virus[‡] from a clinical specimen; or
 - detection of measles-virus specific nucleic acid[‡] from a clinical specimen using polymerase chain reaction; or
 - IgG seroconversion[‡] or a significant rise in measles immunoglobulin G antibody[‡] using any evaluated and validated method; or
 - a positive serologic test for measles immunoglobulin M antibody^{‡§}; or
 - direct epidemiologic linkage to a case confirmed by one of the methods above.

[†] Temperature does not need to reach $\geq 101^{\circ}\text{F}/38.3^{\circ}\text{C}$ and rash does not need to last ≥ 3 days.

[‡] Not explained by MMR vaccination during the previous 6-45 days.

[§] Not otherwise ruled out by other confirmatory testing or more specific measles testing in a public health laboratory.

Probable:

- In the absence of a more likely diagnosis, an illness that meets the clinical description with:
 - no epidemiologic linkage to a laboratory-confirmed measles case; and
 - noncontributory or no measles laboratory testing.

Suspect (KDHE internal use only not reported to CDC):

- Acute illness with fever $\geq 101^{\circ}\text{F}$ and generalized, maculopapular rash in a person for whom there is not a more compelling diagnosis

Epidemiologic Classification:

- **Internationally imported case:** An internationally imported case is defined as a case in which measles results from exposure to measles virus outside the United States as evidenced by at least some of the exposure period (7–21 days before rash onset) occurring outside the United States and rash onset occurring within 21 days of entering the United States and there is no known exposure to measles in the U.S. during that time. All other cases are considered U.S.-acquired.
- **U.S.-acquired case:** An U.S.-acquired case is defined as a case in which the patient had not been outside the United States during the 21 days before rash onset or was known to have been exposed to measles within the United States.

LABORATORY ANALYSIS

Limit testing to those patients most likely to have measles. Testing for measles in patients with no rash, no fever, a vesicular rash, or a rash limited to the diaper area leads to false-positive results.

The State Public Health Laboratory (KHEL) is able to assist with measles RT-PCR testing to expedite confirmation of measles from highly suspect cases (recent travel, classic signs and symptoms) and will also arrange for shipment of **approved** samples to CDC for culture and confirmatory serological testing.

Requests for measles serologic testing that are strictly for rule-out purposes (low index of suspicion, does not meet clinical case definition, no travel or contact with cases), should be directed to commercial clinical laboratories.

CDC's confirmatory serological testing includes using [Avidity and PRN Assays](#) for previously positive IgG samples: A single serum can be tested for IgG avidity; both an acute and a convalescent phase serum are recommended for PRN testing.

When measles is first suspected:

- Collect: blood **and** throat and/or nasopharyngeal swab(s).
- [Notify](#) public health. To test at KHEL, KDHE must be notified at 877-427-7317.
- Specimens for serology (1) and culture and/or PCR (2,3):
 - (1) Blood, 3-5 ml collected in clot separator tubes shipped to
 - IgM serology: Collect ASAP after rash onset and, **if negative**, repeat at >72 hours after rash onset. [*IgM can be detected for at least 28 days after rash onset.*]
 - IgG serology: Collect paired sera.
 - **Acute:** ASAP after rash onset (7 days at the latest);
 - **Convalescent:** 10–30 days after first specimen.
 - (2) Throat (and/or nasopharyngeal) swabs are the preferred clinical samples for PCR and/or culture
 - Preferred collection is before day 4 of rash.
 - *At a maximum, collect no more than 10 days after rash onset.*
 - Use Dacron or synthetic swab placed in Viral Transport Media (VTM).
 - Keep all specimens on wet ice or at 4°C until shipment.
 - Ship for overnight receipt as soon as possible on cold packs.
 - Culture is **necessary** if case was vaccinated 6-45 days before testing to distinguish wild-type virus from the vaccine virus by molecular testing.
 - (3) Urine samples (10 – 50 mL collected ideally before day 8 of rash):
 - Not the preferred specimen for PCR and/or culture but when collected along with the throat and/or NP swabs can increase the likelihood of detecting the virus.
 - Refer to CDC guidance for further instructions.
(www.cdc.gov/measles/lab-tools/rt-pcr.html)

Low Prevalence Settings and False-positive IgM

In countries such as the United States where endemic circulation of measles has been eliminated, most suspected cases are not measles, and rash and fever illnesses are more likely due to a number of other rash-causing illnesses such as:

- parvovirus B19,
- enteroviruses, or
- human herpesvirus-6 (roseola).

In addition, testing for measles is frequently requested for people with ear infections or sore throats who were given antibiotics which resulted in a rash. The presence of rheumatoid factor can also result in a false positive IgM.

However, with ongoing measles activity in many other countries, sporadic cases of measles in the United States may occur.

Do not wait for results of confirmatory testing to begin the case investigation. The need to initiate prophylaxis will be evaluated based on initial findings of potential travel or other exposures and by identifying potentially susceptible populations.

- False-positive measles IgM tests are more likely to occur when:
 - IgM test was not EIA,
 - Case did not meet clinical criteria,
 - Case is an isolated indigenous case, or
 - Measles IgG was detected within 7 days of rash onset.
- Ruling out a false positive IgM by testing a second serum
 - If the acute sample was IgG negative, a second serum can be collected at ≥ 10 days after the acute sample. If this serum is IgG negative, measles can be ruled out.
 - If the acute serum was IgG positive, a second serum, collected ≥ 2 weeks after the acute specimen, can be tested for a significant rise in IgG between paired serum samples.
 - Tests for IgG rise or seroconversion such as plaque reduction neutralization (PRN) and avidity testing may be helpful in certain situations, and can be done at CDC after approval.
- For additional information and/or questions concerning laboratory analysis:
 - Call KDHEL at (785) 296-1620, or
 - Manual for the Surveillance of Vaccine-Preventable Diseases,
 - Chapter 7: Measles: <https://www.cdc.gov/vaccines/pubs/surv-manual/chpt07-measles.html>
 - Chapter 22: Laboratory Support for Vaccine-Preventable Diseases: <https://www.cdc.gov/vaccines/pubs/surv-manual/chpt22-lab-support.html>
 - CDC Measles Laboratory Website: <https://www.cdc.gov/measles/lab-tools/serology.html>

EPIDEMIOLOGY

Measles occurs worldwide. In temperate zones, peak incidence occurs in late winter and early spring. A single dose of MMR vaccine induces measles immunity in about 95% of vaccinees; however, due to measles extreme infectiousness, 2 doses are recommended. In developing countries, case fatality rates average 3-5% but can be as high as 10-30%. Since 1995, the incidence of measles in the United States has been very low with only a few hundred cases reported each year. An increasing proportion of these cases are imported.

