CONTENTS

Introduction 5
Objectives 5
  Why CRS and rubella surveillance are treated separately 5
Types of surveillance 6
Case detection 6
  Definition of suspected case 6
  Case definition 6
Case reporting 7
  Nodal person 7
  Linkages with other surveillance programmes 7
Investigation of suspected case 8
  Case investigation form 8
  Unique ID 8
  Specimen collection 8
  Detection / isolation of virus 9
  Detection of antibodies 9
Laboratory testing 9
Case classification 10
Case management 12
Outbreak 12
  Definition 12
  Measures to be taken 12
  Public health response 12
Special considerations 13
  Retrospective review of medical records 13
  Serological survey of women of reproductive age 13
Data management 14
  Reporting requirements 14
  Unique case ID 14
  Recommended data elements 14
  Data analysis 15
Introduction
Rubella surveillance cannot capture every case of rubella since the disease is frequently mild or asymptomatic. Congenital rubella syndrome (CRS) is the most severe outcome of rubella and its prevention is the primary objective of rubella vaccination.

CRS surveillance allows for the detection of infants with clinically apparent manifestations and can be standardized for regional and global reporting, and for comparison. The early detection of infants with CRS is necessary to control the infection and prevent it from spreading further, as infants with CRS may shed the virus for a prolonged period (up to 1 year of age or longer). An immediate diagnosis of CRS also facilitates early intervention for specific defects.

Objectives
The key objective of CRS surveillance is to provide data in support of the pursuit of the national goals related to rubella vaccination, including monitoring progress to achieve and maintain elimination of the disease. The objectives are to:

- monitor the impact of the rubella vaccine on the reduction of the incidence of CRS;
- detect and isolate affected infants rapidly;
- mitigate the consequences of the disease for infants and their families through the early provision of appropriate medical care; and
- demonstrate the elimination of rubella and CRS.

Why CRS and rubella surveillance are treated separately
Both rubella and CRS are manifestations of infection with the rubella virus. However, though they are linked in terms of public health significance and as far as implications for vaccination are concerned, the surveillance systems for the two differ substantially in terms of:

- case definitions;
- age groups of interest; and
- sites of case detection.

All Member States in the South-East Asia Region should develop a CRS surveillance system that captures the majority of infants with suspected CRS within the country. If there is no surveillance in place, countries may opt to first establish CRS surveillance in a few sentinel sites, then add additional sites to cover a larger proportion of the population.
Types of surveillance

Minimal surveillance: The minimal surveillance recommended for CSR is case-based at sentinel sites, with laboratory confirmation in select health facilities. The main target age group for the surveillance is infants < 12 months of age.

As CRS is a combination of congenital abnormalities that may have other causes, the surveillance requires a high level of specificity. Thus, laboratory confirmation is critical.

Enhanced surveillance: In the case of enhanced surveillance, a national case-based surveillance system (passive, active or both), together with laboratory confirmation at health facilities, is recommended.

Case detection

Definition of suspected case
A health worker should suspect CRS in the case of an infant <12 months of age with:

- congenital heart disease (most commonly, patent ductus arteriosus or peripheral pulmonary artery stenosis); and/or
- suspicion of hearing impairment; and/or
- one or more of the listed eye signs –
  - white pupil (cataract);
  - larger eyeball (congenital glaucoma); or
  - loss of night vision and/or side vision.

A health worker may suspect CRS in any infant <12 months of age even without apparent signs of CRS, in case of maternal history of suspected or confirmed rubella infection during pregnancy.

Case definition
The mother may complain that her child does not react to loud sounds; does not seek out or detect the direction from which sound is coming; does not react to voices; has stopped babbling and trying to make sounds; or still babbles but is not progressing towards more understandable speech. The lens of the eye may be clouded at birth. There may be excessive tearing, or the child may not open his/her eyes in bright light, or may have a large, cloudy cornea (the normally clear front surface of the eye). The child’s vision at night or in low light may be decreased and there may be loss of side vision (tunnel vision). The mother may complain that her child is not growing at the normal pace. Besides, the child may suffer from heavy and fast breathing.
Case reporting

The most common type of surveillance for CRS is passive reporting from sentinel sites. The success of the programme depends on the selection of appropriate reporting sites. As the defects associated with CRS are most likely to be evaluated and treated at secondary and tertiary care facilities, it is these facilities that should be chosen as reporting sites or sentinel sites in the beginning of CRS surveillance. Some examples are:

- secondary care providers/facilities, particularly ophthalmologists, cardiologists, audiologists and neonatologists;
- tertiary care facilities, particularly those that provide paediatric surgical services for the eyes, ears and heart;
- speciality care centres (e.g. children's hospitals, and centres for hearing and blindness); and
- obstetric centres or private clinics providing care to pregnant women with rubella.

Nodal person

Since an infant with CRS is likely to be seen in any one of several specialities – for example, paediatrics, obstetrics, otorhinolaryngology, cardiology and ophthalmology – there is a need to have a nodal person who will be able to coordinate between these departments. The nodal person should:

- ensure the collection of the clinical and epidemiological data of the infants, as also the completion of case investigation forms;
- be responsible for the appropriate collection and transportation of specimens and ensure that laboratory data can be linked to clinical and epidemiological information;
- maintain a line list of suspected CRS cases in the assigned facilities;
- communicate regularly with the national coordinator on the identification and follow-up of suspected cases identified in the area.

The steps to be taken for the establishment of a CRS surveillance system are detailed in Annex 2. For more details, please refer to *Introducing rubella vaccine into national immunization programmes: a step-by-step guide.*

Linkages with other surveillance programmes

The World Health Organization Regional Office for South-East Asia created an online integrated surveillance database for newborn birth defects (SEAR-NBBD) in 2014, to support the management of data on birth defects detected at birth, in stillbirths and among

---

newborns in hospital settings. A network of hospitals with a high client load of childbirth has been set up in the countries in consultation with the Ministries of Health. The hospital staff has been trained in surveillance on birth defects and stillbirths. Suspected cases of CRS should be reported through this network and also, to this network.

