



## Report Immediately

# Rubella (German Measles)

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## Disease Plan

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Last updated: December 3, 2018, by Bree Barbeau.

Questions about this disease plan?

Contact the Utah Department of Health Bureau of Epidemiology: 801-538-6191.

✓ **CRITICAL CLINICIAN INFORMATION**

<b>Clinical Evidence</b>
<p>Signs/Symptoms</p> <ul style="list-style-type: none"> <li>• Postnatal Rubella             <ul style="list-style-type: none"> <li>○ Generalized maculopapular rash</li> <li>○ Swollen lymph nodes</li> <li>○ Conjunctivitis</li> <li>○ Headache</li> <li>○ Fever</li> <li>○ Malaise</li> <li>○ Lymphadenopathy</li> <li>○ Upper respiratory symptoms</li> </ul> </li> <li>• Congenital Rubella Syndrome (CRS)             <ul style="list-style-type: none"> <li>○ Cataracts</li> <li>○ Congenital heart disease</li> <li>○ Hearing impairment</li> <li>○ Developmental delay</li> </ul> </li> </ul>
<p>Period of Communicability</p> <ul style="list-style-type: none"> <li>• Persons with rubella are most infectious when the rash is erupting, but they can shed virus from seven days before to seven days after rash onset.</li> <li>• Infants with CRS can shed virus in body secretions for up to one year.</li> </ul>
<p>Incubation Period</p> <ul style="list-style-type: none"> <li>• Average 16–18 days (range 12–23 days)</li> </ul>
<p>Mode of Transmission</p> <ul style="list-style-type: none"> <li>• Respiratory droplet</li> <li>• Direct contact with respiratory secretions</li> <li>• Infants with CRS may shed virus from the throat and urine for a prolonged period</li> </ul>
<b>Laboratory Testing</b>
<p>Type of Lab Test/Timing of Specimen Collection</p> <ul style="list-style-type: none"> <li>• Serology – test for both IgM (<math>\geq 5</math> days after onset of symptoms) and IgG (acute and convalescent specimens collected as close to onset of symptoms as possible and 7–21 days later, respectively; a fourfold or greater increase in antibody titer between acute and convalescent specimens indicates recent infection).</li> <li>• PCR – Collect a throat/oropharyngeal/nasopharyngeal swab (virus may be detected 1 week before to 2 weeks after onset; maximum viral shedding occurs up to day 4 after rash onset)</li> <li>• Viral Culture – useful for genetic characterization but should not be used as routine diagnosis</li> </ul>
<b>Treatment Recommendations</b>
<p>Type of Treatment</p> <ul style="list-style-type: none"> <li>• Supportive</li> </ul>
<p>Prophylaxis</p> <ul style="list-style-type: none"> <li>• None</li> </ul>
<b>Contact Management</b>
<p>Isolation of Case</p> <ul style="list-style-type: none"> <li>• Patients with rubella should be isolated for seven days after rash onset.</li> </ul>

**Disease Name Here:** Utah Public Health Disease Investigation Plan

Quarantine of Contacts

- Exposed persons without presumptive evidence of immunity should remain home in voluntary quarantine for 23 days after last exposure

**Infection Control Procedures**

- Standard and droplet precautions for seven days after rash onset

## ✓ WHY IS DISEASE IMPORTANT TO PUBLIC HEALTH?

In 2004, rubella was officially declared eliminated from the United States. The United States elimination of rubella and CRS was reconfirmed in 2011 and maintenance of elimination was reported in 2014. Despite progress in the United States, there is still risk of rubella importation and rubella outbreaks, especially if transmission of imported disease occurs in unvaccinated communities. In addition to sustained, high vaccination coverage, rubella surveillance with thorough public health response to every rubella case is required to prevent re-establishment of endemic disease transmission.

## ✓ DISEASE AND EPIDEMIOLOGY

### Clinical Description

#### Postnatal rubella

When contracted after birth, rubella is usually a mild disease characterized by a generalized maculopapular rash, swollen lymph nodes, and slight fever. Up to 50% of rubella infections are thought to be asymptomatic or subclinical. In children, the rash is usually the first sign of illness. Older children and adults may experience a 1–5 day prodrome prior to rash onset consisting of a low-grade fever, conjunctivitis, headache, malaise, lymphadenopathy, and upper respiratory symptoms. The rash is often quite variable, complicating diagnosis. The rash usually begins on the face and then progresses from head to foot. It usually lasts about three days and is often more prominent after a hot shower or bath.

Complications of rubella are not common, but they tend to occur more often in adults than in children. Although rare in children and adult males, arthralgia or arthritis may occur in up to 70% of adult women who contract rubella. Joint symptoms usually occur with rash onset and may last for up to one month. Rare complications include chronic arthritis, thrombocytopenic purpura, and encephalitis.

#### Congenital Rubella Syndrome (CRS)

Infection with rubella during early gestation can result in a variety of physical abnormalities referred to as CRS. The severity of the effects of rubella on the fetus depends largely on the time of gestation when infection occurs. Up to 85% of infants born to mothers infected in the first trimester will develop CRS. Additionally, infection may lead to fetal death, spontaneous abortion, or premature delivery. Common congenital defects of CRS include cataracts, congenital heart disease, hearing impairment, and developmental delay. Infants with CRS often present with more than 1 sign or symptom consistent with congenital rubella infection. However, infants may present with a single defect, with hearing impairment being the most common single defect. Moderate and severe CRS is usually recognizable at birth. Symptoms of mild CRS may not develop for 2–4 years. Defects are rare when maternal infection occurs after the 20<sup>th</sup> week of gestation.

