**Section 1 \*\*February 2024: See specimen shipping and storage update page 16**

ABOUT THE DISEASE

**A. Etiologic Agent**

Rubella is caused by the rubella virus, an enveloped, positive-stranded RNA virus (family *Togaviridae,* genus *Rubivirus)*. It is sometimes called “German measles” or “3-day measles” but is caused by a different virus from measles.

**B. Clinical Description**

When contracted after birth (also referred to as “postnatal” or “acquired” rubella, to differentiate from congenital rubella syndrome), rubella is usually a mild disease characterized by a generalized maculopapular rash (which sometimes begins on the face), swollen lymph nodes, and slight fever. It may be clinically indistinguishable from febrile rash illness due to measles, dengue, parvovirus B19, human herpesvirus 6 (roseola), coxsackie virus, echovirus, adenovirus, Zika virus or scarlet fever.

In older children and adults, there is often a one-to-five-day prodrome with low-grade fever, headache, malaise, and upper respiratory symptoms (including mild coryza and conjunctivitis) preceding the rash. Five to ten days prior to rash onset, a characteristic postauricular, occipital and posterior cervical lymphadenopathy will also occur. In children, rash is usually the first manifestation and a prodrome is rare. The rash may be more prominent after a hot shower or bath. The rash presentation can be quite variable. 20-50% of infections occur without recognized rash. Transient inflammation of the joints rarely occurs in children but is common in adolescents and adults, especially women. Arthralgia or arthritis may occur in up to 70% of adult women with rubella. Encephalitis (1 per 6,000 cases) and thrombocytopenic purpura (1 per 3,000 cases) are rare complications.

**Congenital rubella syndrome**: Rubella is of greatest danger to the fetus. Up to 85% of infants born to mothers infected in the first trimester will develop the physical anomalies referred to as congenital rubella syndrome (CRS). CRS is characterized by a number of complications and findings, including cataracts, congenital glaucoma, pigmentary retinopathy, cardiac defects, hearing impairment, developmental delay, growth restriction, radiolucent bone disease, enlarged liver and spleen, inflammation of the brain and surrounding tissue, thrombocytopenia, and purple skin lesions. Some effects may not be apparent at birth.

Reinfection has been demonstrated on rare occasions, but only very rarely has resulted in CRS.

**C. Vectors and Reservoirs**

Humans are the only host for rubella.

**D. Modes of Transmission**

Rubella is transmitted from person to person by droplets or direct contact with the nasopharyngeal secretions of an infected person or with the nasopharyngeal secretions or urine of an infant with CRS. Transplacental infection resulting in CRS occurs in infants who are born to women who have rubella during pregnancy, usually during the first trimester.

**E. Incubation Period**

The average incubation period is 17 days, with a range of 12–23 days.

**F. Period of Communicability or Infectious Period**

The infectious period for acquired rubella is seven days before to seven days after rash onset with rash onset date as day 0.



In the example above, the rash appeared on December 15th.

To determine the infectious period:

* Count back 1 week (7 days) from the rash onset. This would be December 8th.
* From the rash onset, count forward 7 days. This would be December 22nd.

Therefore, the infectious period is from December 8th through December 22nd.

Studies have shown presence of rubella virus in nasopharyngeal secretions ranging from 5–14 days after rash onset. However, infectiousness is highest while the rash is erupting, but decreases significantly after day five in most individuals. Rubella is similar to influenza and mumps in infectiousness and is not as contagious as measles or chickenpox.

An asymptomatic person with laboratory-confirmed and epidemiologically-linked rubella (epi-linked to a laboratory-confirmed case with rubella-like illness) has no rash onset for determining an infectious period and should be considered infectious for 5–30 days after exposure that resulted in infection.

Infants with CRS shed virus in nasopharyngeal secretions and urine from birth and possibly up to a year. Infants are no longer considered infectious after 2 consecutive negative monthly PCR tests; however, a small proportion continue to be infectious for one year or more, evidenced by continued positive PCRs.

**G. Epidemiology**

Before the rubella vaccination program started in 1969, rubella was a common and widespread infection in the United States. During the last major rubella epidemic in the United States from 1964 to 1965, an estimated 12.5 million people became infected with rubella, 11,250 pregnant women miscarried, 2,100 newborns died, and 20,000 babies were born with congenital rubella syndrome (CRS). Once the vaccine became widely available, the number of people infected with rubella in the United States dropped dramatically. Rubella was eliminated from the United States in 2004; elimination was then reconfirmed in 2011 and 2014. Today, fewer than 10 people in the United States are reported as having rubella each year. Most of these cases are internationally imported.