DISEASE OVERVIEW

A. Agent:

Measles virus in the family paramyxovirus, genus Morbillivirus.

B. Clinical Description:

2-4 day prodrome: fever, malaise, non-productive cough and coryza (runny nose). Conjunctivitis and bronchitis often present. Low fever initially will be followed by higher temperatures peaking, with the rash onset.

Lymphadenopathy occurs in younger children. Older children may have photophobia and, occasionally, arthralgia. Koplik spots (seen in over 80% of cases) occur as punctate blue-white spots on the bright red background of the buccal mucosa. 1-2 days before to 1-2 days after the characteristic rash .

Within 2-4 days after prodromal symptoms, a rash made up of large, blotchy red areas initial appears behind ears and on the face (typically the hairline). The rash gradually proceeds over the next 3 days downward and outward, reaching the hands and feet. The maculopapular lesions are generally discrete, but may become confluent, particularly on the upper body. Typically the rash lasts 3-7 days and then fades in the same pattern it appeared and may be followed by a fine desquamation.

Complications include diarrhea, otitis media, pneumonia, and encephalitis. The case fatality rate ranges between 1 and 3 per 1,000 cases. Increased risk for pneumonias, encephalitis, and death occur with immunocompromised.

C. Reservoirs:

Humans.

D. Mode(s) of Transmission:

Airborne droplet or direct contact with infectious nasopharyngeal secretions.

E. Incubation Period:

About 10 days, but may be 7 to 18 days from exposure to onset of fever, usually 14 days until rash appears; rarely, as long as 19–21 days. Immune globulin may extend this period.

F. Period of Communicability:

From 1 day before the beginning of the prodromal period (usually about 4 days before rash onset) to 4 days after rash appearance. The vaccine virus has not been shown to be communicable. Immunocompromised patients are considered infectious for the duration of their illness.

G. Susceptibility and Resistance:

Immunity is life-long after infection. Adults born before 1957 are likely to have been infected naturally and are considered immune.

H. Treatment:

Supportive only.

I. Vaccination:

Live attenuated measles virus vaccine is available in combination vaccines. Two doses of measles-containing vaccine are recommended routinely for children; with the first dose at age 12 through 15 months and the second dose at ages four through six years (school entry). Two doses are also recommended for adults at high risk, including international travelers, college and other post-high school students, and health care personnel born during or after 1957. All other adults, born during or after 1957, without other presumptive evidence of measles immunity should be vaccinated with one dose of MMR vaccine.

NOTIFICATION TO PUBLIC HEALTH AUTHORITIES

All confirmed or **suspected** measles cases shall be reported within **4 hours by phone**:

1. Health care providers and hospitals: report to the local public health jurisdiction or KDHE-BEPHI (see below)
2. Local public health jurisdiction: report to KDHE-BEPHI (see below)
3. Laboratories: report to KDHE-BEPHI (see below)
4. KDHE-BEPHI contacts the local public health jurisdiction by phone within one hour of receiving a measles report

**Kansas Department of Health and Environment (KDHE)
Bureau of Epidemiology and Public Health Informatics (BEPHI)
24/7 Phone: 1-877-427-7317**

As a nationally notifiable condition, **confirmed** measles cases require an IMMEDIATELY NOTIFIABLE, URGENT report to the Center of Disease Control and Prevention (CDC).

1. IMMEDIATELY, URGENT reporting requires a KDHE epidemiologist to call the CDC EOC at 770-488-7100 within 24 hours of a case meeting the **confirmed** criteria, followed by submission of an electronic case notification in next regularly scheduled electronic transmission.
 - KDHE-BEPHI will notify the CDC immediately by phone of all confirmed measles cases.
 - KDHE-BEPHI will file electronic reports weekly with CDC.
2. **Local public health jurisdiction** will report information requested as soon as possible, completing the electronic form within 3 days of receiving a notification of a measles report.

INVESTIGATOR RESPONSIBILITIES

Note: Investigation should begin as soon as possible; do not delay pending laboratory results. Initiate control measures within 24 hours of the report.

- 1) [Report](#) all confirmed, probable and suspected cases to the KDHE-BEPHI at 1-877-427-7317 within 4 hours of the initial report
- 2) Contact medical provider to collect additional information and confirm diagnosis using the current case definition.
 - Collect all information requested in [Step 1](#)) of case investigation.
 - Ensure that the patient is aware of his/her diagnosis.
- 3) Continue the [case investigation](#) starting with 1 day of the report.
 - Identify any major public health concerns.
 - Daycare, schools, or medical facility involvement.
 - Under-immunized population within the community.
 - Initiate [control and prevention measures](#) to prevent spread of disease.
 - Complete the case investigation within 3 days of the initial report.
- 4) Conduct [contact investigation](#) to locate additional cases and/or contacts.
- 5) [Record](#) data, collected during the investigation, in the KS EpiTrax system under the data's associated [\[tab\]](#) in the case morbidity report (CMR). Identify whether the source of infection is major public health concern,
- 6) As appropriate, use the [notification letter\(s\)](#) and the disease [fact sheet](#) to notify the case, contacts and other individuals or groups.

STANDARD CASE INVESTIGATION AND CONTROL METHODS

The [Measles Rapid Assessment Worksheet](#) can help to collect initial data.