## **Causative Agent**

Rubella is caused by a togavirus. It is most closely related to group A arboviruses, such as eastern and western equine encephalitis viruses. It is an enveloped RNA virus, with a single antigenic type that does not cross-react with other members of the togavirus group.

## **Differential Diagnosis**

The differential diagnosis includes, but is not limited to: measles, fifth disease, adenovirus, enterovirus infection, scarlet fever, roseola, Kawasaki's disease, and drug reaction.

## **Laboratory Identification**

Laboratory diagnosis of rubella is required since clinical diagnosis is often inaccurate. Because many rashes can mimic that of rubella, laboratory identification is the only way to confirm a diagnosis. UPHL does not perform testing for rubella. Several reference labs can conduct serology; viral culture and PCR is usually performed at CDC or a CDC reference laboratory. Submission to CDC or a CDC reference laboratory should be coordinated through a UDOH epidemiologist.

### **IgM serology**

Several laboratory methods to measure IgM levels are available and may be used to screen for immunity and/or test for disease. Detection of the IgM antibody usually indicates recent postnatal infection or congenital infection in a newborn infant, but both false-positive and false-negative results occur. The preferred method is IgM EIA, however, LA tests and IFA assays are also acceptable. IgM antibodies may not be detectable until five days after rash onset. If a negative IgM result is obtained from serum drawn less than five days after rash onset, then IgM testing should be repeated. When testing for postnatal rubella, specimens should be collected at least three days after rash onset. When testing for CRS, specimens should be collected as soon as possible. False-positive serum rubella IgM tests have occurred in persons with parvovirus infections or positive heterophile test (indicating infectious mononucleosis) or with a positive rheumatoid factor test (indicating rheumatologic disease). When a false-positive rubella IgM is suspected, a rheumatoid factor, parvovirus IgM, and heterophile test should be used to rule out a false-positive rubella IgM test result.

### **IgG serology**

IgG testing for acute rubella requires demonstration of a rise in titer of antibody against rubella virus, so two serum specimens are always required. The first specimen should be drawn as soon after rash onset as possible. The second specimen should be drawn 7–14 (preferably 14–21) days later. Rubella needs to be diagnosed in a timely manner; for this reason, IgG serology testing for acutely ill patients is not recommended.

### **Viral culture**

Virus isolation and genetic characterization can take several weeks to complete, and therefore should not be used as a routine method to diagnose rubella. However, virus isolation is important in determining the geographic origin of the virus, and collecting clinical specimens for viral isolation should be done at the same time as samples taken for serologic or RT-PCR testing. Only when serological results come back positive for rubella should the culture specimen be sent for testing. Virus may be isolated from one week before, to two weeks after,

rash onset; however, maximum viral shedding occurs in the first four days after rash onset.

Throat swabs or oropharyngeal swabs usually produce the best results, but virus can also be isolated from nasopharyngeal swabs and urine. For infants with suspected CRS, a NP swab may be pooled with a throat swab to ensure an adequate sample.

### **RT-PCR**

Rubella virus can be detected from nasal, throat, urine, blood, and cerebrospinal fluid specimens from persons with rubella. The best results are achieved with throat swabs. Cerebrospinal fluid specimens should be reserved for persons with suspected rubella encephalitis. Efforts should be made to obtain clinical specimens for virus detection from all case-patients at the time of the initial investigation. 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.

Real-time RT-PCR and RT-PCR can be used to detect rubella virus; PCR has been extensively evaluated for its usefulness in detecting rubella virus in clinical specimens. Clinical specimens obtained for virus detection and sent to CDC are routinely screened by these techniques. For infants with suspected CRS a NP swab may be pooled with a throat swab to ensure an adequate sample. Submission to CDC should be coordinated through UDOH epidemiologist.

### **Treatment**

There is no specific treatment for rubella. Supportive treatment is needed to help with symptoms.

### **Case Fatality**

Rubella is rarely a fatal disease.

### **Reservoir**

Humans are the only known hosts of rubella virus.

### **Transmission**

Rubella is spread through respiratory droplets generated by coughing and sneezing, and by direct contact with respiratory secretions of ill persons. Infants with CRS may shed virus from the throat and urine for a prolonged period—sometimes up to a year or even longer.

### **Susceptibility**

Prior to the introduction of the vaccine, rubella was considered a childhood disease. However, anyone can get rubella. In 2004, the CDC determined that vaccination efforts had eradicated the virus in the United States. All cases now occurring in the U.S. are either imported from an area where rubella virus is still circulating, or are linked to a case with imported rubella virus. Rubella cases can occur throughout the year, but tend to peak in late winter and spring.

### **Incubation Period**

The incubation period ranges from 12-23 days, with an average of 16-18 days.

## **Period of Communicability**

Persons with rubella are most infectious when rash is erupting, but they can shed virus from seven days before to seven days after rash onset. Infants with CRS shed large quantities of virus from body secretions for up to one year.

## **Epidemiology**

Rubella infection peaks during late winter and early spring and occurs worldwide. Before the widespread use of rubella vaccine, which was licensed in 1969, peaks of rubella incidence occurred in the U.S. every 6–9 years, with most cases occurring in children. In 1964–1965 a rubella epidemic in the United States resulted in 12.5 million cases of rubella infection and about 20,000 newborns with CRS. This epidemic caused more than 2,000 cases in Utah alone. The estimated cost of the epidemic was \$840 million.