Unfortunately, rubella is much more widespread in other countries where there is little vaccination against rubella. Rubella vaccine coverage is estimated at 35% in Africa and 45% in the Eastern Mediterranean region, both the only remaining regions that have not yet established rubella elimination goals. More than 100,000 infants are born every year with CRS, mainly in Africa, South-East Asia, and the Western Pacific. In the U.S., CRS now disproportionately affects infants born to foreign-born women. Identifying and managing susceptible pregnant women who may have been exposed to rubella is particularly challenging, especially when women from other countries arrive in the U.S. shortly before giving birth, and therefore do not receive routine prenatal care in the U.S., which includes screening for immunity to rubella. For more information about rubella around the world: <https://www.who.int/news-room/fact-sheets/detail/rubella>.

**H. Vaccine Effectiveness**

**One dose** of measles, mumps, rubella (MMR) vaccine on or after 12 months of age induces rubella immunity in about **97%** of vaccinees.

**I. Bioterrorist Potential**

This pathogen is not considered to be of risk for use in bioterrorism.

**Section 2**

**REPORTING CRITERIA AND LABORATORY TESTING**

1. **What to Report to the Massachusetts Department of Public Health (MDPH)**

Prompt identification and reporting of suspected, probable, or confirmed cases of rubella is important to avoid exposure of susceptible pregnant women. Report any of the following:

* A case of rash illness accompanied by fever;
* A suspect case of rubella (with or without fever), as diagnosed by a health care provider;
* Positive serologic test for immunoglobulin M (IgM) antibody against rubella virus;
* Significant rise between acute- and convalescent-phase titers in serum rubella immunoglobulin G (IgG) antibody or total antibody level by any standard serologic assay;
* Isolation of rubella virus from a clinical specimen; Detection of rubella-virus specific nucleic acid by reverse-transcription polymerase chain reaction (RT-PCR);
* A suspect or confirmed case of CRS in a child (usually a baby), as diagnosed by a health care provider.

*Note: See Section 3C for information on how to report a case.*

1. **Laboratory Testing Services Available**

Acute or recent cases of rubella infection must be laboratory confirmed via virus detection or serologic testing since clinical diagnosis of rubella is unreliable. Before sending sera and clinical specimens to the Massachusetts State Public Health Laboratory (MA SPHL) for virus isolation, **please call an MDPH epidemiologist (24 hours a day/7 days per week) at (617) 983-6800**.

See [*Attachment A: Rubella Testing & CRS Testing – Specimen Collection*](#Attachment)(at the end of this chapter) for instructions on collecting and submitting specimens to MA SPHL.

***Virus Isolation/Molecular Characterization of Rubella (Rubella PCR and Culture)***

Virus isolation from, and detection by real time polymerase chain reaction (RT-PCR) in, clinical specimens is very useful for disease control purposes as well as confirming rubella. Samples accepted include oral or nasopharyngeal (preferred) swabs and urine. These should be collected during initial investigation, as maximum viral shedding occurs up to day 4 after rash onset. However, the virus may be detected from 1 week before to 2 weeks after rash onset.

For CRS, clinical specimens for virus isolation should be collected as close to birth as possible and prior to 3 months of age. However, because infants with CRS may shed virus from the throat and urine for a prolonged period (a year or longer), specimens obtained later may also yield rubella virus. To screen for shedding from confirmed CRS cases, nasopharyngeal, throat and/or urine samples should be collected monthly after the age of 3 months to determine if rubella RNA is still present in the specimen.

PCR results can be available within 24 to 48 hours after receipt of specimen during regular business hours. Molecular epidemiologic surveillance helps: 1) determine the origin of the virus; 2) determine which viral strains are circulating in the U.S. and whether these viral strains have become endemic; and 3) in cases where serology is not useful or possible (for example, when a suspect case has been recently vaccinated with MMR), can confirm the case and distinguish between wild-type virus and vaccine virus.

The MA SPHL Virus Isolation Laboratory will forward all rubella isolates and any original specimens collected from IgM-positive patients to the U.S. Centers for Disease Control and Prevention (CDC) for genotyping.

***Serologic Testing***

Serologic testing for rubella and CRS includes **IgM** antibody testing, **IgG antibody paired-titer** testing, and **IgG antibody avidity** testing. The MDPH strongly recommends submission of specimens to the MA SPHL within 24 hours of collection. For more information on these types of tests, please refer to [CDC's Serologic Testing for Rubella and CRS in Low Prevalence Setting](https://www.cdc.gov/rubella/lab/serology.html).

**Rubella IgM Antibody Test**

It is important to obtain laboratory confirmation of cases of rubella and suspect cases of rubella. Because commercially available rubella IgM antibody tests may have inadequate sensitivity and specificity, MDPH strongly recommends submission of specimens to the MA SPHL within 24 hours of collection. A specimen drawn at least five days after onset of rash allows sufficient time for the development of measurable antibodies However, serum collected prior to five days after onset of rash is acceptable and will be tested. Please note that if a serum is collected prior to the fifth day, and is negative, a follow-up specimen will be requested as it is necessary to confirm/rule out rubella. The amount of serum required is at least 2 mL.