Case Investigation

- 1) Contact the medical provider who reported or ordered testing of the case to obtain the following from the patient's medical records.
 - Collect case's demographics and contacting information ([address](#), [birth date](#), [gender](#), [race/ethnicity](#), [primary language](#), and [phone number\(s\)](#))
[Demographic]
 - Collect information any other diagnoses being considered with related labs.
 - Examine the symptoms that the medical provider attributes to measles:
 - [Rash](#): [date of onset](#), duration and description (focal/ generalized; origin on body and direction to which it spread). [Investigation-Symptoms]
 - Any other symptoms with dates of onset:
 - o Fever [*highest measurement*], cough, coryza, conjunctivitis
 - Record [onset date](#) of first symptom [Clinical] and other related symptom information [Investigation-Symptoms]
 - Record date [diagnosed - presumptive](#) and [final diagnosis date](#) [Clinical]
 - Record [hospitalizations](#): location and duration of stay [Clinical]
 - Record outcomes: survived or [date of death](#) [Clinical]
 - Record complications (i.e., otitis, diarrhea, pneumonia, encephalitis, etc.)
[Investigation-Complications]

- Examine the laboratory testing that was done and make note of date(s) specimen(s) were collected (to compare to onset of rash) [\[Laboratory\]](#):
 - Coordinate further testing if needed.
 - For pending laboratory results: request name of performing laboratory and when results are expected
 - Through a credible immunization registry or medical record obtain information on history of measles vaccine [\[Investigation-Vaccination History\]](#):
 - Dates of vaccination;
 - Number of doses after 1st birthday or why not vaccinated.
- 2) Interview the case to determine source, risk factors and transmission settings:
- Focus on incubation period 7-18 days prior to rash onset.
 - Examine exposure to others with measles- like illness [\[Investigation-Exposure\]](#).
 - Obtain dates of exposure,
 - Name and the date of birth of possible sources,
 - The possible source’s relationship to case,
 - Transmission setting, if applicable (i.e., household, school, daycare)
 - History of possible exposure(s):
 - Any visits to a doctor’s office, clinic, or hospital (exact date and time)
 - Any indoor group activities attended: church, theater, tourist locations or airports, air travel, parties, athletic events, family gatherings, etc.
 - Travel history of case, with dates of exit from and reentry to Kansas.
 - Include dates of travel to other counties in the travel history.
 - Examine if any of the case’s household/close contacts or guests during the incubation period had any travel 3 weeks prior to the case’s rash onset.
 - Record occupations, group living, daycare associations, and any [Place Exposure\(s\)](#) (where illness could have been transmitted). [\[Epidemiological\]](#)
 - Collect information from case for the [Contact Investigation](#). (See below).
 - Schedule a time for a follow-up interview.(See [Case Management](#))
- 3) Investigate epi-links among cases (clusters, household, co-workers, etc).
- If the patient had contact with person(s) who have/had a measles-like illness, determine if the other “cases” were seen by a medical provider and if they were reported to the state:
 - Search the state electronic surveillance for the possible case.
 - If found, record the previously reported record number in the record of the case you are investigating [\[Notes\]](#).
 - Suspected measles in persons that have not previously been reported should be investigated as a potential case and [reported](#) to KDHE-BEPHI if evidence is collected that supports the [case definition](#).
 - Enter the patient’s contact who exhibited measles-like illness on the [\[Contact\]](#) tab of the CMR and save.
 - After the CMR has updated, click ‘[Show](#)’ beside the contact.
 - With the [View Contact](#) open in show mode, select ‘[Promote to CMR](#)’; update, as needed.
 - For suspected [Outbreaks](#) refer to Managing Special Situations section.

Contact Investigation

Goal: To rapidly identify primary contacts, evaluate immunity status, and vaccinate susceptible persons within 24 hours of the initial report.

- 1) Review the patient's occupation and activities collected during the [Case Investigation](#) and recorded on [\[Epidemiological\]](#) and [\[Notes\]](#) tabs.
 - 2) Continue to interview patient / family to identify activities during the [Measles Infectious Period](#): four days before rash onset through four days after rash onset (day of rash onset is day 0), consider the following:
 - Patient's occupation and living and/or sleeping accommodations;
 - High-risk situations including living in institutional or residential facilities,
 - Involvement in health care or child care,
 - Locations where the patient may have sought medical care,
 - Use of public transit,
 - Shopping or dining activities, and/or
 - Social or athletic activities.
 - 3) Prepare a contact listing for [each possible transmission setting](#) [\[Contact\]](#).
 - Record potential contacts in each setting.
 - Identify each contact's age, primary residence, and contacting information.
 - Type, duration, and date(s) of exposure.
 - Any symptoms of measles in contacts.
 - Information on immunization status
 - Information on the contact's occupation.
 - Note any school or daycare attendance. (Include facility name and location.)
 - 4) Assess each contacts potential risk of exposure by type of contact, date/time of contact (first and last exposures), and duration of exposure.
 - [Exposure](#) is defined as:
 - Direct contact with a person infectious for measles.
 - Sharing the same confined airspace* with a person infectious with measles (e.g., same classroom, home, clinic waiting room, examination room, airplane etc.), or those in these airspace areas for up to 2 hours after the infectious person was present.
 - Types of contact can be household, direct, sharing same enclosed airspace, or exposed to infectious airspace ≤ 2 hours after case leaves.
- * Note: A minimum duration of exposure is not established; contact of even a few minutes is considered an exposure, but longer periods of exposure or being in the same airspace with a case or soon after a symptomatic case was present is more likely to result in measles transmission than brief, transient exposures. Airspace includes exposure through shared air handling systems; such systems should be considered during the contact investigation.*
- 4) Rapidly assess if any contacts are potentially high risk contacts and attempt to assess those individuals' susceptibility to measles first (see step 5).
 - [High risk contacts](#): **susceptible** contacts who are at higher risk of disease complications or who could expose other high risk/susceptible contacts

- Children younger than 5 years (especially younger than 1 year)
 - Adults older than 20 years of age
 - Immunocompromised, malnourished, or pregnant individuals
 - Health care workers and daycare workers or attendees.
 - Those interacting with the case who are likely to be unimmunized
 - Travel contacts: contacts traveling with case during infectious period
 - If case traveled by plane or ship during the infectious period the CDC Quarantine Station with jurisdiction for Kansas should be contacted for contact tracing of potentially exposed passengers and crew.
 - CDC Dallas Quarantine Station: 972-973-9258 (24-hour access)
 - Source: www.cdc.gov/quarantine/QuarantineStations.html
- 5) Assess each primary contact's susceptibility to measles.
- Susceptible contacts: individuals without [presumptive evidence of measles immunity](#), including those with medical or religious exemptions.
 - Verbal history of measles vaccine is NOT adequate proof of vaccination.
 - Verbal history of measles infection is NOT adequate proof of past history.
 - Serological screening of those who lack acceptable evidence of immunity is only appropriate if such individuals are vaccinated in timely manner.
 - For example, an individual without evidence of immunity facing exclusion may wish to have blood drawn for testing before receiving the vaccine so that exclusion measures can possibly be lifted when the serological results become available.
 - DO NOT wait to administer prophylaxis until serology is available; the vaccine should still be administered as soon as possible within the 72 hours after exposure.
- 6) Presumptive evidence of immunity, based on [2013 ACIP Recommendations](#), defined by at least one of the following conditions (Also review [Table 1](#), below):
- Written documentation of receipt of adequate measles-containing vaccine based on age and the risk of potential exposure to measles virus:
 - One dose of measles containing vaccine on or after their 1st birthday:
 - Preschool-aged children,
 - Adults not at high risk for measles exposure
 - Two doses on or after 1st birthday, administered ≥28 days apart:
 - School age children (K-12);
 - Students at post-high school educational institutions;
 - International travelers who are older than 1 year of age;
 - Persons who work in health-care facilities; or
 - Any other individual whose risk for measles exposure is high.
 - One dose of measles containing vaccine between 6-11 months of age (revaccination will occur as recommended after 1 year of age)
 - International travelers between 6 – 11 months of age
 - Children (6-11 months of age) who have received 1 dose of measles-containing vaccine due to a previous measles exposure
 - Laboratory evidence of immunity
 - Laboratory confirmation of disease
 - Born before 1957