Most reported rubella cases in the U.S. now occur in persons born in areas where rubella vaccine is not routinely given. Adults born in the U.S. before 1957 are considered to be immune to rubella because of the high probability that they have been infected naturally during childhood. The last documented case of postnatal rubella in Utah occurred in 2004.

At the end of 2016, 148 countries/territories (76% of the world total) had introduced rubella vaccine into their national immunization programs. Many countries that have sustained high levels of rubella immunization have drastically reduced or eliminated rubella and CRS. The incidence of rubella in the U.S. has decreased by more than 99% from the pre-vaccine era.

## **PUBLIC HEALTH CONTROL MEASURES**

### **Public Health Responsibility**

- Promote vaccination to prevent disease.
- Identify all cases and susceptible exposed people rapidly.
- Ensure appropriate management of exposed pregnant women.
- Identify the source of infection through genotyping of viral isolates.

### **Prevention**

Vaccination is the primary method of prevention. Special emphasis must continue to be placed on the immunization of at-risk, post-pubertal males and females, especially college students, military recruits, recent immigrants, health care professionals, teachers, and childcare providers.

### **Chemoprophylaxis**

Rubella vaccine is not effective for post-exposure prophylaxis of rubella. However, vaccination after exposure is not harmful and may possibly prevent later disease. Immune globulin (IG) is not recommended for routine use, even in women exposed to rubella in early pregnancy. IG should be considered only if termination of the pregnancy is not an option. Limited data shows that the probability of clinically apparent infection after IG administration in exposed persons decreases. However, a lack of clinical symptoms does not guarantee that the fetus will not be

infected. Infants with congenital rubella have been born to mothers who received IG shortly after exposure.

## **Vaccine**

For prevention of rubella, MMR vaccine is recommended for persons  $\geq 12$  months of age.

Two doses of MMR vaccine are recommended routinely for children with the first dose at 12 through 15 months of age and the second dose at 4–6 years of age. Because two doses of combined MMR vaccine are recommended in the current schedule for measles and mumps vaccination, most children and adolescents now receive two doses of rubella-containing vaccine.

MMRV vaccine can be used in place of MMR vaccine to implement the 2-dose recommendation for children 12 months to 12 years of age.

Adults born during or after 1957, including those who may be at increased risk for rubella exposure or transmission, should receive at least 1 dose of rubella-containing vaccine. These persons include students attending colleges or other post-high school educational institutions, healthcare personnel, international travelers, and non-pregnant women of childbearing age. Healthcare providers should routinely assess women of childbearing age for presumptive evidence of rubella immunity (see below) and vaccinate those who lack acceptable evidence of immunity and who are not pregnant. Pregnant women who do not have acceptable evidence of rubella immunity should be vaccinated immediately postpartum.

Healthcare facilities should consider vaccinating unvaccinated healthcare personnel born before 1957 who lack laboratory evidence of rubella immunity or laboratory confirmation of disease with one dose of MMR vaccine.

Additional MMR ACIP vaccine recommendations can be found at <https://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mmr.html>.

### **Precautions and contraindications**

Contraindications for MMR and MMRV vaccines include history of anaphylactic reactions to neomycin, history of severe allergic reaction to any component of the vaccine, and immunosuppression. Women known to be pregnant or attempting to become pregnant should not receive rubella vaccine. Although there is no evidence that rubella vaccine virus causes fetal damage, pregnancy should be avoided for four weeks (28 days) after rubella or MMR vaccination.

Persons with immunodeficiency or immunosuppression, resulting from leukemia, lymphoma, generalized malignancy, immune deficiency disease, or immunosuppressive therapy should not be vaccinated. However, treatment with low-dose (less than 2 mg/kg/day), alternate-day, topical, or aerosolized steroid preparations is not a contraindication to rubella vaccination. Persons whose immunosuppressive therapy with steroids has been discontinued for one month (three months for chemotherapy) may be vaccinated. Rubella vaccine should be considered for persons with asymptomatic or mildly symptomatic HIV infection

Persons with moderate or severe acute illness should not be vaccinated until the illness has improved. Minor illness (i.e., otitis media, mild upper respiratory infections), concurrent antibiotic therapy, and exposure or recovery from other illnesses are not contraindications to rubella vaccination.

Receipt of antibody-containing blood products (i.e., immune globulin, whole blood or packed red blood cells, intravenous immune globulin) may interfere with seroconversion to rubella vaccine. Vaccine should be given two weeks before, or deferred for at least three months following administration of an antibody-containing blood product. If rubella vaccine is given as combined MMR, a longer delay may be necessary before vaccination.

Previous administration of human anti-Rho(D) immune globulin (RhoGam) does not generally interfere with an immune response to rubella vaccine and is not a contraindication to postpartum vaccination. However, women who have received anti-Rho immune globulin should be serologically tested 6–8 weeks after vaccination to ensure that seroconversion has occurred.

A personal or family e.g., sibling or parent) history of seizures of any etiology is a precaution for MMRV vaccination. Studies suggest that children who have a personal or family history of febrile seizures or family history of epilepsy are at increased risk for febrile seizures compared with children without such histories. Children with a personal or family history of seizures of any etiology generally should be vaccinated with MMR vaccine and varicella vaccine (for the first dose) because the risks for using MMRV vaccine in this group of children generally outweigh the benefits.

