This guideline was prepared by the Epidemiology Surveillance Program with
the contribution of the clinical laboratory of Rafic Hariri University Hospital for
the section related to laboratory investigation, and under the supervision of
the Director General of the Ministry of Public Health. It was prepared based
on WHO guidelines.

Tel: 01 - 614 194  
Fax: 01 - 610 920  
Hotline: 1214

This guideline is available on the website of the Ministry of Public Health:
www.moph.gov.lb - (→ prevention → surveillance)

Measles Surveillance Guideline
الدليل الوطني لرصد الحصبة

المقدمة


في إطار المبادرة الإقليمية للقضاء على فيروس الحصبة، تقوم وزارة الصحة العامة بتقديم تلقح الأطفال عبر التلقح الروتيني وحملات التلقح. تجمع خبراء من التلقح فوق عمر عدد هي ضمانة للتعليم. تختلف مبادرة للقضاء على الحصبة الكشف عن إيحالة ملحوظة بها للتعليم والتثقيب منها تلقية المخاطرين للحد من انتشار الفيروس. يقسم التلقح تعدد الأمراض الفيروسية المتورطة على الأراضي اللبنانية. ففي حين كان النطاق "D4" منتشرًا حاليًا 2003-2007، ظهر مخزون النطاق "D8" في 2013. أن البيانات التي تقدمها نظام ترصد الحصبة يساعد في توجيه الجهود الوطنية لللقاح الأطفال.

عد قراءة هذا الدليل، ستعزز على استراتيجيات ترصد حالات الحصبة. تعتبر أي حالة حمى مع ملحق يغطي طففي (macular) حالة مثيرة بها تتنقل التلقس والتثقيب الحذر.

تشير كل طب وموادца بصية تقوم بالإبلاغ عن حالات الحصبة. تشير مختبر مستشفى رفعت الحبري الذي ينتمي للبيروست المخبرية للحصبة بعد إغلاق المختبر المركزي للصحة العامة. تشير منظمة الصحة العالمية في مراجعات أن حالات الحصبة في مسح لتعزيز الشفاء القضاة على الحصبة.

كما تبدو قراءة بدأ تعداد هذا الدليل من قبل برنامج الرصد الوطني، وترجعه وطبيعته من قبل منظمة الصحة العالمية بدعم من الاتحاد الأوروبي بالإضافة إلى مفوضية الأمم المتحدة العليا للأمور الإنسانية.

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I. Background

A. Worldwide situation
Measles remains the leading cause of child mortality among vaccine preventable diseases, despite the availability of a safe, effective and relatively inexpensive vaccine for over 40 years.

Before 2001, the World Health Organization (WHO) estimated that more than 750,000 measles related deaths occurred annually among children worldwide.

Following the implementation of the Measles Initiative in 2001, WHO estimated a decrease of measles deaths by 78%, reaching 122,000 measles deaths globally in 2012.

B. Worldwide measles initiative
The measles initiative launched in 2001 by a collaborative effort of WHO, Unicef, and partners includes:
1. Strong routine immunization for children by their first birth day
2. A ‘second opportunity’ for measles immunization through mass vaccination campaigns, to ensure that all children receive at least one dose
3. Effective surveillance to quickly recognize and respond to measles outbreaks
4. Better treatment of measles cases, to include vitamin A supplements, antibiotics if needed, and supportive care that prevents complications.

In 2010, the World Health Assembly (WHA) endorsed the objective towards measles elimination and later towards measles eradication by achieving the following targets:
- Ensuring 90% immunization coverage nationally and 80% in all districts
- Reducing measles incidence to <5 cases per million inhabitants
- Reducing measles mortality by 95%.

Measles elimination refers to the absence of endemic measles cases for a period of twelve months or more, in the presence of adequate surveillance.

Measles eradication refers to the worldwide interruption of measles transmission in the presence of a surveillance system that has been verified to be well performing.

C. Measles situation in Lebanon
Lebanon has witnessed several measles outbreaks in the past years (Figure 1):
- The 1997-1998 outbreak in the North reported 980 measles cases and 3 deaths
- From 2003 to 2007, annual epidemic waves were observed with recurring outbreaks every 2 years in North-Lebanon
- In 2013, a national outbreak occurred with 1700 cases and 4 deaths.

Figure (1): Reported measles cases by year, Lebanon, 1997-2014

Source: Lebanon, MOPH, Esumoh, 2014
D. Objectives and target audience for this guideline

This guideline aims to provide health professionals as well as the MOPH staff an easy tool to be active partners in the national measles surveillance system and in the worldwide measles elimination initiative.

At the end of this guideline, our target audience will:
- Know the objectives of the measles surveillance
- Know the disease dynamics
- Know how to report cases
- Know how to investigate, collect specimen and classify cases
- Know how to analyze the data
- Know how to monitor surveillance indicators
- Be able to interact with various key players in the system.
II. The disease

A. Agent
Measles is a RNA virus belonging to the Morbillivirus genus of the Paramyxoviridae family. The virus is antigenically stable with no evidence of significant change over time. In addition, it is sensitive to ultraviolet light, heat and drying.

B. Reservoir
Humans are the only natural hosts of measles virus.

C. Mode of transmission
Transmission of measles virus is person-to-person via two modes:
- Respiratory droplets transmission to mucous membranes of the upper respiratory tract and conjunctiva
- Airborne transmission in closed areas is also possible.

D. Incubation
The incubation period is on average 10 days (with a range of 7-18 days and rarely as long as 21 days) from virus infection to rash onset (Figure 2).