For CRS, IgM antibody should be collected as soon as possible, and within 6 months of birth. Suspected cases should be tested again at 1 month of age if the initial IgM test is negative. If paired sera are to be collected, the second sample should be collected 14 to 21 days after the acute specimen was collected. The MDPH strongly recommends submission of specimens to the MA SPHL within 24 hours of collection.

Because rubella incidence is low, a high proportion of IgM-positive tests are likely be false positives. False-positive serum rubella IgM tests may occur due to the presence of rheumatoid factor (indicating rheumatologic disease) or cross-reacting IgM, or infection with other viruses. Avidity testing (see below) can be used to resolve uncertainties in the serologic evaluation of suspected cases.

**Rubella IgG Antibody Paired-titer Test**

In rare circumstances, paired testing for IgG antibody can be helpful when rubella IgM antibody results are not interpretable. An acute serum should be collected as soon as possible after onset of rash in rubella; convalescent serum should be collected approximately 14 days later. The suspect case can be confirmed if there is a 4-fold or higher rise in rubella IgG from the acute to convalescent specimen.

For CRS, convalescent specimen (IgG) should be collected after 9 months of age, but before vaccination with MMR vaccine.

Rubella IgG antibody testing is performed at the MA SPHL and/or CDC under special circumstances and after consultation with a MDPH epidemiologist. These tests are readily available at hospital and commercial labs. The amount of serum required is at least 2 mL and the acute specimen should be sent to MA SPHL within 24 hours.

**IgG Antibody Avidity Testing**

Antibody avidity is the overall strength of binding between the antigen and antibody, and it increases with time so that low avidity antibodies are replaced with high avidity antibodies. Assays for IgG avidity are useful to distinguish the difference between recent and past rubella infections. Low avidity is associated with recent primary rubella infection, whereas high avidity is associated with past infection or reinfection.

For pregnant women, avidity testing is most useful in the first trimester to help rule out a rubella infection. By the third trimester, antibody avidity will be high if rubella occurred in the first trimester, so it is no longer as useful.

Antibody avidity testing can be performed at the CDC when test results from MA SPHL and/or CDC testing is difficult to interpret. Avidity tests are not routine tests and should be performed in CDC reference laboratories.

1. **Shipment of Specimens**

Specimens should be sent within 24 hours from collection on a cold pack to maintain the sample at 4°C. Send specimens with a completed MA SPHL [*Specimen Submission Form*](https://www.mass.gov/doc/specimen-submission-form/download)found on the MDPH website.

Send to: **MA State Public Health Laboratory, Attn: Virus Serology Lab, 305 South Street, Jamaica Plain, MA 02130.**

The table below and [*Attachment A: Rubella Testing & CRS Testing – Specimen Collection*](#Attachment)(at the end of this chapter) provide more detail with regard to specimen collection for rubella testing.

**Rubella Testing Summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test** | **Specimen** | **Timing** **(1st specimen)** | **Timing** **(2nd specimen)** | **Turnaround Time** |
| **Rubella IgM** | Serum (SST or red top) | Acute, at time of diagnosis; also send a serum to hospital or commercial lab for rubella IgG testing | After day five of rash (if initial test collected prior to day 5) | 1-2 days\* |
| **CRS IgM** | Cord blood or serum | As soon as possible, within 6 months of birth; send serum for IgG after 9 months of age, but before vaccination with MMR vaccine | At 1 month of age (if initial test is negative) | 1-2 days\* |
| **PCR** | NP (preferred) or OS in VTM/UTM and urine (infants) | ASAP, ideally ≤ day 3 or < 10 days post rashFor CRS, as close to birth as possible and w/i 3 mo. of age | For CRS, monthly collection after 3 mo. of age until 2 consecutive negatives | 1-2 days |
| **Culture** | NP or OS in VTM/UTM; urine (infants) | ASAP, ideally ≤ day 3 of rash | N/A | Up to 2 weeks |

\*May be longer (> 1 week) if serology testing is performed by CDC.

When submitting clinical specimens to the MA SPHL, you must use the MA SPHL [*Specimen Submission Form*](https://www.mass.gov/doc/specimen-submission-form/download), which can be found on the MDPH website. Use one form for each specimen.

**Section 3**

**REPORTING RESPONSIBILITIES AND CASE INVESTIGATION**

**A. Purpose of Surveillance and Reporting**

* To identify cases and susceptible exposed people, and to prevent further spread of infection, especially to pregnant women.
* To ensure appropriate management of exposed pregnant women and their babies.
* To monitor the effectiveness of outbreak control strategies.
* To identify cases of congenital rubella infection/syndrome that may occur after a cluster or outbreak of rubella.
* To identify the source of infection by virus isolation and molecular characterization.
* To identify virus strains circulating in the U.S., and to determine whether they are endemic.

**B. Laboratory and Health Care Provider Reporting Requirements**

Rubella is **immediately reportable** to the local board of health (LBOH) and the MDPH.

The MDPH requests that health care providers immediately report to the LBOH in the community where the case is diagnosed, all confirmed, probable, or suspect cases of rubella, as defined by the reporting criteria in Section 2A.