Although vaccine virus may be isolated from the pharynx, vaccinees do not transmit rubella to others, except occasionally in the case of the vaccinated breastfeeding woman. In this situation, the infant may be infected, presumably through breast milk, and may develop a mild rash illness, but serious effects have not been reported. Infants infected through breastfeeding have been shown to respond normally to rubella vaccination at 12–15 months of age. Breastfeeding is not a contraindication to rubella vaccination and does not alter rubella vaccination recommendations.

## Isolation and Quarantine Requirements

**Isolation:** Non-hospitalized persons with postnatal rubella should be voluntarily isolated in their home until seven days after rash onset. Infants diagnosed with CRS should be considered contagious until they are at least one year old, unless NP and urine cultures after three months of age, obtained one month apart, are repeatedly negative, and care should be taken to reduce exposure.

**Hospital:** In addition to standard precautions, for postnatal rubella, droplet precautions are recommended for seven days after rash onset. Contact isolation is indicated for children with suspected or confirmed congenital rubella until they are at least one year of age, unless NP and urine culture results after three months of age, obtained one month apart, are repeatedly negative for rubella virus.

**Quarantine:** In schools and other educational institutions, exclusion of persons without acceptable evidence of rubella immunity may limit disease transmission and may help to rapidly raise the vaccination level in the target population. All persons who have been exempted from rubella vaccination for medical, religious, or other reasons also should be excluded from attendance. Exclusion should continue until 23 days after the onset of rash of the last reported case-patient in the outbreak setting. Unvaccinated persons who receive MMR vaccine as part of the outbreak control may be immediately readmitted to school provided all persons without documentation of immunity have been excluded.

In healthcare settings, exposed healthcare personnel without adequate presumptive evidence of immunity should be excluded from duty beginning seven days after exposure to rubella and continuing through either 23 days after last exposure or seven days after rash appears. Exposed healthcare personnel who are vaccinated as part of control measures should be excluded from direct patient care for 23 days after the last exposure to rubella because effectiveness of post-exposure vaccination in preventing rubella infection has not been shown.

**R396-100-8. Exclusions of Students Who Are Under Exemption and Conditionally Enrolled Status.**

(1) A local or state health department representative may exclude a student who has claimed an exemption or who is conditionally enrolled from school attendance if there is good cause to believe that the student has a vaccine preventable disease and:

- (a) has been exposed to a vaccine-preventable disease; or
- (b) will be exposed to a vaccine-preventable disease as a result of school attendance.

(2) An excluded student may not attend school until the local health officer is satisfied that a student is no longer at risk of contracting or transmitting a vaccine-preventable disease.

✓ **CASE INVESTIGATION**

**Reporting**

If rubella is at all suspected, it should be reported immediately to the local health department or the Utah Department of Health. All cases should be reported to the local health department or the Utah Department of Health.

**Table 1: Criteria for Reporting Rubella (CSTE)**

Criterion	Reporting*		
<i>Clinical Evidence</i>			
Fever >99.0°F (37.2°C)	N	N	N
Rash: generalized maculopapular	N	N	N
Lymphadenopathy (cervical)			O
Arthralgia or arthritis			O
Conjunctivitis			O
Absence of a more compelling diagnosis	N		N

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<i>Laboratory Evidence</i>			
Culture rubella virus		O*	
PCR, rubella-specific nucleic acid		O*	
Rubella IgM antibody		O*	
Acute and convalescent rubella IgG antibodies		O*	
<i>Epidemiological Evidence</i>			
Contact of a confirmed rubella case	O		
Belonging to a defined risk group during an outbreak	O		
Residence in a geographic area of the U.S. where an outbreak of rubella is occurring	O		
Travel during the 21 days before illness onset to a geographic area where an outbreak of rubella is occurring	O		

Notes:

S = This criterion alone is Sufficient to report a case.

N = All "N" criteria in the same column are Necessary to report a case.

O = At least one of these "O" (Optional) criteria in each category (i.e., clinical evidence and laboratory evidence) in the same column—in conjunction with all "N" criteria in the same column—is required to report a case.

\* A requisition or order for any of the "O" laboratory tests—in conjunction with all "N" criteria in the same column—is sufficient to meet the reporting criteria.

**Table 2: Criteria for Reporting Congenital Rubella Syndrome**

	Reporting		
<i>Clinical Presentation</i>			
Category A			
Cataracts or congenital glaucoma		O*	
Congenital heart disease (patent ductus arteriosus or peripheral pulmonary stenosis are the most common)		O*	
Hearing impairment		O*	
Pigmentary retinopathy		O*	
Purpura		O*	
Category B			
Hepatosplenomegaly		O*	
Jaundice		O*	
Microcephaly		O*	
Developmental delay		O*	
Meningoencephalitis		O*	
Radiolucent bone disease		O*	

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Physician diagnosis of congenital rubella syndrome				S
<i>Laboratory findings</i>				
Rubella virus isolated from a clinical specimen	S			
Rubella IgM test positive	S			
PCR positive for Rubella virus	S			
Persistently high Rubella antibody titer	S			
<i>Epidemiological risk factors</i>				
Mother born outside the U.S.		C		
Maternal rubella during pregnancy		C	S	

Notes:

S = This criterion alone is sufficient to report a case

\*O = For congenital rubella syndrome, at least two of the clinical “O” criteria are required to report a case. For a case to be classified as “probable,” a minimum of either two clinical findings from Category A or one clinical finding from Category A and one clinical finding from category B must be present.