Investigation of suspected case

Case investigation form

Suspected cases should be investigated within 48 hours of being reported. A case investigation form should be filled in following a clinical evaluation for CRS-related signs/symptoms by different specialities. A sample case investigation form is given in Annex 3.

For children between 6 and 11 months of age, it is important to record the history of the receipt of doses of the measles–rubella (MR) vaccine. This will help to understand laboratory results for the classification of cases.

Unique ID

Each suspected case should be assigned a unique case identification number (UID). The case number should begin with one or more three-letter combinations designating the geographical location, followed by the year and serial number of the case. All communications and forms related to the case should cite the UID.

For example:

CRS – suspected CRS case code
COU – country code
PRO – province code
DIS – district code
2022 – year of onset
001 – serial number of case in the province

The UID would be CRS-COU-PRO-DIS-22-001.

Specimen collection

Specimens should be collected for laboratory confirmation of all suspected cases.

Two types of biological specimens should be collected – one for the detection/isoaltion of the virus and the second for the detection of antibody levels.
Detection / isolation of virus

Nasopharyngeal swabs are the most preferred method of isolating the virus. A sample of urine (5–20 mL) is also collected frequently because of the ease of collection. However, contamination is a potential problem and decreases the specificity of virus isolation.

Other methods which are acceptable include throat swabs, nasal swabs, blood samples (1 mL) and cerebrospinal fluid samples (1 mL). Dried blood spots are an option in remote locations where the transport of serum sample is not possible maintaining a cold chain.

Detection of antibodies

A blood sample of approximately 1 mL should be drawn (0.5 mL from very small infants, or dried blood spots ≥ 3 fully filled circles are acceptable). This should be centrifuged to separate out the serum, which should then be stored under refrigeration, at 2–8 °C for up to 24 hours, or at 20–25°C for 6 hours.

Dried blood spots can be used when it is not possible to perform venepuncture, or if a cold chain or economical method to ship serum samples is not available.

For details of sample collection, storage and transport, refer to Annex 4.

Laboratory testing

A laboratory-confirmed case of congenital rubella infection (CRI) or syndrome in an infant meets one of the following criteria.

- For infants < 6 months of age: rubella IgM antibody is detected; and
- For infants between 6 and 12 months of age: rubella IgM and IgG antibody are detected, OR there is a sustained rubella IgG antibody level (determined on a minimum of two occasions at least one month apart in the absence of the receipt of rubella vaccine or exposure to wild-type rubella).

For infants of any age < 12 months, rubella virus is detected by viral culture OR polymer chain reaction (PCR) in an appropriate clinical sample (throat or nasal swabs, or blood, urine or cerebrospinal fluid specimens).

The following points should be noted in relation to laboratory testing.

- Serology results cannot be used to confirm CRS after a child with suspected CRS has received rubella-containing vaccine.
- Although IgM antibodies may persist for up to one year, about 50% of CRS cases are IgM-negative at 6 months of age, depending on the sensitivity of the test.
Since IgM may not be detectable in some infants tested shortly after birth, IgM-negative infants with suspected CRS should be retested at the age of 1 month or shortly thereafter.

- Laboratory confirmation of CRS in an infant older than 6 months of age should not rely on the IgM test alone if the IgM result is negative. In such cases, serial IgG testing should be conducted after at least one month to check if the level of IgG antibody is sustained over several months.

- Virus isolation techniques should be used to test if infants with congenital rubella are shedding rubella virus. Congenitally infected infants may shed and transmit rubella virus for up to 1 year of age and thus become a source of rubella outbreaks. Therefore, it is important to continue testing the infant for the virus throughout the first year of life so that infection control measures can continue until virus shedding stops. Whether viral shedding has ceased may be confirmed by two negative results of viral testing of specimens obtained 1 month apart from infants of at least 3 months of age.

- Genotyping may provide information on the source of the virus. In an endemic setting, genotype testing should be conducted at least once for every chain of rubella transmission.

### Case classification

The classification of CRS cases depends partly on the identification of the clinical signs mentioned under Group A or Group B in Table 2.1. These signs may be used to classify cases as follows.

**Clinically compatible CRS:** A suspected case where adequate specimen could not be collected and in whose case a qualified clinician detects at least two of the complications listed in Group A or one each from Groups A and B

**Laboratory-confirmed CRS:** A suspected case who has at least one sign from Group A and meets the laboratory criteria for the confirmation of CRS

**Congenital rubella infection:** An infant who has none of the clinical signs of CRS listed in Group A, but who meets the laboratory criteria for CRS

**Discarded:** A suspected case with an adequate specimen who does not meet the definition of a laboratory-confirmed case, or a suspected case who does not have an adequate laboratory specimen and does not meet the clinically compatible case definition
Table 2.1: Clinical signs of CRS

Clinical signs in Congenital Rubella Syndrome

- **Group A**
  1. Cataract
  2. Congenital glaucoma
  3. Congenital heart disease
  4. Hearing impairment
  5. Pigmentary Retinopathy

- **Group B**
  1. Purpura
  2. Splenomegaly
  3. Microcephaly
  4. Developmental delays
  5. Meningoencephalitis
  6. Radiolucent bone disease
  7. Jaundice that begins within 24 hours after birth

---

**Fig. 2.1. Classification of suspected cases < 6 months of age**

- Suspected CRS case
- >6 months
- Blood samples taken
  - IgM-ve
    - Within 1st month of life, and high suspicion of CRS
      - Follow-up test 1-2 months later
        - IgM-ve
          - Discarded
        - IgM-ve
          - Confirmed
      - IgM-ve
        - Presence of >1 defect from [A]
          - Only (CRI)
    - IgM-ve
      - Presence of <1 defect from [A]
        - Discarded

---

**Fig. 2.2. Classification of suspected cases 6 – 12 months of age**

- Suspected CRS Case
- >6 mths of age

- Blood sample not obtained
  - IgG-, IgM-/IgM+
    - Discarded
  - IgG-, IgM- from Gp A
    - IgG+ IgM -
      - No defect from Gp A
    - IgG+ IgM +
      - >1 defect from Gp A
      - IgG-IgM-/IgM+
        - Discarded

- Blood sample obtained
  - IgG+ IgM -
    - No defect from Gp A
  - IgG+ IgM +
    - >1 defect from Gp A
    - IgG-IgM-/IgM+
      - Discarded
Case management

Currently, no treatment is available for CRS beyond the clinical management of the related congenital abnormalities. The patient should be looked after and the follow-up done by experienced personnel, according to the national treatment guidelines.