E. Communicability
Measles can be transmitted from four days before rash onset to four days after rash onset. Infectivity is greatest three days before rash onset (Figure 2).
F. Serological response to natural measles virus infection
Following primary infection with measles virus, measles specific antibodies appear in the blood after rash onset:
- IgM peaks one week after rash onset and is rarely detectable six weeks after rash onset.
- IgG peaks two weeks after rash onset and is detectable for years after infection.

G. Clinical features
Following exposure, measles virus infects the nasopharyngeal epithelium and extends to cells of the reticulo-endothelial tissues. Viraemia peaks towards the end of the incubation period, when the patient develops prodromal symptoms of high fever, cough, coryza (runny nose) and conjunctivitis.

Three to four days after the prodromal phase, the maculopapular rash appears, often with fever peaking at 39-40°C, spreads from the face and neck to the trunk and extremities, and fades three to four days later. At rash onset, Koplik’s spots may be seen in the oral mucosa.
Patients normally improve by the third day of rash, and are fully recovered seven to ten days from rash onset.

Modified forms of measles, with generally mild symptoms, may occur in infants who still have partial protection from maternal antibody, and occasionally in persons who only received partial protection from the vaccine.

H. Differential diagnosis
Many illnesses are accompanied by fever, rash, and a variety of non-specific symptoms.
The main differential diagnoses are: rubella, scarlet fever, roseola, dengue fever...
Other conditions may present in similar forms: erythmea infectosium, enterovirus, adenovirus, Kawasaki’s disease, toxic shock syndrome, rickettsial disease, drug hypersensitivity reactions...

I. Complications
Approximately 10% of reported cases of measles in developed countries involve one or more complications. The risk of serious measles complications is higher in infants, adults, malnourished persons, and immuno-compromised persons.

1) Short-term complications
a) Pneumonia is the most common complication associated with the measles-related deaths. It may be due to the measles virus, or to secondary infection with adenoviruses or bacterial organisms, in particular Staphylococcus aureus. Pneumonia occurs in 5-10% of measles cases among children less than 5 years old.

b) Diarrhea may develop during and following acute measles illness. It can cause dehydration and death in childhood.

c) Otitis media occurs 5-15% among children under 5 years old.
d) Laryngo-tracheobronchitis is reported in 32% of hospitalized children in the United States. Bacterial pathogens, particularly Staphylococcus aureus were isolated in up to 50% of the cases.

e) Neurological complications such as post infectious encephalomyelitis occur few days after rash onset in 1 to 3 every 1000 infected persons, especially in adolescents and adults. Febrile seizures are common manifestations. Around 25% of the patients die and 25% have lifelong neurological sequelae (severe mental retardation, motor impairment, and blindness…)

f) Blindness is a very common complication in areas known to be at risk of vitamin A deficiency.

2) Long -term complications
Sub-acute sclerosing panencephalitis (SSPE) is a rare chronic, degenerative neurological disorder associated with the persistence of the measles virus in the central nervous system. It may develop approximately seven years after measles infection. The incidence is approximately 1 per 100000 measles cases.

J. Case fatality
The measles case fatality rate (CFR) in Lebanon is 2 per 1000 reported cases, based on previous outbreaks (1997-1998, 2013). It is estimated to be around 1 per 1000 reported cases in industrialized countries, and 3-6% in developing countries. In high-risk populations, case-fatality rates for infants under 1 year may reach 20% to 30%.

These rates underestimate the true lethality of measles because of incomplete reporting of measles illness, miscoded hospital records or death certificates.
Factors leading to these observed high case-fatality rates are: young age, crowding, underlying immunodeficiency, vitamin A deficiency, and lack of access to medical care.

**K. Treatment**
There is currently no specific treatment for measles infection. WHO recommends the administration of vitamin A to children with measles as it has shown to decrease both the severity of the disease and the case-fatality rate. Symptomatic and specific treatments are indicated for measles complications, such as diarrhea, pneumonia and otitis media...

**Figure (3): Measles pictures**
(a) Maculo-papular rash  (b) Maculo-papular rash  (c) Koplik’s spots on buccal mucosa

Sources: CDC website & WHO Measles Elimination Field Guide, 2005
III. Measles vaccines

The current used vaccine is an-attenuated live measles vaccine. Two main vaccine strains are used: the Moraten strain and the Schwartz strain. In Lebanon, Schwartz strain is used. The measles-containing vaccines (MCV) are available in two forms:

- Monovalent: Measles
- Combined: Measles/Rubella (MR) or Measles/Mumps/Rubella (MMR), given after 1 year of age.

A. Immunity due to vaccine

Vaccine efficacy is estimated as the percentage reduction in disease incidence attributable to immunization. For measles, vaccine efficacy is age-dependent due to the interference with maternal antibodies that pass from mother to child in-utero and protect the child for the first few months of life (5-9 months).

Measles vaccine efficacy is:
- At 6 months of age: around 50%
- At 9 months of age: 80%
- At 12 months and above: ≥ 90%.

Measles vaccine efficacy can be enhanced by providing two doses of MCV. For instance, providing two doses of MCV increases the proportion of immunized persons to 98% whereas it is only 80% with one dose at 9 months (Figure 4). For measles elimination purpose, two doses are needed in order to ensure 95% population immunity.

The peak antibody response occurs six to eight weeks after vaccination. Immunity conferred by vaccination against measles has been shown to persist for at least 20 years and is thought to be lifelong.
As a result, persons susceptible to measles are:
- The non-vaccinated
- Or the vaccinated without acquiring immunity.

B. Vaccination in Lebanon
Measles monovalent vaccine was included in the official routine vaccination calendar in 1987. The MMR was included in 1996.