C = This finding corroborates (i.e., supports) the diagnosis of—or is associated with— Congenital rubella syndrome, but is not required for reporting.

## Case Definition

### Rubella (2013)

*Suspected:* Any generalized rash illness of acute onset that does not meet the criteria for probable or confirmed rubella, or any other illness.

*Probable:* In the absence of a more likely diagnosis, an illness characterized by all of the following:

- acute onset of generalized maculopapular rash; **and**
- temperature greater than 99.0°F or 37.2°C, if measured; **and**
- arthralgia, arthritis, lymphadenopathy, or conjunctivitis; **and**
- lack of epidemiologic linkage to a laboratory-confirmed case of rubella; **and**
- non-contributory or no serologic or virologic testing.

*Confirmed:*

- A case with or without symptoms who has laboratory evidence of rubella infection confirmed by one or more of the following laboratory tests:
  - isolation of rubella virus; **or**
  - detection of rubella-virus specific nucleic acid by polymerase chain reaction; **or**
  - IgG seroconversion\*or a significant rise between acute and convalescent phase titers in serum rubella IgG antibody level by any standard serologic assay; **or**
  - positive serologic test for rubella IgM antibody\*

**OR**

- An illness characterized by all of the following:
  - acute onset of generalized maculopapular rash; **and**

- temperature greater than 99.0°F or 37.2°C; **and**
- arthralgia, arthritis, lymphadenopathy, or conjunctivitis; **and**
- epidemiologic linkage to a laboratory-confirmed case of rubella.
- Not explained by MMR vaccination during the previous 6–45 days.

\*Not otherwise ruled out by more specific testing in a public health laboratory.

## **Epidemiologic Classification of Internationally-Imported and U.S.-Acquired**

***Internationally imported case:*** An internationally imported case is defined as a case in which rubella results from exposure to rubella virus outside the U.S. as evidenced by at least some of the exposure period (12–23 days before rash onset) occurring outside the U.S., and the onset of rash within 23 days of entering the U.S. and no known exposure to rubella in the U.S. during that time. All other cases are considered U.S.-acquired cases.

***U.S.-acquired case:*** A U.S.-acquired case is defined as a case in which the patient had not been outside the United States during the 23 days before rash onset, or was known to have been exposed to rubella within the U.S. These cases are sub-classified into four mutually exclusive groups:

- **Import-linked case:** Any case in a chain of transmission that is epidemiologically linked to an internationally imported case.
- **Imported-virus case:** A case for which an epidemiologic link to an internationally imported case was not identified, but for which viral genetic evidence indicates an imported rubella genotype, e.g., a genotype that is not occurring within the U.S. in a pattern indicative of endemic transmission. An endemic genotype is the genotype of any rubella virus that occurs in an endemic chain of transmission (e.g., lasting ≥12 months). Any genotype that is found repeatedly in U.S.-acquired cases should be thoroughly investigated as a potential endemic genotype, especially if the cases are closely related in time or location.
- **Endemic case:** A case for which epidemiological or virological evidence indicates an endemic chain of transmission. Endemic transmission is defined as a chain of rubella virus transmission continuous for ≥12 months within the U.S.
- **Unknown source case:** A case for which an epidemiological or virological link to importation, or to endemic transmission within the U.S., cannot be established after a thorough investigation. These cases must be carefully assessed epidemiologically to assure that they do not represent a sustained U.S.-acquired chain of transmission or an endemic chain of transmission within the U.S.

***Note:*** Internationally imported, import-linked, and imported-virus cases are considered collectively to be import-associated cases. States may also choose to classify cases as “out-of-state-imported” when imported from another state in the U.S. For national reporting, however, cases will be classified as either internationally imported or U.S.-acquired.

***Comments:*** Serum rubella IgM test results that are false positives have been reported in persons with other viral infections (i.e., acute infection with Epstein-Barr virus [infectious mononucleosis], recent cytomegalovirus infection, and parvovirus infection) or in the presence

of rheumatoid factor. Patients who have laboratory evidence of recent measles infection are excluded.

**Table 3: Criteria for Classification of Rubella Cases (CSTE)**

Criterion	Case Definition		
	Confirmed	Probable	Suspected
<i>Clinical Evidence</i>			
Rash: generalized maculopapular		N	N
Fever >99.0°F (37.2°C)		N	N
Lymphadenopathy (cervical)		O	O
Arthralgia or arthritis		O	O
Conjunctivitis		O	O
Absence of a more likely diagnosis			N
<i>Laboratory Evidence</i>			
Culture rubella virus	S		
PCR, rubella-specific nucleic acid	S		
IgG seroconversion	S		
Significant rise in serum anti-rubella IgG antibodies	S		
Positive serologic test for rubella IgM antibody†*	S		
Noncontributory or no serologic or virologic testing			N
<i>Epidemiological Evidence</i>			
Epidemiologic linkage to a laboratory-confirmed case		N	A

**Notes:**

S = This criterion alone is Sufficient to classify a case.

N = All “N” criteria in the same column are Necessary to classify a case. A number following an “N” indicates that this criterion is only required for a specific disease/condition subtype (see below).

O = At least one of these “O” (Optional) criteria in each category (i.e., clinical evidence and laboratory evidence) in the same column—in conjunction with all “N” criteria in the same column—is required to classify a case.

A = This criterion must be absent (i.e., NOT present) for the case to meet the reporting criteria.