Table1. Acceptable presumptive evidence* of immunity to measles

Routine	Students, post-high school educational institutions	Health-care personnel	International travelers
(1) Documentation of age-appropriate vaccination with a live measles virus-containing vaccine [§] : – Preschool-aged children: 1 dose – School-aged children (grades K-12): 2 doses – Adults not at high risk ^{¶¶} : 1 dose, or (2) Laboratory evidence of immunity, [¶] or (3) Laboratory confirmation of disease, or (4) Born before 1957	(1) Documentation of vaccination with 2 doses of live measles virus-containing vaccine, [§] or (2) Laboratory evidence of immunity, [¶] or (3) Laboratory confirmation of disease, or (4) Born before 1957	(1) Documentation of vaccination with 2 doses of live measles virus-containing vaccine, [§] or (2) Laboratory evidence of immunity, [¶] or (3) Laboratory confirmation of disease, or (4) Born before 1957 ^{††}	(1) Documentation of age-appropriate vaccination with a live measles virus-containing vaccine: – Infants aged 6–11 months ^{**} : 1 dose – Persons aged ≥12 months [§] : 2 doses, or (2) Laboratory evidence of immunity, [¶] or (3) Laboratory confirmation of disease, or (4) Born before 1957

§ The first dose of MMR vaccine should be administered at age ≥12 months; the second dose of measles- or mumps-containing vaccine should be administered no earlier than 28 days after the first dose.

¶ Measles immunoglobulin G (IgG) in serum; equivocal results should be considered negative.

¶¶ Adults at high risk include students in post-high school educational institutions, health-care personnel, and international travelers.

** Children who receive a dose of MMR vaccine at age <12 months should be revaccinated with 2 doses of MMR vaccine, the first of which should be administered when the child is aged 12 through 15 months and the second at least 28 days later. If the child remains in an area where disease risk is high, the first dose should be administered at age 12 months.

†† For unvaccinated personnel born before 1957 who lack laboratory evidence of measles, rubella, or mumps immunity or laboratory confirmation of disease, health-care facilities should consider vaccinating personnel with 2 doses of MMR vaccine at the appropriate interval (for measles and mumps) and 1 dose of MMR vaccine (for rubella), respectively.

*Severely immunocompromised patients exposed to measles are presumed to be susceptible regardless of immunologic or vaccination status because their condition may not allow protection by the vaccine.

7) Define potential transmission setting(s):

- Identify possible transmission settings through information on contacts' measles vaccination status, immune status, and recent significant illnesses.
- Define each setting by age, vaccination and immune status.

- 8) Institute control measures as indicated under [Isolation, Work and Daycare Restrictions](#).
- 9) All attempts to follow-up with all susceptible contacts, especially the high risk contacts, as instructed under [Contact Management](#).

Isolation, Work and Daycare Restrictions

K.A.R 28-1-6 for Measles:

Control of Cases

- For each person hospitalized with a case, airborne precautions shall be followed for four days following the onset of rash.
- Each person with a case shall remain in home isolation for four days following the onset of rash, except when seeking medical care.

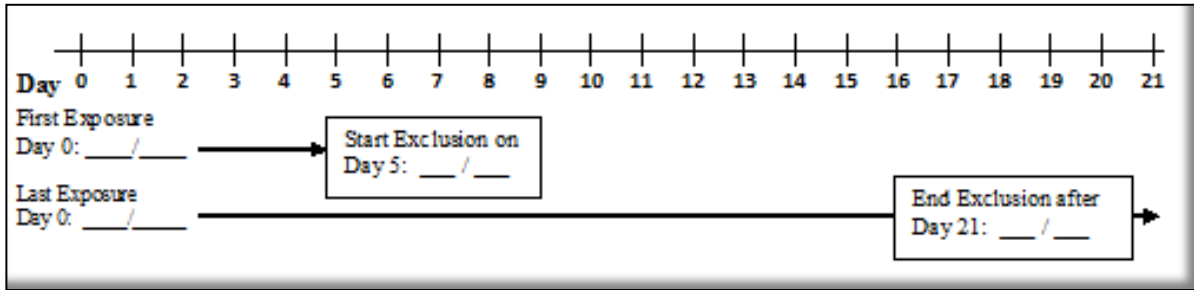
Control of Contacts

- Each susceptible contact that is not age appropriately vaccinated within 72 hours of first exposure to a person that is infectious with a case shall be excluded from working in an adult care home, correctional facility, or health care facility and attending or working in a school, child care facility, or adult day care for 21 days following the last exposure to an infectious case.

In addition to the regulation above, consider the following recommendations:

- Healthcare facilities:
 - Those with measles or suspected to have measles should avoid contact with others and, when seeking medical evaluation, should make prearrangements via phone with their medical provider to minimize their contact with areas used by other patients.
 - Hospitalized patients with measles must be under airborne precautions from the onset of prodrome until 4 days after the appearance of the rash. (i.e., 4 days before and 4 days after rash onset which is counted as day 0.)
 - Further guidance on the use of vaccine and immune globulin for “Treating Exposed Persons and Controlling Outbreaks” can be accessed through the [MMWR article on the Immunization of Health-Care Personnel](#).
- Volunteer exclusion measures to recommend:
 - Exposed, susceptible contacts should avoid public settings and/or limit their exposure to susceptible individuals from day 5 of first exposure until after day 21 of the last exposure. The exposure day is counted as day 0. (See [Figure 1](#).)