Due to the health implications of rubella, the MDPH requests that information about any suspected case of rubella also be immediately reported to a MDPH immunization epidemiologist at the MDPH Division of Epidemiology at (617) 983-6800.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of rubella infection shall immediately report such evidence of infection, directly by phone, to the MDPH Division of Epidemiology at (617) 983-6800.

**C. Local Board of Health (LBOH) Reporting and Follow-Up Responsibilities**

*Reporting Requirements*

MDPH regulations *(105 CMR 300.000)* stipulate that rubella is reportable to the LBOH and that each LBOH must report any case of rubella or suspect case of rubella, as defined by the reporting criteria in Section 2A. Cases should be **reported immediately** (24 hours a day, 7 days a week) to an MDPH epidemiologist at the MDPH Division of Epidemiology by calling (617) 983-6800.

*Case Investigation*

Depending on local public health capacity, the MDPH will take the lead on rubella case investigation and control recommendations in partnership with the LBOH. When this is necessary, the MDPH will keep the LBOH informed of all significant developments through MAVEN and will request the assistance of the LBOH as needed. Rapid implementation of disease control measures is an integral part of case investigation. It is the responsibility of the LBOH to understand, and if necessary, institute the control guidelines listed in Section 4.

Essential components of case investigation include establishing a diagnosis of rubella, obtaining immunization history for confirmed cases, identifying sources of infection, assessing potential for transmission, identifying susceptible contacts and obtaining specimens for viral isolation. In order to assess the likelihood that a suspect case is a true case prior to laboratory testing, the MDPH and/or other public health staff helping in the investigation should ask about:

* Clinical presentation: description of rash; adults with rubella may have lymphadenopathy; CRS infants will have signs of birth defects including hearing impairment, cataracts, developmental delay, cardiac defects, etc.
* Rubella immunization history (one dose of MMR is highly protective); for CRS, mother’s immune status should be determined by mother’s history of titers for rubella, birthplace of mother/length of time in the US/vaccination history, history of documentation of rubella infection or disease during pregnancy, and contact with foreign travelers during pregnancy
* Country of origin and length of residence in U.S. (those in the U.S. for a short time are more likely to be susceptible);
* Recent history of travel (to where and dates);
* Whether there were any recent out-of-town and out-of-country visitors (from where and dates);
* Whether there was any recent contact with anyone with symptoms compatible with rubella;
* Risk factors for severe disease and CRS (e.g., <12 months of age, pregnancy, immunosuppression). For CRS, mother’s previous pregnancy history and details regarding prenatal care prior to birth
* Exposure and transmission settings (e.g., health care, childcare, school, institutional/residential settings [e.g., correctional, shelter, group home, military, and college—any setting where large numbers of foreign-born individuals are employed or live]); and
* Laboratory information, including viral isolation and serologic test results.

Please note that complete case follow-up includes collection and reporting of ALL demographic data elements found in MAVEN Demographic Question Package including age, gender, sexual orientation, race, ethnicity, disability, occupation, and preferred language.

*Using MAVEN*

As indicated above, depending on local capacity, the MDPH epidemiologist may enter most, if not all, rubella case investigation information into MAVEN. In other circumstances, the LBOH will enter most if not all the information. MDPH staff and local health staff should work in partnership to ensure that all variables are assessed and entered. Medical Records should be requested, particularly for CRS.

Administrative Question Package

Monitor your “Online LBOH Notification for Immediate Disease” workflow in MAVEN for any new cases of rubella. An MDPH Epidemiologist-of-the-Day (EOD) will review all new cases and initiate immediate follow-up for rubella events. Depending on local capacity, EODs may take the lead for case investigation and will coordinate follow-up with the LBOH as needed.

Once a new event appears in this workflow, open the Administrative Question Package (QP) and under the “Local Health and Investigation” section, answer the first question “**Step 1** – LBOH acknowledged” by selecting “Yes.” The “LBOH acknowledged date” will auto-populate to the current day. Completing this first step will move the event out of this workflow and into your “Online LBOH notified but Case Report Forms (CRF) are pending” workflow.

The epidemiologist leading the case investigation will document when the investigation was initiated by answering “**Step 2** – Investigation started” as “Yes” and then noting the date where shown. They will record their name and phone number where shown in “**Step 3** – LBOH/Agency Investigator.” If you are actively involved with the investigation, you should add a new line for **Step 3** and enter your name, agency, and phone number as well.

Demographic Question Package

Record **ALL** demographic and employment information.

For CRS, ensure that the mother’s demographics are also completed, including travel during pregnancy

Clinical Question Package

Complete the “Diagnosis/Clinical Information” section, providing symptom and other medical information.

For case classification purposes, it is particularly important that Rash/Rash Onset Date, Fever, Cough, Coryza, and Conjunctivitis symptom questions are answered, as well as information about the duration and distribution of the rash.