The current public vaccination calendar includes 3 doses of measles for children:
- Measles at 9 months
- MMR dose at 12 months
- MMR dose at 18 months (replacing the dose at 4-5 years).
In addition to the routine vaccination, national catch-up campaigns against measles were conducted in 2001, 2008 and 2013. Those campaigns aim to enhance vaccination coverage and reduce the accumulation of susceptibles.

C. Contraindications
The main contraindications for measles vaccine are:
- Severe allergic reaction (anaphylaxis) to a previous dose of MMR or its components
- Anaphylactic reaction to neomycin or gelatin-containing products
- Severe immune-suppression caused by HIV infection or another condition
- Pregnancy.

D. Adverse reactions following measles vaccination
The main adverse reactions following measles vaccine are:
- Minor reactions such as pain at injection site
- Low-grade fever and generalized rash that may appear 7-12 days after vaccination
- Systemic reactions such as anaphylaxis that are rare and occur mainly among people who have never been vaccinated
- Allergic reactions to streptomycin, polymyxin B and neomycin that may occur in persons sensitive to these antibiotics.

E. Vaccine cold chain
Measles vaccine should be stored at 2-8°C. Administration of improperly stored vaccine may fail to provide protection against the disease.
IV. Measles surveillance

“Surveillance is a continuous and systematic collection of data related to health events, their verification, investigation, compiling, analysis and interpretation, and the dissemination of the information to those who need to know in order to reduce mortality and morbidity and enhance the health status of the population” (WHO).

Acquired rubella is integrated within measles surveillance, as the clinical picture is similar.

A. Objectives of measles surveillance
Measles surveillance aims to:
- Measure disease burden: measure the incidence, describe cases’ profiles, identify high-risk populations
- Detect and investigate outbreaks: identify the source (local or imported), the cause (failure to vaccinate, vaccine failure, or accumulation of susceptible persons), document the transmission sustainability (following importation)
- Identify the genotypic diversity of circulating viral strains and identify imported strains
- Predict next outbreaks based on susceptibility profile
- Monitor progress towards achieving disease elimination goals
- Monitor surveillance indicators in order to identify areas where it is necessary to strengthen surveillance
- And provide evidence that the absence of reported cases is attributable to the absence of disease rather than to inadequate detection and reporting.

B. Measles case definitions
Measles cases are classified according to laboratory and epidemiological investigation.
1) Before investigation: suspected measles case

At clinical presentation, a suspected measles case is defined as below [Annex 1]:
- A patient with maculo-papular rash (i.e. non-vesicular) and fever
- Or a patient for whom the physician is suspecting measles.

This case definition is also adopted for suspected rubella case.

2) After investigation

Based on the epidemiological and laboratory investigation, measles cases are classified as below [Annex 1]:

2.1) Laboratory-confirmed case

A laboratory-confirmed case is a suspected case of measles with positive measles IgM and/or positive RT-PCR result.

2.2) Epidemiologically-confirmed case

An epidemiologically-confirmed case is a suspected case of measles with:
- No laboratory confirmation
- And linked epidemiologically to a laboratory-confirmed case. The epidemiological linkage is defined as direct contact with another laboratory confirmed measles case or another epidemiologically-linked case within the last 28 days.

2.3) Clinically-confirmed case

A clinically-confirmed case is a suspected case of measles with:
- No laboratory confirmation or equivocal laboratory results
- And without any epidemiological linkage to confirmed cases.

2.4) Discarded case

A discarded case is a suspected case of measles that has been investigated and discarded as non-measles and
non-rubella case based on IgM serology or RT-PCR testing. As rubella is integrated within measles surveillance, suspected cases are tested for both measles and rubella.

2.5) Vaccine-associated measles case
A vaccine-associated measles case is a suspected case of measles that meets all the following 5 criteria:
- Presence of rash illness, with or without fever, without cough or other respiratory symptoms related to the rash
- Rash onset 7–14 days after vaccination with a measles-containing vaccine
- Positive result for measles IgM testing in specimen collected 8–56 days after vaccination
- Absence of secondary cases based on thorough field investigation
- Absence of other causes based on field and laboratory investigations.

2.6) Endemic case
An endemic case is a confirmed measles case (laboratory, epidemiologically, or clinically-confirmed) resulting from endemic transmission of measles virus.

2.7) Imported case
An imported case is a confirmed measles case (laboratory, epidemiologically, or clinically-confirmed) with epidemiological and/or virologic evidence of exposure outside the region or country during the 7–21 days prior to rash onset.

2.8) Case related to importation
A case related to importation is a confirmed measles case (laboratory, epidemiologically, or clinically-confirmed) that is:
- Resulting from locally acquired infection
- And occurring as part of a chain of transmission originated by an imported case as supported by epidemiological and/or virological evidence.
If transmission of measles cases related to importation persists for ≥12 months, cases are no longer considered to be import-related, they are considered to be endemic.

2.9) Chain of transmission
A chain of transmission includes at least two confirmed cases that are:
- Epidemiologically-linked
- And/or virologically-linked
At least one of those cases has to be laboratory-confirmed.

2.10) Measles outbreak
An outbreak of measles is defined as a chain of transmission with three or more confirmed cases.

2.11) Measles-related death
A measles-related death is a death in confirmed measles case (laboratory, epidemiologically, or clinically-confirmed) in which
- Death occurs within 30 days of rash onset
- And is not due to another etiology, e.g., a trauma or chronic disease.

Usually, measles-related death occurs following measles complications such as pneumonia, diarrhea with dehydration, and encephalitis.