Figure 1:



Case Management

- 1) Assure proper [isolation measures](#) begin as soon as measles is suspected.
- 2) During the contagious period (until 4 days after the rash), cases should:
 - Stay home and avoid childcare facilities, school, crowded work settings, public places or social activities.
 - Take careful measures to avoid exposing susceptible individuals, especially children, pregnant women, and immunosuppressed individuals. This includes family members and visitors.
 - Avoid exposing others at healthcare facilities by calling ahead to make special arrangements.
- 3) Initiate outbreak control measures appropriate to setting.
 - If necessary, reference the [Kansas Community Containment Toolbox](#) for templates concerning isolation measures.
- 4) Conduct a follow-up as needed to assure compliance with control measures, including [work, school or daycare restrictions](#).
- 5) Conduct a follow-up interview to determine duration of rash (if previous interview was less than 3 days after onset. [Clinical])
- 6) Report any additional complications or patient status changes

Contact Management

Decisions on proper strategies for the use of immunization and/or IG will be made with the assistance of the local Health Officer, BEPHI, and the Kansas Immunization Program. The following guidelines are presented:

- 1) Attempts should be made to assure all susceptible contacts are referred for post-exposure prophylaxis (vaccine/IG).
 - Given within 72 hours of exposure, vaccine may provide some protection and is preferred method of prevention in most settings. (Refer to [Box 1.](#))
 - Given within 6 days of exposure, immune globulin (IG) can prevent or modify infection and is indicated for susceptible household or other close contacts, particularly if younger than 1 year of age, pregnant, and severely immunocompromised. (Refer to [Box 2.](#))
 - *Note: All susceptible contacts, for which immunization is not contradicted, should be instructed to receive vaccine to protect against future exposures, even if it is >6 days from the exposure under investigation.*
- 2) When transmission occurs in a place where all potentially exposed individuals cannot be identified the following should occur:

- Release of a communication most likely to reach those potentially affected (i.e., press release, internal news or notification letters, electronic bulletin boards); include information about the time and place of exposure, susceptibility, symptoms of measles, and ways to prevent infection.
 - Release of a health alert to area physicians informing them of the potential for measles cases – timeline for possible cases, symptoms, infection control guidelines and protection of workers, immunization recommendations, and proper testing and notification to local health authorities.
- 3) High risk contacts who may require special referral include:
- Pregnant women: refer to their obstetrician
 - Immunosuppressed individuals: refer to their healthcare provider
 - Infants <12 months of age: refer to their pediatrician
- 4) Additional considerations:
- Post-exposure immunization and IG administration are not 100% effective; susceptible contacts may still be infectious from day 5 to 21 post exposure.
 - Recommend exclusion from highly susceptible populations and avoidance of public settings during the potential infectious period.
 - Keep in mind that public health authorities may need to modify or use more stringent exclusion measures to stop the spread of disease.
 - All contacts should be educated about symptoms of measles, instructed to watch for symptoms from 7 to 21 days after the last exposure, and told to isolate themselves and contact the health department if symptoms develop.
 - To protect those who cannot receive the measles-containing vaccine, ensure that household and close contacts are fully immunized to measles and attempt to keep the susceptible individual from settings in which measles exposure could occur.
 - Educate all individuals on the benefits of vaccination and recommend immunization, if it is not contraindicated to protect against future exposures.
- 5) Monitor contacts for symptoms and start active surveillance for additional cases 7-21 days after last potential exposure.
- 6) Maintain [records](#) on all susceptible contacts: symptoms screening, immunization histories, prophylaxis recommended/completed, exclusions, and the disposition of the contact after 21 days of active surveillance, including any missing or gone explanations (MOGE). [\[Contact-'Edit Contact'\]](#)
- Use the contact listing to record and report outcomes (maintain listings for 21 days after exposure):
- 7) Symptomatic contact: investigate and report to the state as a case; initiate any work, school, or daycare restrictions. A contact meeting the clinical case definition can be considered a confirmed or probable case depending on the lab confirmation status of the source case.
- Report and manage as measles case and refer for medical care.
(On the [\[Contact\]](#) Tab of the CMR, click 'Show' beside the contact on the listing. When View Contact Event opens in show mode, select 'Promote to CMR'.)
- 8) Hospital Personnel: To decrease nosocomial infection, immunization programs should be established to ensure that health care professionals who may be in contact with cases are immune to the disease.
- See [Medical Settings under Special Situations](#) for more information.

Box 1: Use of measles containing vaccine in non-immune contacts, within 72 hours of exposure:

- For vaccine eligible persons aged >12 months who are not severely immunocompromised * or pregnant.
 - Two doses of measles vaccine should be separated by at least 4 weeks.
 - Do not give until ≥ 6 months have passed after IGIM administration or ≥ 8 months have passed after IGIV administration.
- For vaccine eligible persons aged 6-11 months who are not severely immunocompromised.
 - One dose of measles-containing vaccine, followed by revaccination at age 12 - 15 months and again before entering school.
 - Review [Special Situations](#) for additional information.
- Report any adverse event that occurs after the administration of a vaccine to Vaccine Adverse Events Reporting System at <http://vaers.hhs.gov/index>.

Box 2: Use of postexposure Immune Globulin (IG) within 6 days of exposure:

- Do not use with close contacts who have received 1 dose of vaccine at 12 months of age or older, unless they are severely immunocompromised.
- IG is used to reduce the risk for infection and complications in the person receiving it, NOT to control measles outbreaks.
 - Immunity is temporary; therefore, the person receiving IG should receive measles-containing vaccine no earlier than 6 months after IGIM administration or 8 months after IGIV administration (if they are >12 months of age and the vaccine is not contraindicated).
 - Even after IG administration, the exposure may still result in modified or atypical measles with an incubation period that may be prolonged to 21 days before any symptoms are noted.
- Recommended Dose:
 - IGIM: 0.5 mL/kg of body weight (maximum 15 mL), intramuscularly (IM).
 - Infants aged <6 months
 - Non-immune contacts >6 months of age whose initial exposure is >72 hours prior or for whom vaccination is contraindicated – unless IGIV is recommended because of pregnancy or severe immunodeficiency.
 - IGIV: 400 mg/kg of body weight, intravenously (IGIV)
 - Pregnant women without evidence of measles immunity
 - Severely immunocompromised patients; including patients with a primary immunodeficiency, bone marrow transplant within 12 months after finishing all immunosuppressive treatment or longer if graft-versus-host disease develops; treatment for ALL within and until at least 6 months after completion of immunosuppressive chemotherapy; or diagnosis of AIDS or HIV infection with CD4 percent <15% (all ages) or CD4 count <200 lymphocytes/mm³ (aged >5 years) or if within <6 months receipt of ART with CD4 percent $\geq 15\%$ (all ages) or CD4 count ≥ 200 lymphocytes/mm³ (aged >5 years) .*
 - For those on IGIV therapy of at least 400 mg/kg <3 weeks before exposure or IGSC (IG Subcutaneously administered) therapy of at least 200mg/kg for 2 consecutive weeks before exposure, no additional IG should be required.