†Not explained by MMR vaccination during the previous 6–45 days.

\*Not otherwise ruled out by more specific testing in a public health laboratory.

**Rubella, Congenital Syndrome (2010)**

*Suspected Case:* An infant that does not meet the criteria for a probable or confirmed case, but who has one of more of the following clinical findings:

- cataracts or congenital glaucoma,
- congenital heart disease (most commonly patent ductus arteriosus or peripheral pulmonary artery stenosis),
- hearing impairment,
- pigmentary retinopathy
- purpura,
- hepatosplenomegaly,

- jaundice,
- microcephaly,
- developmental delay,
- meningoencephalitis, or
- radiolucent bone disease

*Probable Case:* An infant without an alternative etiology that does not have laboratory confirmation of rubella infection, but has at least two of the following:

- cataracts or congenital glaucoma,\*
- congenital heart disease (most commonly patent ductus arteriosus or peripheral pulmonary artery stenosis),
- hearing impairment, or
- pigmentary retinopathy;

**OR**

An infant without an alternative etiology that does not have laboratory confirmation of rubella infection, but has at least one or more of the following:

- cataracts or congenital glaucoma,\*
- congenital heart disease (most commonly patent ductus arteriosus or peripheral pulmonary artery stenosis),
- hearing impairment, or
- pigmentary retinopathy AND one or more of the following:
  - purpura,
  - hepatosplenomegaly,
  - jaundice,
  - microcephaly,
  - developmental delay,
  - meningoencephalitis, or
  - radiolucent bone disease.

*Confirmed Case:* An infant with at least one symptom (listed above) that is clinically consistent with congenital rubella syndrome; and laboratory evidence of congenital rubella infection as demonstrated by:

- isolation of rubella virus, or
- detection of rubella-specific immunoglobulin M (IgM) antibody, or
- infant rubella antibody level that persists at a higher level and for a longer period than expected from passive transfer of maternal antibody (i.e., rubella titer that does not drop at the expected rate of a twofold dilution per month), or
- a specimen that is PCR positive for rubella virus.

*Infection only:* An infant without any clinical symptoms or signs, but with laboratory evidence of infection as demonstrated by:

- isolation of rubella virus, or
- detection of rubella-specific immunoglobulin M (IgM) antibody, or
- infant rubella antibody level that persists at a higher level and for a longer period than expected from passive transfer of maternal antibody (i.e., rubella titer that does not drop at the expected rate of a twofold dilution per month), or
- a specimen that is PCR positive for rubella virus.

\*In probable cases, either or both of the eye-related findings (cataracts and congenital glaucoma) count as a single complication. In cases classified as infection only, if any compatible signs or symptoms (i.e., hearing loss) are identified later, the case is reclassified as confirmed.

### **Epidemiologic Classification of Internationally-Imported and U.S.-Acquired**

Congenital rubella syndrome cases will be classified epidemiologically as internationally imported or U.S.-acquired, according to the source of infection in the mother, using the definitions below, which parallel the classifications for rubella cases.

***Internationally imported case:*** To be classified as an internationally imported CRS case, the mother must have acquired rubella infection outside the U.S., or in the absence of documented rubella infection, the mother was outside the United States during the period when she may have had exposure to rubella that affected her pregnancy (from 21 days before conception through the first 24 weeks of pregnancy).

***U.S.-acquired case:*** A U.S.-acquired case is one in which the mother acquired rubella from an exposure in the United States. U.S.-acquired cases are sub-classified into four mutually exclusive groups:

- **Import-linked case:** Any case in a chain of transmission that is epidemiologically linked to an internationally imported case.
- **Import-virus case:** a case for which an epidemiologic link to an internationally imported case was not identified but for which viral genetic evidence indicates an imported rubella genotype, i.e., a genotype that is not occurring within the United States in a pattern indicative of endemic transmission. An endemic genotype is the genotype of any rubella virus that occurs in an endemic chain of transmission (i.e., lasting  $\geq 12$  months). Any genotype that is found repeatedly in U.S.-acquired cases should be thoroughly investigated as a potential endemic genotype, especially if the cases are closely related in time or location.
- **Endemic case:** a case for which epidemiological or virological evidence indicates an endemic chain of transmission. Endemic transmission is defined as a chain of rubella virus transmission continuous for  $\geq 12$  months within the United States.
- **Unknown source case:** a case for which an epidemiological or virological link to importation or to endemic transmission within the U.S. cannot be established after a thorough investigation. These cases must be carefully assessed epidemiologically to assure that they do not represent a sustained U.S.-acquired chain of transmission or an endemic chain of transmission within the U.S.

**Note:** Internationally imported, import-linked, and imported-virus cases are considered collectively to be import-associated cases.

States may also choose to classify cases as “out-of-state-imported” when imported from another state in the United States. For national reporting, however, cases will be classified as either internationally imported or U.S.-acquired.