C. Case notification
Suspected measles case is notified to the Epidemiological Surveillance Program (Esumoh) at the Lebanese Ministry of Public Health (MOPH) through various channels:
1. Classical surveillance
2. Hospital weekly zero-reporting
3. Hospital active surveillance
4. Medical centers and dispensary-based weekly reporting
5. Ambulatory sentinel surveillance for private physicians
6. School absenteeism surveillance system.
1) Classical surveillance system
The Law on communicable diseases issued on the 31st December 1957 requires physicians to report to MOPH on a list of notifiable communicable diseases. Since 2001, measles is included among the immediately notifiable diseases for immediate case investigation.

Physicians and health structures report to MOPH by filling an individual-reporting form [Annex 2], or a specific measles/rubella case-based form [Annex 3]. It is recommended to use the specific measles/rubella case-based form as it provides specific information for case investigation. Filled forms are sent to MOPH (caza, mohafaza or central level) by fax or mail. Upon reception by Esumoh, cases are immediately investigated and recorded in the national measles/rubella database. Contact details of MOPH/Esumoh teams are find in Annex 17.

2) Hospital weekly-zero reporting
The MOPH decision no. 1162/2 dated on the 5th December 2001 requests from all public and private hospitals to zero-report on weekly basis to the MOPH. The target events for zero-reporting are all immediately communicable notifiable diseases including measles.

The zero-reporting relies on the designation of a focal person appointed by the hospital. The terms of reference of the focal person are:
- Raising awareness of hospital staff on timely reporting
- Searching for cases with the target diseases
- Filling the zero-reporting form and sending it to MOPH/Esumoh caza team [Annex 4]
- Coordinating with MOPH/Esumoh caza team for case investigation
The reporting is done on weekly basis. In Beirut, hospitals report directly to the central level. At MOPH/Esumoh caza level, the forms are received and verified. If cases are mentioned, investigation is launched. Forms are entered in a specific database able to compute completeness and timeliness.

3) Active surveillance
The revised MOPH decision no. 549/2 dated on the 15th June 2006 requests from MOPH/Esumoh caza teams to conduct weekly active surveillance in selected public and private hospitals.

Not all hospitals are included in the active surveillance. In each caza, 2 hospitals are selected based on their activity. If the caza population exceeds 100000 inhabitants at least 3 hospitals are selected.

The MOPH circular no.61 dated on the 3rd July 2014 specifies the target events for active surveillance: acute flaccid paralysis/acute poliomyelitis, meningitis, measles/rubella, and cholera.

A MOPH officer (MD, nurse, epidemiologist) conducts the weekly active surveillance in the selected hospitals with the following terms of reference:
- Visiting hospital wards (pediatric, internal medicine, Intensive Care Unit)
- Meeting with the hospital staff and raising awareness on timely reporting
- Checking admission registries (hard copy or database)
- Searching for target International Classification of Diseases-10th revision (ICD-10) codes if used
- Checking the medical files if needed
- Initiating investigation if needed.
- Documenting the visit using a specific form [Annex 5].
Table (2): Codes for measles and rubella

<table>
<thead>
<tr>
<th>Disease</th>
<th>ICD-10</th>
<th>ICD-9</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measles</td>
<td>B05</td>
<td>055</td>
</tr>
<tr>
<td>Rubella</td>
<td>B06</td>
<td>056</td>
</tr>
</tbody>
</table>

Source: WHO/ICD-9, WHO/ICD-10

The forms are entered in a specific database and completeness of field visits is monitored.

4) Medical center and dispensary-based surveillance system
The system was initiated in 2006 in the 3 mohafazas (Bekaa, South and Nabatieh) in addition to Baabda caza, and was generalized in 2009. The revised MOPH decision no. 529/1 dated on 10th March 2014 requests medical centers, dispensaries and field medical units to report to MOPH on weekly basis.

The health unit designates a contact person with the following terms of reference:
- Maintaining and updating the consultation logbook
- Searching for cases among the outpatients
- Filling the weekly aggregated-based form and sending it to MOPH/Esomoh caza level
- Filling the individual-based form if needed
- Coordinating with MOPH for case investigation.

The reporting form is aggregated-based and indicates the number of patients consulted for target health events, including measles [Annex 6]. If a measles case is encountered, the health unit notifies the case in the weekly form in addition to the measles case-based form [Annex 3].
Upon reception of weekly forms, the MOPH/Esumoh caza team verifies the content and initiates the investigation when measles is reported. The weekly forms are entered in specific database which enables generating and monitoring needed outputs and indicators.

5) Ambulatory sentinel surveillance system
In 2009, the ambulatory sentinel surveillance system was initiated with 100 volunteering physicians (pediatricians, internals and family medicine Drs, GPs) distributed all over Lebanon. Not all physicians are included.

On weekly basis, physicians report using a specific form on a maximum of 10 target diseases or syndromes, including measles [Annex 7].

Forms are received at the Esumoh central level where they are verified and entered. Investigation is initiated if measles is notified.

6) School-based surveillance system
Initiated in 2009-2010, schools became part of the national epidemiological surveillance program. The revised joint circular of the Ministry of Education High Education (MEHE) no. 139 and MOPH no. 83 issued on the 6th September 2013 requests from schools of both public and private sectors to report to MOPH.

At school level, a focal person is designated with the following terms of reference:
- Collecting data on absenteeism
- Collecting data on received medical reports for school absenteeism
- Collecting data on health inspection
- Filling the weekly form and sending it to MOPH [Annex 8]
- Coordinating with MOPH and MEHE for investigation and response.
The weekly form is aggregated-based [Annex 8] and includes the number of received medical reports mentioning measles/rubella.