* HIV-infected individuals who have completed 6 months of ART and are not severely immunocompromised should consult their physician regarding receipt of IG versus MMR vaccine.

Environment

If a person infectious with measles is examined in a health care facility, the examination room should be cleaned and closed to use for 2 hours.

(Source: Outbreak of Measles -- San Diego, California, January-February 2008. MMWR Vol 57, No 8; 203 02/29/2008 (www.cdc.gov/mmwr/preview/mmwrhtml/mm5708a3.htm))

Education

- 1) Advise cases that, while infectious, they should avoid contact with susceptible children, pregnant women, and immunosuppressed individuals.
- 2) Instruct contacts or parents to look for the symptoms and signs of measles beginning one week after the first day of contact with a person during the period of communicability until 21 days after.
- 3) It should be highly recommended that susceptible contacts who have not received any measles-containing vaccine avoid all public settings from 5 days after the first date of exposure until 21 days after the last date of exposure.
- 4) If suggestive symptoms develop, they should call the local health department for instructions.

MANAGING SPECIAL SITUATIONS

A. Outbreak Investigation:

A single case of measles is considered a potential outbreak situation and requires prompt investigation and implementation of control measures to reduce the disease occurrence and the magnitude of the outbreak.

Do not delay response pending laboratory results. The main strategy for controlling a measles outbreak is to (1) define the at-risk population(s) and the potential transmission setting(s) based on vaccination coverage; (2) rapidly identify and vaccinate persons without presumptive evidence of immunity or, if a contraindication exists, provide IG as recommended, especially to those most at risk of severe complications from acquired measles; and (3) exclude persons without presumptive evidence of immunity from the setting(s) to prevent their potential exposure to measles and/or the further transmission of measles.

The control measures applied will depend on the defined “at-risk” population and the potential for further transmission of illness.

Additional definitions to consider as part of an outbreak investigation:

- (1) Household cluster: ≥ 2 cases of measles in a period of 6 weeks among persons of a common household or those considered close contact of the household.
- (2) Organization-based outbreak: ≥ 2 cases of measles in period 6 weeks among persons with a common organizational affiliation but no close contact with each other or a primary household cluster.
- (3) Community outbreak: ≥ 2 cases of measles in a period of 6 weeks among persons residing in the same area who are not close contacts, do not share a common organization affiliation, and are not contacts of a household cluster.

Outbreak control objectives:

- 1) Prevent measles complications and deaths by working with medical providers who serve the at-risk population(s) to promote:
 - Early and effective [case](#) and [contact management](#).
 - Increasing immunization coverage in at risk populations.
- 2) Evaluate the effectiveness of, and consider any amendments to, the restrictions applied based on the [Isolation, Work and Daycare Restrictions](#).
- 3) Establish a clear strategy to slow or prevent the transmission of disease in affected settings that is routinely evaluated and adjusted based on findings.
- 4) Increase public awareness of measles infection treatment and prevention.
- 5) Perform a post-outbreak evaluation to adjust future strategies and strengthen the established immunization programs to prevent future outbreaks.

To accomplish these objectives, refer to “Steps to Consider during the Outbreak Investigation” on the next page, as well as, Sections B-E of this Managing Special Situations unit for any special circumstances.

Steps to Consider during the Outbreak Investigation:

- Notify KDHE-BEPHI immediately, 1-877-427-7317.
- Organize and maintain all data related to outbreak:
 - Construct and maintain case listing which includes:
 - Record number, name, DOB (or age) and other demographics,
 - Number of doses of measles vaccine received
 - Symptoms (rash, fever, cough, coryza, conjunctivitis);
 - Rash onset date and duration.
 - Fever onset date and highest measured temperature.
 - Source of exposure (i.e., Record Number, setting, classroom),
 - Specimen collection date and lab results,
 - Complications and hospitalizations
 - Case status (i.e., confirmed, probable, suspect, not a case)
 - Investigator assigned to follow-up
- Construct listing(s) of contacts as instructed in [Contact Management](#), organized by group setting and with the associated case’s record number.
- For each affected setting attempt to determine the vaccination coverage, age distribution, and presence of any high risk contacts.
- Document measures that have been taken so far in the response and attempt to identify reasons for the outbreak.
- Use tracking tools (logbooks, chalkboards or databases) to record actions needed for each suspected case
 - All epidemiologic data will be reported and managed through the Kansas outbreak module of the electronic surveillance system.
- Assemble a response team made up of local and state public health officials to accomplish the following:
 - Identify population(s) at risk of infection based on the information collected in the case and contact investigations. Define:

- o Person: who is becoming ill (i.e., age, gender, occupations, immunization status)
- o Place: where are the cases and to what settings or activities are they associated (i.e. household, organization, community)
- o Time: when did it start (onset dates) and is it still going on
- Predict and prepare for future cases; agree upon a clear strategy of response that outlines control measures to be accomplished.
- Inventory resources available to apply to response (vaccine, IG, and staff) and determine what resources are still needed
- Define and assign responsibilities to accomplish the outlined measures.
- Plan for further communications and assessments of response.
- Enhance surveillance and perform active case finding:
 - Obtain clinical specimens for viral isolation from at least some of the cases in each outbreak at the time of the initial investigation.
 - Maintain active surveillance with medical providers serving the affected communities for two incubation periods from last confirmed case.
 - Use the attached [Sample Letter](#) for Medical Facility Notifications.

B. Outbreaks among Preschool-Aged Children, <12 months of age

- Infants typically are protected from measles at birth by passively acquired maternal antibodies. The duration of this protection depends largely on the amount of antibody transferred, which is related to gestational age and maternal antibody titer.
- Measles can be more severe among infants aged less than 12 months.
- If cases are occurring among infants aged <12 months, measles vaccination of infants 6-12 months of age can be undertaken as an outbreak control measure, but it should only be applied within those populations at risk of measles exposure. (Refer to [Outbreak Investigation](#).)
 - Monovalent vaccine is preferred but MMR vaccine may be administered if monovalent not available.
 - Children vaccinated before 1st birthday must be revaccinated at age 12 - 15 months and again before entering school.
- Passive immunization with IG may be preferred for infants <12 months who are household contacts, because it is likely they were exposed > 72 hours before the diagnosis in the household member.