In CRS cases, add any notes from medical provider into the “Medical Information Notes” section describing any significant symptoms or signs of birth defects (cataracts, thrombocytopenia, hearing impairment, cardiac defects, etc.) or any screening tests performed on the newborn.

Vaccine and IG Information Question Package

Enter at least vaccine type and date for any documented doses of rubella-containing vaccine. If the case has no documentation of rubella-containing vaccines or does not know his or her history, “Vaccination history unknown” should be selected. If the case is known to be unvaccinated, “No vaccine administered” should be selected and an answer to the question “If not vaccinated, why not received?” should be entered. For CRS cases, the answer would be “under-age.”

In CRS cases, ensure that mother’s immunization history is noted in the Notes field on the home page.

Risk/Exposure/Control & Prevention Question Package

Accurately record all risk questions about travel, exposures, and where the case acquired rubella. Please note that rubella is not currently endemic in the United States, and cases of rubella typically will have traveled themselves or been in contact with an international traveler. It is important to identify the source of infection and whether the case can be tied to an international importation. Documenting mother’s travel history, particularly during the first trimester, is especially important for CRS infants

Epi-linked and Outbreak Information Question Package

The EOD leading the case investigation will complete questions about links to other cases or outbreaks.

*Completing Your Investigation*

The EOD leading the case investigation will mark “Step 4 – Case Report Form Completed” as “Yes” and then choose “MDPH Epidemiologist” for the Completed by variable. This will move the event out of your “Online LBOH notified but Case Report Forms (CRF) are pending” workflow and into your “Online LBOH needs final review” workflow.

Answer “Step 5 – LBOH final review” as “Yes” to move the case out of this workflow and complete the investigation.

**Section 4**

**CONTROLLING FURTHER SPREAD**

This section provides detailed control guidelines that are an integral part of case investigation and follow-up. LBOHs should familiarize themselves with the information. However, depending on local capacity, the MDPH may take the lead on implementing control measures for rubella in collaboration with the LBOH.

**A. Isolation and Quarantine Requirements *(105 CMR 300.200)***

**Minimum Period of Isolation of Patient**

*Rubella (non-CRS):* Until a full seven days after onset of rash (counting the day of rash onset as day zero). Consider asymptomatic laboratory-confirmed cases (with epi-link to a laboratory-confirmed case with clinically compatible symptoms) infectious for 5-30 days after last exposure to case while case was infectious and isolate for days 5-30.

*CRS:* Until two viral cultures (or PCRs) of clinical specimens (oral or nasopharyngeal secretions or urine), obtained one month apart after age three months, are negative for rubella virus. In some cases, this can take up to one year.

**Minimum Period of Quarantine of Contacts**

Rubella is transmitted primarily through droplets or direct contact with the nasopharyngeal secretions from an infected person. Any direct or close contact with a patient with rubella during the infectious period (7 days before to 7 days after rash onset) is defined as an exposure. Susceptible contacts will be excluded from public activities from the 7th through the 23rd day after their last exposure. When multiple cases occur, susceptibles need to be excluded until 23 days after the onset of the last case. In certain outbreak situations deemed to be high-risk, the MDPH may recommend additional control measures.

**B. Protection of Exposed Contacts of a Case**

*Note: Additional control measures for CRS can be found in Section 4C.*

1. Isolate case. Implement control measures before laboratory confirmation in high suspect cases
2. Inquire about contact with a known or suspect case of rubella and travel during the rubella exposure period (12–23 days prior to rash onset). Ask other questions listed in Section 3C.
3. Identify all those exposed. Rubella is spread by droplets, so requires close contact (3-6 feet) or direct contact with respiratory secretions (or urine in infants with CRS). Think in terms of the “zones of exposure” and consider members of the following groups, if they were in close contact with the case during their infectious period:
* Household members,
* School/daycare contacts (students and staff),
* Staff and patients at medical facility where patient was seen,
* Individuals at workplace of case (especially daycare centers, schools, and medical settings),
* Members of same religious/social groups,
* Members of sports teams and other extracurricular groups,
* Bus or carpool mates,
* Close friends, and
* Persons potentially exposed at social events, travel sites, etc.
1. Identify **high-risk susceptibles (those who lack evidence of immunity to rubella)**, including pregnant women, with whom the case had contact during his/her infectious period. **Pregnant women are particularly important to identify because of the risk of CRS.**
	1. Pregnant women, infants <12 months of age, and immunocompromised individuals should be referred to their obstetricians/health care providers. Develop a line-listing of pregnant exposed contacts if there are multiple. See next section, “Pregnant women exposed to rubella.”

**Evidence of Immunity to Rubella**

|  |
| --- |
| * Documentation of rubella vaccination on or after the first birthday;
* Serologic evidence of immunity to rubella or laboratory evidence of disease;
* Birth**1** in the U.S. before 1957, except for healthcare workers.
 |

1 Persons born outside the U.S. (without other evidence of immunity to rubella) are considered susceptible, regardless of year of birth.