Upon reception at MOPH/Esumoh caza level, the forms are checked. Investigation is initiated if measles is reported. The forms are entered in specific application which enables generating automatic outputs and various indicators.
Table (3): Summary table on various components of surveillance system

<table>
<thead>
<tr>
<th>System</th>
<th>Data sources</th>
<th>Passive/active</th>
<th>Type of form</th>
<th>Frequency</th>
<th>Forms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classical surveillance</td>
<td>Physicians and health structures</td>
<td>Active for physicians &amp; health structures / Passive for MOPH</td>
<td>Individua-based</td>
<td>Immediately (measles) and weekly</td>
<td>Annex 2, Annex 3</td>
</tr>
<tr>
<td>Hospital zero-reporting</td>
<td>All hospitals</td>
<td>Active for hospitals / Passive for MOPH</td>
<td>Aggregated-based</td>
<td>Weekly</td>
<td>Annex 4</td>
</tr>
<tr>
<td>Hospital active surveillance</td>
<td>MOPH/officer visiting selected hospitals</td>
<td>Active for MOPH</td>
<td>Aggregated-based including line listing</td>
<td>Weekly</td>
<td>Annex 5</td>
</tr>
<tr>
<td>Medical center and dispensary-based</td>
<td>All medical centers &amp; dispensaries</td>
<td>Active for medical centers / Passive for MOPH</td>
<td>Aggregated-based</td>
<td>Weekly</td>
<td>Annex 6</td>
</tr>
<tr>
<td>Sentinel ambulatory network</td>
<td>Selected private physicians</td>
<td>Active for physicians / Passive for MOPH</td>
<td>Aggregated-based</td>
<td>Weekly</td>
<td>Annex 7</td>
</tr>
<tr>
<td>School-based</td>
<td>All schools</td>
<td>Active for schools/ Passive for MOPH</td>
<td>Aggregated-based</td>
<td>Weekly</td>
<td>Annex 8</td>
</tr>
</tbody>
</table>
D. Case investigation
Once a suspected case is detected, investigation is launched.

Case investigation aims to gather information and specimens that are necessary to:
- Document the case
- Confirm the disease
- Identify the underlying factors
- Identify the source and the secondary cases.

Case investigation includes:
- Getting a national identification number
- Collecting information
- Collecting specimens
- Performing case-classification.

1) National patient identification number
Each suspected measles/rubella case has a national identification number, allocated by MOPH/Esumoh central team where the national measles/rubella database is maintained and updated by the national measles/rubella surveillance coordinator. Cases are checked for potential duplication. The national patient identification number is provided by the central unit to MOPH/Esumoh caza and mohafaza teams.

The case ID is necessary to identify anonymously each case for epidemiological and laboratory investigation. The ID is as follows: Country Code–Year–Disease Code–Case count
Example: “LEB-2013–MR–5” is the 5th reported measles/rubella case in Lebanon in 2013.
2) Case investigation: Data collection
Clinical investigation aims to have answers for the following questions:
- Did the case meet the case definition of suspected measles?
- Did the case receive any MCV vaccine?
- What is the potential source of infection?
- Is there any time/space cluster of measles cases?

To answer these questions, data collection is done through two forms:
- The measles/rubella case-based reporting form
- The measles/rubella investigation form.

2.1) Measles/rubella case-based reporting form
The measles/rubella case-based reporting form [Annex 3] is filled by the physician or the focal person at the healthcare setting (hospital, medical center, dispensary, field medical unit...).

This form includes minimal information aiming to answer the questions related to case definition and vaccination status. The table (4) provides detailed information on the variables included in the form and their purposes.
Table (4): Content of the specific measles/rubella reporting form

<table>
<thead>
<tr>
<th>Part I: Patient identification and demography</th>
<th>Variables</th>
<th>Purpose of collecting such information</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Patient name</td>
<td>- Date of birth</td>
<td>- Gender</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part II: Medical information</th>
<th>Administrative:</th>
<th>To contact the health setting for further details, specimen collection, and result feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Date of consultation</td>
<td>- Hospital admission</td>
<td>- Date of hospital admission</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clinical data:</th>
<th>- Disease</th>
<th>- Date of rash onset</th>
<th>- Type of rash: maculo-papular, vesicular, other</th>
<th>- Other symptoms: coryza, cough, conjunctivitis, lymphadenopathy, arthralgia/arthritis</th>
<th>- Complications: pneumonia, gastroenteritis, other…</th>
<th>- Pregnancy</th>
<th>- Death (and date)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Part III: Vaccination status</th>
<th>Number of received vaccines:</th>
<th>- To assess vaccination status</th>
<th>- To detect vaccine-related cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Measles vaccine</td>
<td>- MMR vaccine</td>
<td>- MR vaccine</td>
<td>- R vaccine</td>
</tr>
</tbody>
</table>
| Part IV: Specimen collection | Clinical specimens for IgM/RT-PCR:  
- Date of collection  
- Type of specimen | - To confirm the case  
- To verify the adequacy of the specimen |
|-----------------------------|-------------------------------------------------|--------------------------------------------------|
|                             | Clinical specimen for virus isolation:  
- Date of collection  
- Type of specimen | - To identify the genotype |
| Part V: Health care provider identification | - Treating physician: name and contact details  
- Date of filling the reporting form  
- Signature | - To contact the treating physician for further details, specimen collection and result feedback |

2.2) Measles investigation form

The measles investigation form [Annex 9] is filled by the MOPH/Esumoh caza teams.