C. School and Child Care Settings:

- Coordinate activities with school nurse and/or administration.
- Exclude suspected cases from setting from the onset of prodrome type symptoms until for 4 days from onset rash, which is considered day 0.
- Identify potential contacts based on patterns of interaction with case:
 - Classmates, roommates, educators and teammates are to be considered close contacts.
 - Home childcare setting: All children, the child-care provider and members of his/her family who have had contact with case are close contacts.
 - Other contacts are evaluated based on extent and type of exposure.

- Create listing(s) of close contacts; perform the following for each contact:
 - Evaluate for measles illness.
 - Assess immunization status
 - Refer symptomatic contacts to health care providers for evaluation and exclude them from school or daycare until 4 days after rash onset or until they are considered not to be infectious.
 - Refer susceptible contacts (children and staff) for measles vaccination within 72 hours of notification or exclude susceptible contacts from the setting for 21 days after the onset of rash in the last person in the school or daycare who develops measles ([K.A.R. 28-1-6](#)).
- Maintain the log of symptomatic contacts referred for medical evaluation and testing and of any recommendations for vaccination or exclusion.
 - Follow-up to see outcomes of referrals and exclusions.
- Notify parents of close contacts of the case. The notice should advise the parents on the following:
 - The need to verify their child’s immunization status and bring it up to date within the [legally required time period](#).
 - Failure to comply with immunization will result in the child being excluded from school for 21 days from the last rash onset at the setting.
 - Instruction on reporting any symptoms or signs of measles and how to seek medical care for diagnosis and appropriate treatment.
 - Refer to the attached [Sample Letter](#) for School Notification.
- Surveillance: Conduct active surveillance for 2 incubation periods (i.e., 42 days) after onset of the last case.
- Reference K.A.R. 28-1-20 for immunization requirements for the current school year; on-line at: www.kdheks.gov/immunize/schoolinfo.htm.
- Outbreak Control Measures in Daycare Settings:
 - Revaccination of all attendees and their siblings who cannot provide documentation of [presumptive evidence of measles immunity](#).
 - Vaccination of facility personnel (e.g. employees, volunteers, service providers) who cannot provide documentation of [presumptive evidence of measles immunity](#).
 - Consider the revaccination of unaffected child care facilities in the community that are at risk for measles exposure and transmission.
 - Exclude anyone from the daycare who cannot provide documentation of [presumptive evidence of measles immunity](#).
 - Note: Remember that susceptible contacts to an infectious case must receive vaccine with 72 hours as described within [K.A.R. 28-1-6](#) or face exclusion from the daycare.
 - Exclusion of susceptible individuals will last until 21 days after the onset of rash in the last case of measles in the daycare.
- Outbreak Control Measures in schools (elementary, middle, junior and senior high schools, colleges, and other higher education institutions):
 - Revaccinate students and their siblings and all school personnel who cannot provide documentation of [presumptive evidence of measles immunity](#).

- Consider revaccination of students and personnel of unaffected schools in the same geographic area who may be at risk for measles transmission and who cannot provide documentation of [presumptive evidence of measles immunity](#).
- Exclude anyone from the school setting who cannot provide documentation of [presumptive evidence of measles immunity](#).
 - o Note: Remember that susceptible contacts to an infectious case must receive vaccine with 72 hours as described within [K.A.R. 28-1-6](#) or be excluded from the school setting.
 - o Exclusion of susceptible individuals will last until 21 days after the onset of rash in the last case of measles in the school setting.

D. Health Care Setting (including outpatient and long-term care facilities):

- During a measles outbreak within a health-care facility or areas served by that facility:
 - All personnel should receive 2 doses of MMR (separated by 28 days) unless they have documentation of immunity.
 - Serological screening of healthcare workers during an outbreak to determine measles immunity is not recommended.
 - Personnel who become ill should be relieved from all patient contact and excluded from the facility for 4 days after they develop rash.
- When a measles case is associated to a medical setting (treated at or visited), consult with the facilities' infection control practitioner to identify all contacts that need immediate evaluation for measles susceptibility.
- Contacts include:
 - All individuals in the waiting and examination rooms during and up to two hours after the index case was present;
 - All individuals in rooms that share an air-handling system with the room(s) in which the index was present if the system would allow transmission of the infectious agent between rooms.
 - All staff both with and without direct patient contact.
- All susceptible contacts should be immunized or provided immune globulin (IG) to prevent or modify disease development after exposure to measles.
 - Refer to [Contact Management](#) for further guidance.
 - Susceptible personnel (lacking [presumptive evidence of measles immunity](#)) who have been exposed to measles should be excluded from the facility and patient contact from the third to the 21st day after exposure, regardless post-exposure vaccine or IG receipt.
- Refer to [Sample Letter](#), Medical Facility Notification for further guidance.

E. Institutions:

- Coordinate activities with the infection control or administration
- If exposure occurred in the institution; all occupants of same quarters, ward, or classroom are considered contacts.
- Carry out investigation and preventive measures as outlined in this investigation guideline.