1. Identify **all other susceptibles**: individuals without evidence of immunity as defined above.
2. Immunize all susceptibles.
	1. Live-virus rubella vaccine administered after exposure has not been demonstrated to prevent illness. However, immunization of exposed people who do not have contraindications is not harmful and will protect these people in the future, if the exposure did not result in infection.
	2. All susceptibles who are ≥12 months of age (and for whom it is not contraindicated) should receive one dose of MMR vaccine.
3. Exclude susceptible contacts, including those with religious and medical exemptions. Exclude exposed susceptible individuals as follows:
	1. If there was a discrete (one-time) exposure, exclude from days 7–23 from that exposure;
	2. If there was continuous exposure, exclude from days 7–23 from the day of rash onset in the case;
	3. If there is more than 1 case of rubella, exclude until 23 days after the onset of rash in the last reported case in the outbreak setting.
	4. In high-risk settings (healthcare, infant daycare) susceptibles should be excluded regardless of receipt of MMR vaccine post-exposure.
	5. In low-risk settings, unvaccinated persons who received MMR vaccine as part of outbreak control may be immediately readmitted to school/work provided all persons without documentation of immunity to rubella have been excluded.
4. Conduct surveillance for 2 incubation periods (46 days) after rash onset in the last case or the last exposure in the setting, whichever is later.
	1. In addition, surveillance for CRS should be implemented when confirmed or probable rubella cases are documented in a setting where pregnant women might have been exposed.
	2. Women who contract rubella infection while pregnant should be monitored for birth outcome, and appropriate testing should be performed on the infant after birth.

**Pregnant Women Exposed to Rubella**

If a pregnant woman is infected with rubella, immediate medical consultation is necessary. All women of childbearing age who are contacts of a person with confirmed or highly suspected rubella should have their pregnancy status determined. Every effort should be made to identify all pregnant women who might have been exposed to the case and evaluate them serologically for rubella-specific IgM and IgG antibodies. If a pregnant woman lacks laboratory evidence of rubella immunity, precautions should be taken to prevent any type of exposure to persons infected with rubella; these precautions may include ensuring rubella immunity of household contacts and isolating women from settings where rubella virus has been identified.

**Ensure that pregnant women exposed to rubella have evidence of immunity to rubella or, if they do not have evidence of immunity, follow the** [**CDC’s serologic testing algorithm**](https://www.cdc.gov/vaccines/pubs/surv-manual/images/chapt22-figure02-view.gif)**.**

* Pregnancy and Immune Globulin (IG): Routine use of IG for post-exposure prophylaxis is not recommended, even for susceptible pregnant women, because IG does not guarantee prevention of fetal infection. Administration of Immune Globulin to susceptible people experimentally exposed to rubella virus can prevent clinical rubella. However, there have also been many reports of the failure of Immune Globulin to prevent the anomalies of congenital rubella. For this reason, the routine use of Immune Globulin Intramuscular for the prevention of rubella in an exposed pregnant patient is not recommended.
* Previous administration of human anti-Rho(D) immune globulin (RhoGam) does not generally interfere with an immune response to rubella vaccine. However, women who have received anti-Rho immune globulin should be tested serologically 6–8 weeks after vaccination to assure that seroconversion occurred. If other antibody containing blood products are needed for other reasons, they should be administered at least 2 weeks before and deferred for up to 11 months after administration of MMR vaccine.

**C. Managing Special Situations**

*Rubella in Health Care Facilities*

* Follow steps 1-8 in section 4B.
* Consider notification of healthcare providers of all patients identified as exposed in a healthcare facility.
* **Precautions:**
	+ A case of rubella should be placed in a private room on **standard and droplet** precautions for his/her infectious period. Precautions may be discontinued on the 8th day following rash onset.
	+ A case of CRS should be placed on standard and contact precautions until 1 year of age **unless lab results indicate otherwise**. Confirmed asymptomatic cases should be isolated on days 5–30 after the last day of exposure, on standard and droplet precautions.
	+ Exposed susceptible hospitalized patients should be quarantined on standard and droplet precautions for days 7-23 post-exposure and may be taken off precautions on the 24th day.
* New cases should be reported to the MDPH immediately.

*Infants with CRS*

* Immediately place all suspect cases of CRS on **standard and contact** precautions. Infants with CRS shed virus for about 3 months after birth in their urine and nasopharyngeal secretions and can remain infectious for one year or more after birth. Infants with CRS should be placed in contact isolation during any hospital admission before 1 year of age or until the infant is no longer considered infectious. In addition, droplet precautions can be considered if the infant has a respiratory illness or an aerosol generating procedure is being performed. Infection-control precautions should be considered in children with CRS up to 3 years of age who are hospitalized for congenital cataract extraction.
* Health officials should consider excluding infants with CRS from childcare facilities until they are no longer considered infectious. Both the American Academy of Pediatrics (AAP), in the Red Book, and the CDC, in the CDC Guidelines for Isolation and Precautions in Hospitals, recommend contact precautions.
* Collect detailed information about the baby’s symptoms and the mother’s evidence of immunity to rubella. Consider collection of the mother’s serum for rubella IgM and IgG testing.
* Obtain specimens from infant for testing: blood, urine, and nasopharyngeal swab.
* Follow steps 1-8 in section 4B.
* Infants with CRS may be infectious for a year or more. MDPH will need to work with healthcare providers and local health to determine guidelines for minimizing the chance of rubella transmission once the baby is discharged from the hospital.