It aims to:
- Verify information gathered in the reporting form
- Complete missing information on clinical signs and vaccination status
- Identify additional cases
- Identify potential source of infection.

The investigation form includes line listing of contacts with measles which is useful to:
- Detect chain of transmission
- Detect index and secondary cases among contacts
- Identify pregnant women with potential risk of Congenital Rubella Syndrome (if rubella is suspected or confirmed).

Contacts are defined as:
- Household members
- Close family and relatives
- Close neighbors
- Close friends and playmates
- Classmates in kinder-gardens and schools and close staff.
Table (5): Content of the measles/rubella investigation form

<table>
<thead>
<tr>
<th>Part</th>
<th>Variables</th>
<th>Purpose of collecting such information</th>
</tr>
</thead>
</table>
| Part I: Investigation information | - Interviewer name  
- Date of investigation  
- The interviewee: patient, parent, other | - To verify timely investigation |
| Part II: Patient identity and address | - Patient name  
- Gender  
- Date of birth  
- Nationality  
- Type of residence: resident, tourist, refugee  
- Address  
- Contact details (phone number) | To complete the information related to:  
- Description by person and place  
- Identification of the household for field investigation |
| Part III: Signs | - Fever  
- Rash: onset and type  
- Hospital admission: date, hospital name  
- Pregnancy  
- Outcome | - To complete the description of cases by signs, complications, outcome |
| Part IV: Vaccination status | Vaccination status:  
- Vaccine: documentation, number of doses, date of last dose  
- Reasons for non-vaccination | - To complete the information related to vaccination status  
- To identify reasons for non-vaccination |
| Part VI: Contacts | - Contact with pregnant women: name, gestation duration, contact details  
- Similar cases among contacts: setting  
- Contact with cases during the 3 weeks before rash onset: name, age, relation ship, date of rash, date of last contact, phone number | - To identify pregnant women and risk of congenital rubella syndrome (if rubella)  
- To identify additional cases and cluster of cases  
- To identify the source of infection |
| Part VII: Travel history | - Travel history during the 3 weeks before rash onset  
- Travel history of any close contacts | - To identify travel associated infection |
2.3) Other measles investigation form
In case an outbreak has occurred in a specific or defined setting, the MOPH/Esumoh team may use specific line-listing investigation forms:
- The school-based rash investigation form [Annex 10]
- The community-based rash investigation form [Annex 11].

Clinical specimens are collected in order to:
- Confirm the disease
- Identify the circulating genotype.

3.1) Specimen for confirmation
The golden rule to confirm or to discard a case as measles is the collection of adequate specimens from each suspected case.

Two confirmatory tests are available:
- IgM serology
- RT-PCR testing.

Measles IgM is detectable for 28 days after rash onset. Three types of specimens can be collected for IgM testing: serum, oral fluid and dried blood spots. If a specimen collected during the first 3 days gives negative or equivocal result, a second specimen is needed within 28 days of rash.

RT-PCR testing detects the presence of the virus up to 7 days in dried blood spots, and up to 14 days in oral fluid.

The table (6) summarizes the specimen types and optimal period for collection. The Annex 12 provides details on specimen collection for oral fluid, and the Annex 13 on collection of dried blood spots.
3.2) Specimen for genotyping

In addition to case confirmation, collecting samples for virus isolation and genotyping is important for the following reasons:
- Improving diagnostic resolution few days after rash onset
- Determining whether suspected case is due to vaccine or wild virus
- Identifying possible source of virus and determining whether it is indigenous or imported
- Improving surveillance systems quality indicator.

Virus culture is performed on throat swab and/or urine collected up to 5 days from rash onset. Therefore, it is advised to collect the sample for virus isolation at first patient encounter.

Moreover, samples for genetic characterization of measles viruses should be obtained from each chain of transmission.

The Annex 14 provides details on specimen collection for throat swab.
Table (6): Clinical specimens for measles confirmation and virus detection and isolation

<table>
<thead>
<tr>
<th>Type of specimen</th>
<th>Specimen collection details</th>
<th>Specimen recipient</th>
<th>Recommended timing for adequate specimen (from rash onset)</th>
<th>Specimen storage</th>
<th>Annexes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum</td>
<td>10ml of blood is collected in sterile tube, centrifuged at 1000xg for 10 minutes. 5 mL of serum is needed.</td>
<td>Sterile tube</td>
<td>Serology (IgM Antibody detection)</td>
<td>Within 28 days</td>
<td>4–8 °C, No freezing</td>
</tr>
<tr>
<td>Oral fluid</td>
<td>Sponge is brushed against the gum on both sides for at least two minutes until it becomes wet.</td>
<td>Sponge swab in tube</td>
<td>Virus detection using RT-PCR</td>
<td>Within 28 days</td>
<td>4–8 °C</td>
</tr>
<tr>
<td>Dried blood</td>
<td>Patient’s finger is cleaned with alcohol and pricked with a sterile disposable micro-lance. Blood is collected to fill four circles. Filter paper is dried for at least 60 minutes at room temperature.</td>
<td>Filter paper</td>
<td>Virus isolation</td>
<td>Within 28 days</td>
<td>Room temperature, not exceeding 37°C.</td>
</tr>
<tr>
<td>Throat swab</td>
<td>Throat and tonsils are rubbed with sterile cotton swab.</td>
<td>Swab in Viral Transport Media</td>
<td></td>
<td>Within 5 days</td>
<td>4°C within 48h (if exceeding 48h: at minus 70°C)</td>
</tr>
<tr>
<td>Urine</td>
<td>10-15 mL of first passed morning specimens.</td>
<td>Sterile container</td>
<td></td>
<td>Within 5 days</td>
<td>4°C within 48h (if exceeding 48h: at minus 70°C)</td>
</tr>
</tbody>
</table>
3.3) **Choice of specimens**

Outside outbreak circumstances, two types of specimens are essentially needed from each suspected case (Figure 6):
- In ambulatory setting, it is recommended to collect the oral fluid as first choice, if not possible, dried blood spots
- In hospital setting, it is recommended to collect 2 clinical specimens:
  - For confirmatory test: serum as first choice
  - And if within 5 days of rash for genotyping purpose: throat swab or urine.