DATA MANAGEMENT AND REPORTING TO THE KDHE


- A.** Accept the case assigned to the LHD and record the date the LHD investigation was started on the **[Administrative]** tab.
- B.** Organize and collect data.
- The [Measles Investigation Form](#) is provided to assist the investigator but does not have to be submitted to CDC or KDHE.
 - Investigators can collect and enter all required information directly into EpiTrax **[Investigation]**, **[Clinical]**, **[Demographics]**, **[Epidemiological]** and **[Contact]** tabs without using the paper forms.
 - During outbreak investigations, refer to guidance from a KDHE epidemiologist for appropriate collection tools.
- C.** Report data collected during the course of the investigation via EpiTrax.
- Verify that all data requested in [Step 1](#)) has been recorded on an appropriate EpiTrax **[tab]**, or that actions are completed for a case lost to follow-up as outlined below.
 - Some data that cannot be reported on an EpiTrax **[tab]** may need to be recorded in **[Notes]** or scanned and attached to the record.
 - Paper report forms do not need to be sent to KDHE after the information is recorded in EpiTrax. The forms should be handled as directed by local administrative practices.
- D.** If a case is lost to follow-up, after the appropriate attempts:
- Indicate 'lost to follow-up' on the **[Administration]** tab with the number of attempts to contact the case recorded.
 - Record at least the information that was collected from the medical records.
 - Record a reason for 'lost to follow-up' in **[Notes]**.
- E.** After the requirements listed under [Case Investigation](#) have been completed, record the "Date LHD investigation completed" field located on the **[Administrative]** tab.
- Record the date even if the local investigator's [Case](#) or [Contact Management](#) for the contact is not "Complete".
- F.** Once the entire investigation is completed, the LHD investigator will click the "Complete" button on the **[Administrative]** tab. This will trigger an alert to the LHD Administrator so they can review the case before sending to the state.
- The LHD Administrator will then "Approve" or "Reject" the CMR.
 - Once a case is "Approved" by the LHD Administrator, BEPHI staff will review the case to ensure completion before closing the case.

ADDITIONAL INFORMATION / REFERENCES

- A. **Treatment / Differential Diagnosis:** American Academy of Pediatrics. Red Book: Report of the Committee on Infectious Disease, 29th Edition. Illinois, Academy of Pediatrics, 2014.
- B. **Epidemiology, Investigation and Control:** Heymann. D., ed., Control of Communicable Diseases Manual, Washington, DC, American Public Health Association, 2010.
- C. **Case Definitions:** wwwn.cdc.gov/nndss/
- D. **Kansas Regulations/Statutes Related to Infectious Disease:** www.kdheks.gov/epi/regulations.htm
- E. **Pink Book:** Epidemiology and Prevention of Vaccine-Preventable Diseases. Available at: www.cdc.gov/vaccines/pubs/pinkbook/index.html
- F. **Manual for the Surveillance of Vaccine-Preventable Diseases:** Available at: www.cdc.gov/vaccines/pubs/surv-manual/index.html .
- G. **World Health Organization. Epidemic Preparedness and Response to Measles.** Available at: www.who.int/csr/resources/publications/measles/WHO_CDS_CSR_ISR_99_1/en/
- H. **Pan American Health Organization. Measles Elimination: Field Guide.** Available at: www.paho.org/English/AD/FCH/IM/FieldGuide_ALL.htm
- I. **CDC. Notice to Readers: Measles, Mumps, and Rubella – Vaccine use and Strategies for Elimination of Measles, Rubella, And Congenital Rubella Syndrome and Control of Mumps: Recommendations of the Advisory Committee on Immunization Practices (ACIP).** [MMWR 2013; 62\(RR04\);1-34.](http://www.cdc.gov/mmwr/pdf/rr/rr6007.pdf)
- J. **CDC. Immunization of Health-Care Personnel: Recommendations of the Advisory Committee on Immunization Practices (ACIP).** MMWR 2011;60 (7). Available at: www.cdc.gov/mmwr/pdf/rr/rr6007.pdf
- K. **Additional Information (CDC):** www.cdc.gov/measles/index.html

ATTACHMENTS

To view attachments in the electronic version:

1. Go to <View>; <Navigation Pane>; <Attachments> – OR – Click on the “Paper Clip”  icon at the left.
2. Double click on the document to open.

Measles Rapid Assessment Form for the Local Investigator

(Please refer to the Disease Investigation Guideline for additional guidance.)

SYMPTOMS(S)	Unk.	No	Yes	Onset Date	Duration (days)	Comments	
Fever						Highest Temp:	
Rash						Appeared 1 st on: Spread to: Description:	
Cough							
Coryza							
Conjunctivitis							
Koplik's Spots							
Sore Throat							
Photophobia							
COMPLICATIONS	Unk.	No	Yes	Date(s)	Location(s)		
Hospitalized							
Died							
Otitis Media							
Pneumonia							
Diarrhea							
Encephalitis							
TRAVEL / VISITOR HISTORY	Unk.	No	Yes	Date Arrive	Date Depart	Location (To / From)	
Out of USA							
Out of State							
Out of County							
INITIAL EPI INFORMATION	Unk.	No	Yes	Date(s)	Location(s) or Case Information		
School/Daycare/Camp association							
Contact w/ Measles case							
Household contact of any of above							
<i>Collect additional information, as requested, on the Measles Supplemental Form Epidemiologic Information section.</i>							
Measles Vaccination History	Unk.	No	Yes	Date(s)	Type	Manufacturer	Lot
Dose 1							
Dose 2							
If NO to either dose, reason:							
LABORATORY TESTING	Unk.	No	Yes	Collection Date	Results		
Serum IgM					Positive / Negative / Indeterminate		
Serum IgG (Acute)					Positive / Negative / Indeterminate		
Serum IgG (Convalescent)					Positive / Negative / Indeterminate		
Virus Isolation *					Positive / Negative / Indeterminate		
Laboratory information:							

Measles Rapid Assessment Form for the Local Investigator

(Please refer to the Disease Investigation Guideline for additional guidance.)

Activity History For 21 Days Before Rash Onset and 4 Days After Rash Onset

	Day	Date	Activities
POSSIBLE EXPOSURE PERIOD *	-21		
	-20		
	-19		
	-18		
	-17		
	-16		
	-15		
	-14		
	-13		
	-12		
	-11		
	-10		
	-9		
	-8		
-7			
-6			
-5			
INFECTIOUS PERIOD	-4		
	-3		
	-2		
	-1		
	0 [rash onset]		
	1		
	2		
	3		
4			

* Rash usually 2-4 days after prodrome of fever, malaise, cough & coryza. Incubation period: 7-18 days before fever onset.

Measles Investigation Worksheet - Contacts By Location

Additional Comments and Notes on Contact Investigation

Notes:

#	Comments	
1		<p>Contact: Exposure is defined as direct contact with the case or anyone who was in the same room with a case even for a few minutes. Measles virus lingers in the air, so anyone who enters a room within 2 hours after a measles case should be considered exposed.</p> <p>Susceptible contacts are:</p> <ol style="list-style-type: none"> 1) Born in 1957 or after, and 2) Have no written record showing dates of receipt of at least 2 doses of measles-containing vaccine received on or after the 1st birthday, or 3) Have no written record of measles seropositivity. <p><i>Refer to the Measles Disease Investigation Guideline for further information.</i></p>
2		
3		
4		
5		
6		
7		
8		
9		