**D. Preventive Measures**

Although good personal hygiene (which consists of proper hand washing, disposal of used tissues, not sharing eating utensils, etc.) is important in preventing rubella, vaccination, including routine childhood vaccination, catch-up vaccination of adolescents, and targeted vaccination of high-risk adult groups (such as women of childbearing age, international travelers and adults born outside the U.S.), is the best preventive measure.

The continuing occurrence of rubella and CRS among women of childbearing age in other parts of the world indicates the need identify and vaccinate susceptible women of childbearing age who travel to the U.S., as part of routine general medical and gynecological outpatient care; and before discharge from any hospital, birthing center, or other medical facility, unless a specific contraindication exists. Remember to evaluate all adults, especially women of child-bearing age, for needed immunizations at every encounter with the health care system. All foreign-born adults without vaccination records should be vaccinated with one dose of MMR.

A [Rubella Public Health Fact Sheet](https://www.mass.gov/service-details/rubella-german-measles) for the general public can be obtained from the MDPH website.

**ADDITIONAL INFORMATION**

**Case definitions:** The CDC and the MDPH use CDC case definitions to maintain uniform standards for national reporting. For reporting to the MDPH, always use the criteria outlined in Section 2A. *The most up-to-date CDC case definitions are available in the CDC* [*Rubella Chapter*](https://www.cdc.gov/vaccines/pubs/surv-manual/chpt14-rubella.html#:~:text=Top%20of%20Page-,Case%20Definition,-Case%20definition%20for) *and* [*CRS Chapter*](https://www.cdc.gov/vaccines/pubs/surv-manual/chpt15-crs.html#:~:text=Top%20of%20Page-,Case%20Definition,-Case%20definition%20for)*. In addition, MAVEN users can click on the “Help” icon (looks like a Question Mark next to “Enter Case ID” at the top of the screen). Click on the “Case Classification” folder.*

**REFERENCES**

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MDPH. *Regulation 105 CMR 300.000:Reportable Diseases, Surveillance, and Isolation and Quarantine Requirements.* MDPH, Effective May 27, 2022.

**Attachment A**

**\*\*February 2024: See specimen shipping and storage update page 16**



**Report suspect cases immediately to MDPH at 617-983-6800.**

Providers in Boston should contact the Boston Public Health Commission at 617-534-5611.

Local Boards of Health should also be notified.

**When to test for rubella:**

* A clinical diagnosis of rubella must be confirmed by laboratory testing.
	+ Consider lab testing for patients with symptoms consistent with rubella**:** fever, generalized maculopapular rash (occurs in 50-80% in persons infected with rubella), lymphadenopathy, headache, malaise, mild coryza and conjunctivitis. Post auricular, occipital, and posterior cervical lymphadenopathy is characteristic and precedes rash by 5-10 days. Arthralgia or arthritis may occur in up to 70% of adult women with rubella.
* Patients with fever, rash and contact to a known rubella case should be given high priority for testing. Unless known to be a close contact of a confirmed case, asymptomatic patients should **not** be tested for rubella.
* Consider testing for other causes of febrile rash illness, like measles, enterovirus, parvovirus B19, adenovirus, and human herpesvirus-6 virus (roseola). Note: one dose of MMR vaccine is considered to be about 97% effective in preventing rubella.

**When to test for CRS:**

* A clinical diagnosis of CRS should be confirmed by laboratory testing.
	+ Consider lab testing for infants born with some of these congenital defects: cataracts, congenital heart disease, hearing impairment, developmental delay, purpura (red or purple discolored spots – possible bleeding disorder), radiolucent bone disease, hepatosplenomegaly, dermal erythropoiesis (blueberry muffin lesions), meningoencephalitis and microcephaly.
* CRS is extremely rare in the U.S. due to rubella elimination and standard screening of pregnant women for immunity to rubella. A case is likely to be linked to importation/recent travel. Rubella infection in the mother may be mild and not detected.

**Specimen Collection:**

In general, when rubella or CRS is suspected, MDPH recommends the collection of serum for rubella immunoglobulin M (IgM) testing and an oropharyngeal swab (OS, throat swab) or nasopharyngeal swab (NPS) for rubella PCR testing. **The best results are achieved with NP swabs**. Urine should also be collected for infants in CRS. Cataracts removed during surgery can also be used for CRS testing.