Outbreak

Definition

The number of CRS cases generally increases six to eight months after an outbreak of rubella infection. The detection of an increase in CRS cases can be a sign of relatively wider circulation of rubella virus among the population, indicating the possible occurrence of a past or current rubella outbreak.

Measures to be taken

- CRS surveillance should be established or strengthened in maternity hospitals, paediatric hospitals and neonatal intensive care units, as well as among specialists who treat infants with cardiac, hearing or eye deficits.
- Hospitals located in the area where the outbreak is occurring should become sentinel sites, if not already so.
- If a passive surveillance system for CRS is in place, it should be enhanced with active case-finding in facilities located in the areas affected by the outbreak. This can help to identify infants who have CRS or CRI and are prolonging the outbreak by shedding live rubella virus. CRS surveillance should continue for a minimum of nine months after the last rubella case.
- If not already in place, a pregnancy registry should be established to document the pregnancy outcomes of infected and exposed women. The outcomes include miscarriages, fetal deaths, CRS cases, infants with CRI, and unaffected infants.

Public health response

- Infants with CRS or CRI should be considered infectious until two clinical specimens, obtained one month apart, are negative for rubella virus detection or viral isolation. Infection control procedures should be followed until this time.
  - Infants in hospitals should remain in isolation.
  - Persons involved in the care of infants should follow universal precautions.
  - The close contacts, family members and friends involved in the care or handling of such infants should either be immune or be immunized against rubella, in accordance with the national policy.
In areas where follow-up testing of confirmed CRS and CRI cases is not feasible, emphasis must be placed on ensuring that close contacts and health-care workers are vaccinated against rubella.

In health-care settings, contact precautions should be implemented for every CRS and CRI case detected.

Pregnant women should not be exposed to infants with CRS or CRI; if exposed, they should be tested for rubella.

An active search should be conducted in the community to detect more CRS cases, as well as to review the vaccination status of children in the locality. Children who are unimmunized or those whose immunization cards or records are not available should be vaccinated with measles- and rubella-containing vaccine, according to the national recommendation.

Contact tracing is recommended in the case of mothers of infants with CRS or CRI to identify the source of the rubella virus in the mother.

**Special considerations**

**Retrospective review of medical records**

- A retrospective review of the medical records of health institutes can be done annually to monitor the sensitivity of the CRS surveillance system.
- For countries unable to establish or maintain CRS surveillance, a retrospective review can help to identify CRS cases.
- A review of the medical records can aid in the estimation of the disease burden or provide the country with baseline data to measure the impact of the introduction of vaccines.
- A retrospective review can also be used in special circumstances, e.g. in countries with a small population believed to have achieved the elimination of CRS.
- A limitation of this approach is that retrospectively identified cases usually lack laboratory confirmation and, therefore, lack a definitive diagnosis.

**Serological survey of women of reproductive age**

- Serological assessments of rubella IgG antibody levels among women of reproductive-age, carried out in a survey setting, may help evaluate population immunity against rubella and protection against CRS in newborns.
- Rubella IgG can be acquired both through vaccination and natural infection; therefore, serosurveys are not purely a reflection of the coverage of vaccination. A serological survey is not a substitute for CRS surveillance, but can complement it.
Data management

Reporting requirements

- CRS cases should be reported separately from clinical rubella cases.
- The doctor should transmit the case notification form / set of core information to public health personnel.
- Once the case investigation is completed, the case-based data should be transferred from the local level to the higher administrative levels in the surveillance system (state level / national level).
- Each Member State of WHO is required to report in the Joint Reporting Form annually.
- CRS is currently not reportable under the International Health Regulations (IHR 2005).

Unique case ID

A unique case identification number should be assigned to each suspected case, as explained earlier.

Recommended data elements

- Demographic information
  - Child
  - Mother
- Reporting information
- Clinical observations
  - Whether health-care worker suspects CRS
  - Signs and symptoms
  - Outcome
- Laboratory methods and results
- Maternal history
- Classification

The sample case registration form for CRS in Annex 3 gives further details of the above.
Data analysis

- Final case counts by case classification, source of infection (endemic, imported/import-related, unknown), month/year and geographical area
- Incidence of CRS (number of cases per 1000 live births) by year
- Clinical characteristics (types of birth defects) and outcome
- Maternal characteristics, including age group, race/ethnicity, country of birth, location of exposure, vaccination status, gravida/para
- Number of cases with maternal history of rubella-like illness in pregnancy (including during a month or week of gestation; whether it was clinically compatible or laboratory-confirmed; and whether the woman was included in a pregnancy registry)
- Proportion of cases clustered or associated with a rubella outbreak
- Spot maps of confirmed CRS cases by year
- Age of CRS case at time of diagnosis (< 1 month, 1–5 months, 6–11 months, ≥ 12 months)
- Number of infants with follow-up samples to confirm clearance of virus
- CRS surveillance data should be triangulated with rubella surveillance data because after a rubella outbreak among women of childbearing age, the number of CRS cases may increase in that particular area in the following months, usually 6–8 months later.
- CRS surveillance systems should be evaluated annually to assess the completeness of reporting at surveillance sites. The evaluation should include a review of hospital records to identify any missed cases. These can be identified by comparing the list of reported cases with that of all cases matching the definition of a suspected case.
- Data gathered from evaluations of the CRS surveillance system should be included in the National Verification Committee’s reports for measles/rubella/CRS.
### Table 2.2: Using data for decision-making