**Figure (6): Schema for specimen collection outside an outbreak**
During an outbreak, the minimal schema for specimen collection is the following:
- For each caza,
- And for each month,
- At least 5 specimens are collected from:
  - Cases attending a health structure (hospital, medical center…)
  - Cluster of cases in a community
  - Cluster of cases in other settings (school…).

If the outbreak was extended for months, specimens will be collected every month in order to confirm the outbreak continuity.

3.4) Specimen labeling and local packaging

At healthcare facility, specimens should be adequately labeled at time of collection. The labels should include the following:
- Name of the patient
- Type of specimen
- Date of specimen collection.

Clinical specimens are packed as follow [Annex 15]:
- The clinical specimen is conserved in 1st solid recipient, well-sealed
- The 1st recipient is packed in a small zippered bag
- That small zipped bag is added with the documents in a larger zippered bag.

It is recommended to use specific bag with 2 compartments:
- One as zippered bag for the specimen
- And rear pocket for the document.

Specimens are conserved at 4°C, except the dried blood spots that can be left at ambient temperature (table 6).
3.5) Specimen transportation
Transporting specimens from place of collection to the national reference laboratory is done by the MOPH/Esumoh teams within 48 hours of collection.

The MOPH/Esumoh team ensures the following points:
- Verifying the labeling: name, type of specimen, date of specimen collection
- Verifying the adequacy of the specimen: timing, quantity and conservation
- Adding the national ID number.

Specific iceboxes with icepacks are used for specimen transportation.

3.6) Specimen shipment to supranational reference laboratory
Specimens are referred to supranational laboratories for virus isolation. Before shipping the specimens, it is essential to verify that the laboratory is ready to receive the specimens and that the arrival date does not fall during week-ends or holidays. Clinical specimens should be accompanied with clinical and epidemiological data.

The triple packaging technique [annex 16], required by IATA regulations, is essential to ensure risk reduction. The sample must be packed in a three-part system to prevent leakage of material to the outside. The triple layers consist of:
- Leak proof primary container
- Secondary container with absorbent material
- Strong outer packaging.

The laboratory request form must be inserted in a zippered bag and sent along with the specimens.
**E. Case classification**

Case classification relies on both epidemiological and laboratory investigation following the below algorithm (Figure 7).

* Repeat if possible with a second specimen.
V. Data analysis

Data analysis include:
- Verifying the quality of the data
- Describing the cases by final classification
- Computing incidence rate
- Describing cases by time, place and person
- Describing the cases by complications and outcomes
- Monitoring surveillance indicators.

A. Data quality
The data quality includes:
- Search of duplicates
- Completeness of information for core variables: patient full name, place of residence (caza and locality), age, gender, nationality, date of rash, vaccination status, date of last vaccination (if vaccinated), date of specimen collection (if specimen was collected).

Completeness of information is a surveillance indicator for the adequacy of investigation.

B. Final classification
Based on the investigation, rash suspected cases are confirmed or discarded.
Two units are used:
- Total count of all reported rash cases (the suspected cases)
- Total count of measles cases as per the final classification.

1) Rash cases
The count of suspected/rash cases includes all suspected measles and rubella cases. It enables to compute surveillance detection and investigation indicators.
### Table (6): Distribution of suspected cases by final classification, Lebanon, 2013

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>All suspected cases (rash with fever):</td>
<td>2025</td>
<td>100%</td>
</tr>
<tr>
<td>- Measles cases</td>
<td>1760</td>
<td>87%</td>
</tr>
<tr>
<td>- Rubella cases</td>
<td>27</td>
<td>1%</td>
</tr>
<tr>
<td>- Discarded cases</td>
<td>238</td>
<td>12%</td>
</tr>
</tbody>
</table>

Source: Lebanon, MOPH, Esumoh, 2014

In 2013, 2025 suspected cases were reported. Based on the investigation, 1760 were classified as measles, 27 as rubella, and 238 were discarded as non-measles and non-rubella.

### Table (7): Distribution of measles cases by final classification, Lebanon, 2013

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>All measles cases</td>
<td>1760</td>
<td>100%</td>
</tr>
<tr>
<td>- Laboratory-confirmed</td>
<td>903</td>
<td>51%</td>
</tr>
<tr>
<td>- Epidemiologically-confirmed</td>
<td>89</td>
<td>5%</td>
</tr>
<tr>
<td>- Clinically-confirmed</td>
<td>768</td>
<td>44%</td>
</tr>
</tbody>
</table>

Source: Lebanon, MOPH, Esumoh, 2014

2) Final measles cases
The count of final measles cases enables to perform descriptive and further analysis.
In 2013, among the 1760 measles cases, 51% were lab-confirmed, 5% epi-confirmed and 44% clinically-confirmed.

C. Incidence rate
At national level, the incidence rate per 100000 or 100000 inhabitants is computed.

Annual incidence rate = \( \frac{\text{Number of confirmed measles cases} \times 1000000}{\text{Population size (at mid-year or average size)}} \)

For monitoring trends showing wide variations, semi-logarithmic scale may be used, as in figure (8).