The serum and NPS/OS specimens should be sent within 24 hours to the Massachusetts State Public Health Laboratory (MA SPHL) in Jamaica Plain for testing. A rubella IgG test (for evidence of immunity to rubella) should be performed at a hospital or commercial laboratory. The NPS can be tested for other causes of illness if PCR negative for rubella. **Collect these specimens as soon as possible.**

**Timing of specimen collection: rubella**

* Collect the **NPS (preferred)** or OS as soon after onset of rash as possible. Virus may be detected from 1 week before to 2 weeks after rash onset. However, maximum viral shedding occurs up to day 4 after rash onset
* Collect an acute serum at the same time. IgM can usually be detected 4-30 days after onset of illness and often longer. A second serum may be requested five days after rash onset if the initial IgM result is negative since IgM antibodies may not be detectable before day 5 after rash onset.
* Collect urine as a backup for viral isolation (up to 45 mL in a sterile leak-proof container, kept cold).

**Timing of specimen collection: CRS**

* Collect the **NPS (preferred)** or OS as close to birth as possible and within 3 months of age. After 3 months of age, begin monthly collection to assess viral shedding until 2 consecutive negative PCR are obtained.
* Collect an acute serum for IgM testing as soon as possible, and within 6 months of birth. IgM antibodies can be detected in the infant’s cord blood or serum and persists for about 6–12 months. Suspect CRS cases that are IgM negative at birth should have this result confirmed at one month of age. Send serum for IgG after 9 months of age, but before vaccination with MMR vaccine

**Collecting a throat swab or NP swab (for rubella PCR)**

* Use a sterile synthetic swab with a polyester or Dacron tip (flocked swabs are ideal). Do NOT use wooden sticks, cotton swabs, swabs with calcium alginate tips, charcoal swabs, gel swabs or dry swabs.
* Firmly rub tonsillar region/posterior nasopharynx (OS) or nasopharyngeal passage (NPS) with the sterile synthetic swab. **NPS preferred**.
* The swab must be placed and sent wet in viral transport medium (VTM) or universal transport medium (UTM). Agitate the swab for at least 30 seconds in a tube containing 2 mL VTM. The swab should be left in the tube. Break/cut the end if necessary.
* **Dry swabs are not suitable for testing and will not be tested.**

**Collecting serum**

* At least 2 mL of serum should be collected in a serum-separator tube. A red-top tube is an acceptable alternative if a serum separator tube is not available.
* The serum specimen must be spun before submitting it.

**Storing, labeling and shipping the specimens**

Keep specimens refrigerated at 4◦ C and send on cold packs as soon as possible (within 24 hours). Ensure that specimen containers are firmly closed and clearly labeled with two unique identifiers, such as patient name and date of birth. Ship as UN3373- Biological Substances, Category B.

After 48 hours, store and ship specimens at -20°C or lower. Avoid freeze-thaw cycles. Inappropriate or leaking specimens will be rejected.

**Complete the Specimen Submission Form**

**Use one form for each specimen submitted**. Include provider contact information and all-important details (patient demographics, symptoms, rash onset date, recent travel history and possible exposure to rubella). Complete the “Additional Patient Information” section for Rubella and CRS specimen. Failure to fully complete this form will delay testing.

The [Specimen Submission Form](https://www.mass.gov/doc/specimen-submission-form/download) is on the MDPH website.

**How do I get the specimen to the MA SPHL?**

Using your own courier is usually the best way to get a specimen to MA SPHL in a timely manner. In high-suspect situations and outbreaks, MDPH may be able to provide a courier to pick up the specimen and deliver to the MA SPHL. Call 617-983-6800.

**Rubella Testing Summary**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test** | **Specimen** | **Timing** **(1st specimen)** | **Timing** **(2nd specimen)** | **Turnaround Time** |
| **Rubella IgM** | Serum (SST or red top) | Acute, at time of diagnosis; also send a serum to hospital or commercial lab for rubella IgG testing | After day five of rash (if initial test collected prior to day 5) | 1-2 days\* |
| **CRS IgM** | Cord blood or serum | As soon as possible, within 6 months of birth; send serum for IgG after 9 months of age, but before vaccination with MMR vaccine | At 1 month of age (if initial test is negative) | 1-2 days\* |
| **PCR** | NP (preferred) or OS in VTM/UTM and urine (infants) | ASAP, ideally ≤ day 3 or < 10 days post rashFor CRS, as close to birth as possible and w/i 3 mo. of age | For CRS, monthly collection after 3 mo. of age until 2 consecutive negatives | 1-2 days |
| **Culture** | NP or OS in VTM/UTM; urine (infants) | ASAP, ideally ≤ day 3 of rash | N/A | Up to 2 weeks |

\*May be longer (> 1 week) if serology testing is performed by CDC.

**Where can I get more information?**

Call MDPH at 617-983-6800 or your local board of health.

[CDC](https://www.cdc.gov/rubella/hcp.html) has rubella information for healthcare professionals.