<table>
<thead>
<tr>
<th>Data</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detect CRS cases</td>
<td>and isolate infants with CRS to prevent further spread of rubella.</td>
</tr>
<tr>
<td>Document the burden of CRS</td>
<td>to build a case for the introduction of a vaccine in the immunization programme for infants.</td>
</tr>
<tr>
<td>Document the incidence of CRS after vaccine introduction</td>
<td>to monitor the impact of the introduction of the rubella vaccine on the incidence of CRS and identify areas that need strengthening.</td>
</tr>
<tr>
<td>Collect data on the epidemiology of CRS and burden of CRS on the population</td>
<td>and use to inform strategies for immunization against rubella, including addressing the immunity gaps among adolescents and young adults.</td>
</tr>
<tr>
<td>Determine risk factors for CRS, such as mothers who may have migrated from a country where the rubella vaccine has not been introduced or been recently introduced,</td>
<td>to take preventive measures.</td>
</tr>
<tr>
<td>Review data on CRS in conjunction with that on rubella surveillance</td>
<td>to demonstrate the status of achieving or maintaining rubella elimination goals.</td>
</tr>
</tbody>
</table>

### Monitoring indicators

The quality of CRS surveillance data should be evaluated at sentinel sites at least once every six months to assess the completeness of CRS reporting at the surveillance sites. This should include reviews of hospital records to identify any missed cases. The latter can be identified by comparing the list of reported CRS cases with that of all cases matching the definition of a suspected CRS case. The proportion of suspected cases that have been reported but not tested should be identified. The data gathered from evaluations of the CRS surveillance system should be included in the National Verification Committee's reports for measles/rubella/CRS.

Annex 5 presents a list of indicators that may be used for monitoring the performance of surveillance.
Public health measures

Public health measures to be followed for all sporadic cases of CRS are the same as those for CRS outbreaks.

- Infants with CRS and CRI shed live rubella virus for long periods (60% shed in the first four months of life) and can be highly infectious.
- They should be considered infectious until two clinical specimens, obtained one month apart, are negative for rubella virus detection/isolation after 3 months of age. Until this time, infection control procedures should be followed.
  - In hospitals, these infants should remain in isolation.
  - Persons caring for them should follow universal precautions.
  - Close contacts, family members and friends involved in the care or handling of such infants should be either immune or be immunized against rubella as per national policy.
- In areas where follow-up testing of confirmed CRS and CRI cases is not feasible, emphasis must be placed on ensuring that close contacts and health-care workers are vaccinated for rubella.
- In health-care settings, contact precautions should be implemented for every detected CRS and CRI case.
- Pregnant women should not be exposed to infants with CRS or CRI; if exposed, they should be tested for rubella.
- An active search should be conducted in the community for more CRS cases as well as to review the vaccination status of children in the locality. All children in the same locality who are found to be unimmunized or whose immunization cards or records are not available should be vaccinated with measles- and rubella-containing vaccine according to the national recommendation.
- Contact tracing is recommended among mothers of infants with CRS or CRI to identify the source of the rubella virus in the mother.
Annex 1: Disease epidemiology

Background

Rubella, also known as German measles, is a mild clinical illness that is caused by a virus and affects children and young adults. It usually causes low-grade fever and rash. However, infection during pregnancy, especially during the first trimester, can result in a miscarriage, fetal death or stillbirth, or the infant may be born with congenital malformations, known as congenital rubella syndrome. Rubella virus is a leading cause of vaccine-preventable birth defects. The risk of congenital infection and defects is the highest during the first 12 weeks of gestation and decreases thereafter; defects are rare if the infection occurs in the 20th week of gestation or later.

The common congenital defects caused by CRS include cataracts, congenital heart disease, hearing impairment and developmental delay. Infants with CRS often present with more than one of these signs, but may also present with a single defect, most commonly, hearing impairment.

Globally, the number of reported CRS cases increased from 302 in 2012 to 603 in 2020, primarily because of the initiation of CRS surveillance and reporting in several populous countries (Bangladesh, India, Indonesia and Pakistan) from 2012 onwards, and changes in reporting in Pakistan in 2020. The number of countries in the South-East Asia Region that reported CRS cases increased from two in 2002 to 10 in 2016. North Korea, Sri Lanka and Thailand report CRS cases as part of their national integrated disease surveillance programmes.

The South-East Asia Region has the highest burden of CRS cases. Cases are identified through sentinel site surveillance in eight countries (Bangladesh, since 2012; Indonesia and Nepal, 2014; Maldives, 2015; Bhutan, India, Myanmar and Timor-Leste, 2016). In addition, Bangladesh utilizes population-based CRS surveillance, for which all the reporting sites for vaccine-preventable disease surveillance also report CRS cases. CRS is associated with significant morbidity and mortality. The estimated mortality may range from 20–40%. Infants born with cardiac defects have the highest risk of mortality. The estimated mean incidence rate of CRS in the Region has been 121 per 100 000 live births (95% CI: 31–238) since 2010, and the total annual number of cases, 49 229 (95% CI: 11 204–96 976).
The goal of the Region is to achieve “measles and rubella elimination by 2023”. The elimination of rubella in two countries of the Region is estimated to have prevented 52,118 cases of CRS annually. In 2020, Maldives and Sri Lanka were verified to have eliminated rubella, and both sustained their rubella elimination status in 2021.

The facility-based surveillance for CRS in India revealed that about one-fifth of suspected CRS patients during 2016–2018 had evidence of laboratory-confirmed rubella infection, indicating continued transmission of rubella in the country. The estimated incidence of CRS in India varies according to the type of model used. In 2016–2018, it was estimated at 65.5 per 100,000 live births using the age-dependent force of infection model and 225.6 per 100,000 live births using the constant force of infection model. This translates into about 14,520–50,028 infants with CRS annually.

**Essential epidemiology**

For more information on the rubella virus, please refer to the Surveillance Guide for Measles and Rubella.