**Table 4: Criteria for Classification of Congenital Rubella Syndrome Cases (CSTE)**

	Confirmed	*Probable	Suspected	Infection Only
<i>Clinical Presentation</i>				
Category A*				
Cataracts or congenital glaucoma	O	O	O	A
Congenital heart disease (patent ductus arteriosus or peripheral pulmonary stenosis are the most common)	O	O	O	A
Hearing impairment	O	O	O	A
Pigmentary retinopathy	O	O	O	A
Category B*				
Purpura	O	O	O	A
Hepatosplenomegaly	O	O	O	A
Jaundice	O	O	O	A
Microcephaly	O	O	O	A
Developmental delay	O	O	O	A
Meningoencephalitis	O	O	O	A
Radiolucent bone disease	O	O	O	A
<i>Laboratory findings</i>				
Rubella virus isolated from a clinical specimen	O			O
Rubella IgM test positive	O			O
PCR positive for Rubella virus	O			O
Persistently high Rubella antibody titer	O			O

**Notes:**

O = At least one of these “O” criteria in each category in the same column (i.e., clinical presentation and laboratory findings)—in conjunction with all other “N” criteria in the same column—is required to classify a case.

\*For a case to be classified as “probable,” a minimum of either two clinical findings from Category A or one clinical finding from Category A and one clinical finding from category B must be present.

A = This criterion must be absent (i.e., NOT present) for the case to meet the case definition.

C = This finding corroborates (i.e., supports) the diagnosis of—or is associated with— Congenital rubella syndrome, but is not included in the case definition.

## **Case Investigation Process**

All highly suspect cases of rubella warrant immediate action. Cases of rubella should be managed as follows:

- Local and state health departments should be immediately notified.
- Appropriate laboratory samples and preliminary clinical and epidemiologic information (including vaccine history and travel history) should be obtained.
- Strict isolation should be imposed until seven days after rash onset.
- All case contacts should be identified and appropriately managed (explained in detail below).
- The source of the exposure should be identified.

## **Outbreaks**

A single case of rubella is considered an outbreak. Identify all close contacts and define population groups at specific risk, and vaccinate them as needed. During an outbreak, children without evidence of immunity should be immunized or excluded from school for 23 days after onset of rash of the last case in the outbreak. Children with rubella may return to school or child care seven days after rash onset.

## **Identifying Case Contacts**

Close contacts are people who have the following contact with the case patient during the infectious period (seven days before, to seven days after, rash onset):

- Household and immediate family members (those who spend many hours together or sleep under the same roof);
- Those who have direct contact with respiratory secretions;
- Healthcare workers with face-to-face contact with a patient; and
- Those who share confined space during the communicable period. Such contacts may include:
  - Core groups of close friends, social contacts, boyfriends, girlfriends,
  - Students within the same kindergarten class or grade level,
  - Contacts at church activities and employment,
  - Participants in extracurricular activities (such as fieldtrips),
  - Children attending after-school care or a playgroup.

## **Case Contact Management**

- Assess immunity. One dose of rubella-containing vaccine (MMR), documentation of physician-diagnosed rubella, or birth before 1957 are considered proof of immunity. Because birth before 1957 does not guarantee immunity, healthcare facilities should recommend one dose of MMR vaccine for unvaccinated personnel born before 1957 who lack laboratory evidence of immunity or laboratory confirmation of disease.
- Assess pregnancy status.
- Vaccinate susceptible contacts.
- Work with susceptible pregnant contacts' physicians to determine if administration of IG is necessary.

**Disease Name Here:** Utah Public Health Disease Investigation Plan

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- Provide educational materials informing of exposure and recommending vaccination.
- Refer to the Isolation and Quarantine section of this document (page 8-9) for exclusion criteria for children/students and/or healthcare workers.

## ✓ REFERENCES

Centers for Disease Control and Prevention. *Epidemiology and Prevention of Vaccine-Preventable Diseases*. Hamborsky J, Kroger A., Wolf S, eds. 13th ed. Washington DC: Public Health Foundation, 2015.

Centers for Disease Control and Prevention. *Manual for the Surveillance of Vaccine-Preventable Diseases*. Roush S, McIntyre L, Baldy L, eds. 6th ed. Centers for Disease Control and Prevention, 2013.

Control of Communicable Diseases Manual (20<sup>th</sup> Edition), David L. Heymann MD, Ed., 2015.

Red Book: 2015 Report of the Committee on Infectious Diseases (30<sup>th</sup> Edition), American Academy of Pediatrics, Ed. 2015.

Massachusetts Department of Public Health, Guide to Surveillance, Reporting and Control, 2006.

Council for State and Territorial Epidemiologists, Position statements Rubella 2012.  
<http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/PS/12-ID-09FINAL.pdf>.

Council for State and Territorial Epidemiologists, Position statements Rubella 2009.  
<http://c.ymcdn.com/sites/www.cste.org/resource/resmgr/PS/09-ID-61.pdf>.

## ✓ VERSION CONTROL

Update. Aug 2015: General update to document formatting.

Update. Feb 26, 2016: Added importance to public health section.

Update. Feb 26, 2016: Added UT-NEDSS Minimum Required Fields.

Update. Mar 1, 2016: Reviewed CTSE guidelines; no updates needed to case definition, classification, or reporting.

Update. Mar 1, 2016: Update to incubation period and period of communicability.

Update. Mar 1, 2016: Reviewed clinical description and epidemiology.

Update. Mar 4, 2016: Added precautions and contraindications for immunization.

Update. Mar 4, 2016: Reviewed and updated public health control measures.

Update. Mar 4, 2016: Added vaccine storage and handling information.

Update. Mar 4, 2016: Update to references.

Update. Mar 4, 2016: Update to laboratory identification and methods.

Update. Mar 4, 2016: Reviewed case contact management and case investigation process; no updates needed.

Update. Dec 08, 2016: Verified case definition and references.

Update. September 12, 2018: Added Critical Clinician Information and Rules for Entering Laboratory Test Results sections.