**Vaccines**

The rubella vaccine is a live attenuated strain. A single dose confers more than 95% long-lasting immunity, and probably lifelong protection, which is similar to that induced by natural infection. Rubella vaccines are available either in monovalent formulations (a vaccine directed at only one pathogen) or more commonly, in combination with other vaccines, such as vaccines against measles (MR), measles and mumps (MMR), or measles, mumps and varicella (MMRV).
Annex 2: Steps to establish CRS surveillance system

The following steps should be followed to establish CRS surveillance.

National CRS surveillance coordinators

It is necessary to have two national coordinators, one for epidemiology and the other for laboratories, to manage these components of the system.

The epidemiological coordinator plays the following roles:

- developing a protocol for CRS surveillance;
- developing the requisite training materials and conducting training on CRS surveillance;
- monitoring surveillance performance and the quality of data;
- ensuring that adequate specimens are collected and transported for laboratory testing;
- maintaining the CRS surveillance database;
- coordinating with laboratories to ensure linkage of laboratory and epidemiological data;
- coordinating activities with the country’s national measles and rubella elimination programme, including reporting to WHO; and
- providing feedback on CRS surveillance to the participating health-care providers and facilities and relevant public health authorities.

The laboratory coordinator plays the following roles:

- ensuring that there is adequate laboratory testing, that standard operating procedures and necessary accreditations are in place, and that there is an ongoing quality assurance programme;
- interpreting and reporting test results;
- monitoring the duration of shedding of the virus by CRS cases;
- coordinating with those engaged in epidemiological activities to ensure linkage of laboratory and epidemiological data; and
- providing laboratory-related training.

Identification of health-care facilities for reporting CRS

Criteria for identification

The CRS surveillance system should include facilities at which there is a likelihood of coming across infants with the most common defects associated with CRS – cataracts, heart defects or deafness, as well as those with a maternal history of rubella during pregnancy.
As these defects are the most likely to be evaluated and treated at secondary and tertiary care facilities, adequate sentinel surveillance for CRS can be conducted at these facilities, without including primary health-care providers and facilities in the CRS surveillance system.

The facilities/providers that are most likely to evaluate and treat infants with CRS are:

- secondary care providers, particularly ophthalmologists, cardiologists, audiologists and neonatologists;
- tertiary care facilities, particularly those that provide surgical services for the eyes, ears and heart;
- speciality care centres (e.g. children’s hospitals, centres for hearing and blindness); and
- obstetric centres or private clinics involved in the care of pregnant women with rubella.

Considering that an infant with CRS is likely to be seen in any of several specialities, there is a need for a nodal person who can coordinate between the various departments in each health facility.

The local surveillance coordinators at sentinel sites play the following roles:

- ensuring adherence to the national protocol and SOPs for CRS surveillance;
- assisting in the training of health-care providers and the staff of facilities, when necessary;
- ensuring the collection of clinical and epidemiological data and the completion of case investigation forms (Annex 3);
- ensuring the appropriate collection and transportation of specimens and ensuring that laboratory data can be linked to clinical and epidemiological information;
- maintaining a line list of suspected CRS cases in the assigned facilities;
- providing periodic feedback to health-care providers; and
- maintaining contact with the national coordinator regarding the identification and follow-up of suspected cases in the area.

Initial and refresher training for participating providers

- The providers from the sentinel facilities participating in CRS surveillance activities should be trained on an annual basis.
- The training should cover information on the clinical features of CRS, the evaluation of infants with suspected CRS, appropriate laboratory testing of suspected cases, follow-up of cases, the importance of completing case investigation forms, infection control measures to prevent the spread of rubella virus from infants with CRS, and the reporting of cases in a timely manner.
Initiation of surveillance activities

Reporting of suspected CRS cases should be initiated once the coordinator and participating sites have been identified and the participating providers have been trained in the SOPs for CRS surveillance.

Quality assessment and monitoring of surveillance

- Quality assessments of surveillance need to be conducted at the sentinel sites at least once in six months to assess the completeness of CRS surveillance. The sites-level coordinator can review hospital records to identify any missed cases.
- The list of reported CRS cases can be compared with that of all cases matching the criteria for a suspected CRS case to identify missed cases.
- The proportion of missed cases at a sentinel site can be assessed as the percentage of missed cases identified by the coordinator among all cases that meet the CRS surveillance inclusion criteria (total of both reported and unreported cases).
- The proportion of suspected CRS cases that have been reported but not tested by a laboratory can be assessed as the percentage of reported cases without laboratory testing among all reported suspected CRS cases (both tested and not tested).
- CRS surveillance case reports should be assessed for any missing variables. If the records are incomplete, the findings should be discussed with the providers at the site and the need for completeness of data and case reporting should be emphasized.

Analysis of CRS surveillance data

- The CRS surveillance data should be analysed on an annual basis or more frequently, if necessary. The epidemiological variables that should be assessed include:
  - the number of cases reported throughout the time frame assessed (e.g. a year);
  - status of case classification;
  - the geographical location of CRS cases within the country;
  - whether or not cases were clustered and/or associated with rubella outbreaks;
  - maternal characteristics (age, race/ethnicity, country of birth); and
  - the location of maternal exposure to rubella.
Expansion of CRS surveillance

- According to whichever is appropriate, attempts should be made to expand surveillance or include other sites.
- If the providers and facilities included in the surveillance system capture the majority of infants with suspected CRS within a country, the system can be considered adequate.
- In countries which have conducted limited pilot testing of CRS surveillance systems or in which assessments have shown that the CRS surveillance does not include the majority of infants in the country, the surveillance should be expanded to include more sites, with the ultimate goal of establishing sentinel site surveillance that captures the majority of infants in the country.

Feedback for stakeholders
Stakeholders involved in the CRS surveillance system need to be provided feedback, which should include information on the status of the epidemiology of CRS and any updates and recommendations for improvement.

Infection control measures
It is vital to institute infection control measures for infants with CRS since they may shed rubella virus for up to one year and have been the cause of rubella outbreaks.

- Only those who are immune to rubella should have contact with affected infants. Among the family members and friends, those involved in the care or handling of the infant should be immune to rubella.
- In the hospital, the infant should be in contact isolation. Those caring for the patient should wear a protective gown and gloves, and should be immunized against rubella.
Annex 3: Case investigation form

<table>
<thead>
<tr>
<th>UID</th>
<th>Country code/ province code/ district code/ year/ serial number of case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of notification</td>
<td>dd/mm/yyyy</td>
</tr>
<tr>
<td>Date of investigation</td>
<td>dd/mm/yyyy</td>
</tr>
<tr>
<td>Date of reporting</td>
<td>dd/mm/yyyy</td>
</tr>
</tbody>
</table>

**Demographic data**

<table>
<thead>
<tr>
<th>Name of child</th>
<th>Sex</th>
<th>Date of birth, if not available age in months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>dd/mm/yyyy</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>dd/mm/yyyy</td>
</tr>
<tr>
<td></td>
<td>Not known</td>
<td>dd/mm/yyyy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Address</th>
<th>State/province</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Town/village</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Place of delivery of infant</th>
<th>Mother’s name</th>
</tr>
</thead>
</table>

**Clinical information**

<table>
<thead>
<tr>
<th>Gestational age in weeks</th>
<th>Birth weight in grams</th>
</tr>
</thead>
</table>

**Group A (fill in all)**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Yes</th>
<th>No</th>
<th>Not known</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congenital heart disease (if yes, specify defect)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cataract</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congenital glaucoma</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pigmentary retinopathy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hearing impairment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Group B (fill in all)**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Yes</th>
<th>No</th>
<th>Not known</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpura</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microcephaly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningoencephalitis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jaundice</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Splenomegaly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development delays</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radiolucent bone disease</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Other abnormalities:
If yes, please describe:

<table>
<thead>
<tr>
<th>Name of physician who examined the infant</th>
<th>Address:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>House no.</td>
</tr>
<tr>
<td></td>
<td>Street</td>
</tr>
<tr>
<td></td>
<td>City/ town/ village</td>
</tr>
</tbody>
</table>
## Maternal history/ antenatal care

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Yes □</th>
<th>No □</th>
<th>Not known □</th>
<th>If yes, give dates</th>
<th>If yes, in which week of pregnancy</th>
<th>If yes, date of onset:</th>
<th>If yes, date of onset:</th>
<th>If yes, date of onset:</th>
<th>If yes, date of onset:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of previous pregnancies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaccinated against rubella</td>
<td>Yes  □</td>
<td>No □</td>
<td>Not known □</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubella-like illness during pregnancy</td>
<td>Yes  □</td>
<td>No □</td>
<td>Not known □</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maculopapular rash</td>
<td>Yes  □</td>
<td>No □</td>
<td>Not known □</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swollen lymph nodes</td>
<td>Yes  □</td>
<td>No □</td>
<td>Not known □</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arthralgia</td>
<td>Yes  □</td>
<td>No □</td>
<td>Not known □</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other complications</td>
<td>Yes  □</td>
<td>No □</td>
<td>Not known □</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rubella confirmed</td>
<td>Yes  □</td>
<td>No □</td>
<td>Not known □</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During pregnancy, was the woman exposed to anyone of any age with fever</td>
<td>Yes  □</td>
<td>No □</td>
<td>Not known □</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and maculopapular (not vesicular) rash?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Where?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did the woman travel during pregnancy?</td>
<td>Yes  □</td>
<td>No □</td>
<td>Not known □</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At how many weeks of pregnancy?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Laboratory investigations

<table>
<thead>
<tr>
<th>Specimen collected</th>
<th>Type of specimen collected</th>
<th>Serum</th>
<th>Nasopharyngeal/throat swab</th>
<th>Urine</th>
<th>Others (specify)</th>
<th>Date of specimen collection:</th>
<th>dd/mm/yyyy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not known</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specimen collected</th>
<th>Type of specimen collected</th>
<th>Serum</th>
<th>Nasopharyngeal/throat swab</th>
<th>Urine</th>
<th>Cerebrospinal fluid</th>
<th>Others (specify)</th>
<th>Date of specimen collection:</th>
<th>dd/mm/yyyy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not known</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date on which specimen was sent:</th>
<th></th>
<th>Date on which laboratory received specimen:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>dd/mm/yyyy</td>
<td></td>
<td>dd/mm/yyyy</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rubella IgM</th>
<th>Not tested</th>
<th>Positive</th>
<th>Negative</th>
<th>In process</th>
<th>Inconclusive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rubella IgG</th>
<th>Not needed</th>
<th>Positive</th>
<th>Negative</th>
<th>In process</th>
<th>Inconclusive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Second specimen

<table>
<thead>
<tr>
<th>Specimen collected</th>
<th>Type of specimen collected</th>
<th>Serum</th>
<th>Nasopharyngeal/throat swab</th>
<th>Urine</th>
<th>Cerebrospinal fluid</th>
<th>Others (specify)</th>
<th>Date of specimen collection:</th>
<th>dd/mm/yyyy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not known</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specimen collected</th>
<th>Type of specimen collected</th>
<th>Serum</th>
<th>Nasopharyngeal/throat swab</th>
<th>Urine</th>
<th>Cerebrospinal fluid</th>
<th>Others (specify)</th>
<th>Date of specimen collection:</th>
<th>dd/mm/yyyy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not known</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date on which specimen was sent:</th>
<th></th>
<th>Date on which laboratory received specimen:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>dd/mm/yyyy</td>
<td></td>
<td>dd/mm/yyyy</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rubella IgM</th>
<th>Not needed</th>
<th>Positive</th>
<th>Negative</th>
<th>In process</th>
<th>Inconclusive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rubella IgG</th>
<th>Not needed</th>
<th>Positive</th>
<th>Negative</th>
<th>In process</th>
<th>Inconclusive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sustained IgG levels*</th>
<th>Not tested</th>
<th>Yes</th>
<th>No</th>
<th>In process</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Genotype

<table>
<thead>
<tr>
<th>Date of first validated laboratory result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

### Final classification

<table>
<thead>
<tr>
<th>CRS</th>
<th>Discarded</th>
<th>If discarded, please specify.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Laboratory-confirmed</th>
<th>Clinically compatible</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Classification by origin</th>
<th>Endemic</th>
<th>Imported</th>
<th>Import-related</th>
<th>Not known</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date of final classification</th>
<th>dd/mm/yyyy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Investigator's name</th>
<th>Signature with date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

*Sustained IgG level on at least two occasions between 6 and 12 months of age

†PCR: polymerase chain reaction
Annex 4: Collection, storage and transport of specimens

Collection of specimens

It is necessary to collect two types of biological specimens – one for the detection/isolation of the virus and the second for the detection of antibody levels.