Update. December 3, 2018: Updates to Critical Clinician Info and Disease and Epidemiology sections.

## ✓ UT-NEDSS MINIMUM/REQUIRED FIELDS BY TAB

### Demographic

- Birth Gender
- Age
- City
- County
- Date of Birth
- Ethnicity
- First Name
- Last Name
- Phone Number
- Race
- State
- Street
- Zip Code
- Street Number

### Clinical

- Clinician First Name
- Clinician Last Name
- Date Diagnosed
- Date of Death
- Diagnostic Facility (DF)
- DF City
- DF County
- DF State
- Died
- Disease
- Onset Date
- Rash Onset Date:
- Did the patient have lymphadenopathy?
- Did the patient have conjunctivitis?
- Did the patient have encephalitis?
- Arthralgia
- Arthritis
- Fever >37.2°C
- Fever ≥39°C
- Highest measured temperature during the illness?
- Lymphadenopathy, cervical
- Other complications
- Specify other complications
- Rash
- Rash duration
- Rash (maculopapular, generalized)

- Thrombocytopenia
- Is patient pregnant?
- Number of weeks of gestation at time of disease
- What is the transmission setting?
- What is the source of the infection?
- Is there documentation of serological immunity?
- Age of patient at time of immunity testing
- What was the IgM result?
- What is the collection date of the IgM specimen?
- What is the IgG result?
- What is the date of the acute specimen collection?
- What is the date of the convalescent specimen collection?
- Was a test done other than IgM or IgG?
- What other test method was performed?
- What was the other test method result?
- Epi-linkage to a confirmed or probable case
- Epi-linkage to a laboratory-confirmed case
- History of vaccination for the indicated disease?
- If vaccinated, how many doses has the patient received?
- If vaccinated, when was the date of the last vaccine?
- If patient was not vaccinated, why were they not vaccinated?
- Bone disease, radiolucent
- Cataracts
- Developmental delay
- Glaucoma, Congenital
- Hearing impairment
- Heart disease, congenital
- Hepatosplenomegaly
- Jaundice

- Meningoencephalitis
- Microcephaly
- Patent ductus arteriosus
- Pigmentary retinopathy
- Pulmonary stenosis, Peripheral
- Purpura
- History of maternal illness during pregnancy (Fever - Date of onset and duration; Rash—date of onset and duration)
- Maternal rubella immunization history

### **Laboratory**

- Collection date
- Organism
- Lab
- Result Value
- Test Result
- Test Type
- Units

### **Epidemiological**

- Imported from
- Other data 1
- Other data 2
- Name and location of daycare:
- Has case been excluded from daycare until 7 days after rash onset?
- Name and location of facility:
- Has case been excluded from the facility until 7 days after rash onset?
- Attends school
- Name and location of school:

- Has case been excluded from school until 7 days after rash onset?
- Country of Mother's birth
- Country of Child's birth
- Maternal Travel history during pregnancy
- Maternal contact to persons with a rash illness - if yes, please list dates
- Date 7 prior to onset:
- Date 7 days after onset:
- Does case have household contacts?
- Does case have workplace contacts?
- Name and location of workplace:
- Does case participate in any extra-curricular activities?
- Name and location of activity:

### **Investigation**

- NA

### **Contacts**

- NA

### **Reporting**

- Date first reported to public health

### **Administrative**

- LHD Investigation
- Outbreak Name
- State Case Status
- Outbreak-associated

## ✓ ELECTRONIC LABORATORY REPORTING PROCESSING RULES

The following rules describe how laboratory results reported to public health should be added to new or existing events in UT-NEDSS. These rules have been developed for the automated processing of electronic laboratory reports, although they apply to manual data entry, as well.

### Test-Specific Rules

*Test specific rules describe what test type and test result combinations are allowed to create new morbidity events in UT-NEDSS, and what test type and test result combinations are allowed to update existing events (morbidity or contact) in UT-NEDSS.*

Test Type	Test Result	Create a New Event	Update an Existing Event
IgG Antibody	Positive	No	Yes
	Negative	No	Yes
	Equivocal	No	Yes
IgM Antibody	Positive	Yes	Yes
	Negative	No	Yes
	Equivocal	Yes	Yes
PCR/amplification	Positive	Yes	Yes
	Negative	No	Yes
	Equivocal	Yes	Yes
Culture	Positive	Yes	Yes
	Negative	No	Yes

### Whitelist Rules

*Whitelist rules describe how long an existing event can have new laboratory data appended to it. If a laboratory result falls outside the whitelist rules for an existing event, it should not be added to that event, and should be evaluated to determine if a new event (CMR) should be created.*

**Rubella Morbidity Whitelist Rule:** Never a new case

**Rubella Contact Whitelist Rule:** If the specimen collection date of the laboratory result is 60 days or less after the event date of the contact event, the laboratory result should be added to the contact event.

### Graylist Rule

*We often receive laboratory results through ELR that cannot create cases, but can be useful if a case is created in the future. These laboratory results go to the graylist. The graylist rule describes how long an existing event can have an old laboratory result appended to it.*

**Rubella Graylist Rule:** If the specimen collection date of the laboratory result is 30 days before to seven days after the event date of the morbidity event, the laboratory result should be added to the morbidity event.

**Other Electronic Laboratory Processing Rules**

- If an existing event has a state case status of “not a case,” ELR will never add additional test results to that case. New labs will be evaluated to determine if a new CMR should be created.