For detection/isolation of virus

- Nasopharyngeal swabs are the most preferred for the isolation of the virus.
- The other specimens which are also acceptable include:
  - throat swabs
  - nasal swabs
  - blood (1 mL)
  - urine (5–20 mL)
  - cerebrospinal fluid (1 mL)
  - dried blood spots (DBS) in remote locations where serum transport is not possible.

Nasopharyngeal swabs: Though these are ideal, it is relatively difficult to collect them.

- Only synthetic fibre swabs with plastic shafts should be used for collection. The use of calcium alginate swabs or swabs with wooden shafts should be avoided as they may contain substances that inactivate viruses and/or inhibit PCR testing.
- The nasopharyngeal swab has a flexible shaft. The patient’s head should be tilted back and the swab inserted into the nostril, parallel to the palate. The swab should come in contact with the mucosal surface. The throat swab is collected by swabbing the posterior pharynx, avoiding the tongue.
- The sample must be placed in a sterile tube that contains 2–3 mL of viral transport media (VTM) or phosphate-buffered saline. It is important to prevent the swabs from drying out.
- The throat and nasopharyngeal swabs may be refrigerated at 2–8 °C for up to 48 hours and shipped on ice/frozen ice packs.
- If arrangements for shipment cannot be made within this time frame, it is best to preserve the sample at -70 °C. After freezing at -70 °C, the samples are shipped on dry ice. Freeze/thaw cycles should be avoided.
- If facilities for storage at -70 °C are not available, the samples should be stored at -20 °C. Viral viability will be lost, but the integrity of the viral RNA may be maintained and detected by RT-PCR.
Urine

- A suitable sterile, leak-proof container should be used to collect the sample of urine.
- Whole urine samples may be shipped in sealed containers at 4 °C.
- If facilities for processing urine samples / centrifugation are available, the sample should be stored at 4–8 °C and centrifuged within 24 hours of collection. The sample must be centrifuged at 500 × g (approximately 1500 rpm) for 5–10 minutes, preferably at 4 °C and with the supernatant removed. Sterile VTM, tissue culture medium or phosphate-buffered saline must be added to the sediment to bring the final volume to 2 mL. If a pellet is not visible, all but 1 mL at the bottom of the centrifuge tube must be removed and mixed with an equal volume of VTM. The processed urine sample should be stored at 4 °C and shipped within 48 hours.
- Alternatively, the urine sample may be frozen at -70 °C in VTM and shipped on dry ice.
- If facilities for storage at -70 °C are not available, samples can be stored at -20 °C; viral viability will be lost, but the integrity of the viral RNA may be maintained and detected by RT-PCR.
- Regardless of the type of specimen collected, all specimens should arrive in the laboratory within five days of collection.

For detection of antibodies

- A 1 mL sample of blood should be taken. In the case of very small infants, 0.5 mL of blood or DBS (≥ 3 fully filled circles) is also acceptable.
- The sample should be centrifuged to separate out the serum, which should be stored at 2–8 °C for up to 24 hours, or 20–25 °C for 6 hours.
- Upon clotting (by spinning or letting it stand for 1 hour), the serum should be transferred to a sterile cryovial to avoid haemolysis.
- The serum should be stored at 4–8 °C until shipment, but not for longer than 7 days.
- When the serum samples are to be held for longer than 7 days, they should be frozen at -20 °C or below and transported to the testing laboratory on frozen icepacks. When they are to be stored for longer periods, they should be transported to the laboratory in cold chain. Repeated freezing and thawing can have detrimental effects on the stability of IgM antibodies.
- As a general rule, serum specimens should be shipped to the laboratory as soon as possible, and shipment should not be delayed for the collection of additional specimens.
Collection of blood for dried blood spots

Dried blood spots can be used when it is not possible to perform venepuncture, or if a cold chain or economical method to ship serum samples is not available.

- While venous blood can be collected for DBS, normally DBS are prepared using capillary blood.
- Blood should be collected by pricking a finger or the heel with a sterile lancet, preferably a single-use disposable lancet.
- Blood specimens that have been spotted on filter paper should be allowed to air dry completely.
- Individual cards should be wrapped in wax paper and placed in a sealable plastic bag with a desiccant pack.
- DBS should be stored at 4 °C until they can be shipped to the laboratory.
- It is acceptable to transport DBS at ambient temperatures of up to 42 °C if they are delivered to the laboratory within 3 days.
## Annex 5: Indicators of performance of CRS surveillance

<table>
<thead>
<tr>
<th>Surveillance attribute</th>
<th>Indicator</th>
<th>Target</th>
<th>Formula (numerator/denominator)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timeliness of reporting</td>
<td>Proportion of surveillance units reporting to the national level on time, even in the absence of cases</td>
<td>≥ 80%</td>
<td>(Number of designated reporting units reporting by deadline / number of designated reporting units) x 100</td>
<td>At each level, reports should be received on or before the requested date.</td>
</tr>
<tr>
<td>Completeness of reporting</td>
<td>Proportion of surveillance units submitting 12 monthly reports per year, even in the absence of cases (zero reporting)</td>
<td>≥ 80%</td>
<td>(Number of designated reporting units that submitted 12 reports in the last year / number of designated reporting units) x 100</td>
<td></td>
</tr>
<tr>
<td>Adequacy of investigation</td>
<td>Proportion of suspected cases investigated adequately within 48 hours of notification</td>
<td>≥ 80%</td>
<td>(Number of suspected cases for which an adequate investigation was initiated within 48 hours of notification / number of suspected cases) x 100</td>
<td>An adequate investigation of a CRS case includes the collection of the following data elements: name and/or UID, place of residence, date of birth, sex, date of reporting, date of investigation, date of specimen collection, clinical examinations for hearing impairment, cataract and congenital cardiac defects, and clinical outcome at the time of the investigation; mother’s history of rashes, travel and vaccination and her age.</td>
</tr>
<tr>
<td>Sensitivity of CRS surveillance</td>
<td>National annual rate of suspected CRS cases</td>
<td>≥ 1 per 10 000 live births</td>
<td>(Number of suspected cases / live births) x 10 000</td>
<td></td>
</tr>
<tr>
<td>Surveillance attribute</td>
<td>Indicator</td>
<td>Target</td>
<td>Formula (numerator/denominator)</td>
<td>Comments</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------</td>
<td>--------</td>
<td>---------------------------------</td>
<td>----------</td>
</tr>
</tbody>
</table>
| Adequacy of specimen collection and testing | Proportion of suspected cases with adequate specimens for detection of rubella infection collected and tested in a proficient laboratory | ≥ 80% | \[
\frac{\text{Number of suspected cases with an adequate specimen tested in a proficient laboratory}}{\text{number of suspected cases}} \times 100
\] | An adequate specimen is a blood sample of a volume of at least 0.5 mL obtained by venepuncture in a sterile tube. A proficient laboratory is one that is WHO-accredited or has established a recognized quality assurance programme with International Organization for Standards or Clinical Laboratory Improvement Amendments certification. |
| Adequacy of specimens for viral detection | Proportion of confirmed cases with adequate specimens tested for virus detection/isolation | ≥ 80% | \[
\frac{\text{Number of confirmed cases with an adequate specimen for viral detection that was tested in a proficient laboratory}}{\text{number of confirmed cases}} \times 100
\] | An adequate specimen is a throat swab, nasal swab, serum, urine, or clinical specimen based on the symptoms (e.g. cataracts and cerebrospinal fluid specimen). The specimen usually taken is a throat swab. |
| Completeness of monitoring for viral shedding | Proportion of confirmed CRS cases demonstrated to no longer be shedding virus | ≥ 80% | \[
\frac{\text{Number of confirmed CRS cases of the age of ≤ 12 months with at least 2 negative tests for virus detection and samples collected at least a month apart}}{\text{number of confirmed CRS cases of the age of ≤ 12 months}} \times 100
\] | This should include individuals found through active case search both in the numerator and denominator. |
| Timeliness of case detection | Proportion of CRS and CRI cases detected within 3 months of birth | ≥ 80% | \[
\frac{\text{Number of confirmed CRS or CRI cases detected within 3 months of birth}}{\text{number of confirmed CRS or CRI cases}} \times 100
\] | |
<table>
<thead>
<tr>
<th>Surveillance attribute</th>
<th>Indicator</th>
<th>Target</th>
<th>Formula (numerator/denominator)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timeliness of specimen transport</td>
<td>Proportion of specimens received at the laboratory within 5 days of collection</td>
<td>≥ 80%</td>
<td>(Number of specimens received by laboratory within 5 days of collection / number of specimens collected) x 100</td>
<td>This indicator applies only to public laboratories.</td>
</tr>
<tr>
<td>Timeliness of reporting laboratory results</td>
<td>Proportion of serological results reported by the laboratory within 4 days of obtaining specimen</td>
<td>≥ 80%</td>
<td>(Number of serological results reported within 4 days of receipt of specimen / number of specimens received by laboratory) x 100</td>
<td>This indicator applies only to public laboratories.</td>
</tr>
</tbody>
</table>
Further reading


CONTRIBUTION

The document was produced under the strategic guidance of the Regional Director, Dr. Poonam Khetrapal Singh; Director, Programme Management Dr. Pem Namgyal, and Director CDS Dr. Suman Rijal WHO SEARO.

The entire process was overseen by Dr. Sunil Bahl, Coordinator, COVAX, Immunization and Vaccines Development.

Dr. Sudhir Khanal, IVD/CDS WHO SEARO, lead the coordination and development of the technical document together with Dr. Sudhir Joshi, IVD/CDS WHO SEARO. WHO Consultant Dr. Lalit Kant played a crucial role in updating the technical content of the document.

This document also benefited from the expert input of all the participants of the Regional workshop to review progress towards measles-rubella and other priority VPD surveillance and outbreak preparedness and response in WHO South-East Asia Region from 13-16 June 2022 in Dhaka, which included National EPI Programme Managers and VPD Surveillance Officers from Member States, as well as a number of WHO country office staff, UNICEF, and other external collaborators.

WHO HQ staff: Dr. Anindya Bose and Dr. Heidi Soeters reviewed the draft surveillance standard document and provided technical inputs.

WHO-SEARO: Dr. Jayantha Liyanage, Dr. Sigrun Roesel, Dr. Emmanuel Njambe, Dr. Lucky Sangal, Dr. Pankaj Bhatnagar, Ms. Uttara Aggarwal, Mr. Sharifuzzaman, Dr. Rajendra Bohara, Dr. Ariful Islam, Dr. Tanbir Islam, Dr. Subramanya Balakuntlam Pattabhiramaiah, Dr. Ratnesh Murugan, Dr. Stephen Chacko, Dr. Paba Palihawadana, Dr. Aishath Thimna Latheef, Dr. Balwinder Chawla, Dr. Khaing Khaing Gy, Dr. Vinod Bura, Dr. Rahul Pradhan, Dr. Pasang Rai, Dr. Preshila Samaraweera, Ms Aree Moungsookjareoun, Dr. Sudath Peiries

UNICEF: Christopher Gregory provided inputs as well as coordinated inputs from UNICEF team to the various sections of the document.

US CDC: Dr. Ahmed Kasem, Dr. Michelle Morales provided inputs to the various sections of the document and coordinated inputs from various teams within US CDC.