Figure (8): Annual incidence rate of measles per 1000000 inhabitants, Lebanon, 2003-2013

Note: Semi-logarithmic scale
Source: Lebanon, MOPH, Esumoh, 2014
Usually, incidence rates are computed by year, by month or by week.

During the year, the “annual” incidence rate may be estimated by using:
- Annualized rates
- Or past 12-months period incidence rates.

The term of “attack rate” is used for epidemics.

D. Descriptive time, place and person
Cases are described by time, place and person.

1) By time
By time, cases are monitored by year, month and weeks. The presentation by year will provide the secular trends (Figure 1). The presentation by weeks will monitor the occurrence of sporadic cases, clusters or outbreaks (Figure 9).

Figure (9): Distribution of measles cases by week of onset, Lebanon, 2013

Source: Lebanon, MOPH, Esumoh, 2014
The outbreak of 2013 started around week 5, peaked at weeks 18-22, and ended around week 36, and lasted for 31 weeks.

2) By place
By place, cases are monitored at national level and by mohafaza, caza and locality. Cases are plotted by:
- Count of cases
- or specific incidence per 100000 inhabitants.

<table>
<thead>
<tr>
<th>Mohafaza</th>
<th>Nb cases</th>
<th>%</th>
<th>Population</th>
<th>Rate /100000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beqaa</td>
<td>630</td>
<td>36%</td>
<td>719705</td>
<td>87</td>
</tr>
<tr>
<td>North</td>
<td>383</td>
<td>22%</td>
<td>1092567</td>
<td>35</td>
</tr>
<tr>
<td>Nabatieh</td>
<td>14</td>
<td>1%</td>
<td>280236</td>
<td>5</td>
</tr>
<tr>
<td>South</td>
<td>66</td>
<td>4%</td>
<td>672468</td>
<td>10</td>
</tr>
<tr>
<td>Mount Lebanon</td>
<td>550</td>
<td>31%</td>
<td>1755973</td>
<td>31</td>
</tr>
<tr>
<td>Beirut</td>
<td>93</td>
<td>5%</td>
<td>424820</td>
<td>22</td>
</tr>
<tr>
<td>Unsp</td>
<td>24</td>
<td>1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LEBANON</td>
<td>1760</td>
<td>100%</td>
<td>4945769</td>
<td>35</td>
</tr>
</tbody>
</table>

Source: Lebanon, MOPH, Esumoh, 2014
The distribution of cases points out the areas with high disease load for case management. The incidence rate points out the area with high incidence rate. They are not necessarily correlated. In 2013, Mount Lebanon had more measles cases than the North, but the North had higher incidence rate than Mount-Lebanon.

Figure (10): Distribution of measles cases by mohafaza, Lebanon, 2013

Source: Lebanon, MOPH, Esumoh, 2014
3) By person
By person, cases are displayed by various inner and acquired characteristics, mainly:
- Age
- Gender
- Nationality
- Vaccination status (see specific paragraph).

For person characteristics, the analysis computes:
- The distribution of cases
- The specific incidence rates.
Table (9): Measles cases by age group, distribution and incidence rates, Lebanon, 2013

<table>
<thead>
<tr>
<th>Age group</th>
<th>Cases</th>
<th>%</th>
<th>Rate/100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1y</td>
<td>251</td>
<td>14%</td>
<td>54</td>
</tr>
<tr>
<td>1-4y</td>
<td>691</td>
<td>39%</td>
<td>129</td>
</tr>
<tr>
<td>5-9y</td>
<td>378</td>
<td>21%</td>
<td>71</td>
</tr>
<tr>
<td>10-14y</td>
<td>49</td>
<td>3%</td>
<td>10</td>
</tr>
<tr>
<td>15-24y</td>
<td>85</td>
<td>5%</td>
<td>9</td>
</tr>
<tr>
<td>25+y</td>
<td>281</td>
<td>16%</td>
<td>14</td>
</tr>
<tr>
<td>Unspecified</td>
<td>25</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1760</strong></td>
<td>100%</td>
<td><strong>35</strong></td>
</tr>
</tbody>
</table>

Source: Lebanon, MOPH, Esumoh, 2014

Age-specific incidence rate identifies the age-group at higher risk for measles infection, where the susceptible persons are.
In 2013, the susceptible persons were children under 10 years old.

4) By vaccination status
Vaccination status is analyzed by:
- Age groups according to the national vaccination calendar
- Or birth cohorts.
Figure (15): Distribution of cases by age-group and vaccination status, Lebanon, 2013

Displaying the cases by birth cohort is another manner to identify the susceptible generations.

Figure (16): Distribution of unvaccinated Lebanese measles cases (up to 30 years old) by birth cohort, Lebanon, 2013 (n=1330)

Source: Lebanon, MOPH, Esumoh, 2014
E. Complications and outcomes

1) Hospital admission
The proportion of hospital admission is an indicator of:
- The severity of the disease
- The access to case management
- The degree of reporting.

Usually, 30% of measles cases required hospital admission. If the proportion exceeds that percentage, it indicates under-reporting from the ambulatory sector.

**Figure (17): Distribution of measles cases by hospital admission, Lebanon, 2013 (n=1760)**

- Yes: 76%
- No: 21%
- Unsp: 3%

Source: Lebanon, MOPH, Esumoh, 2014
2) Complications
Cases are described by type of complications, in particular the serious ones.

Table (10): Distribution of measles cases by complication (based on available data), Lebanon, 2013

<table>
<thead>
<tr>
<th>Complication</th>
<th>Measles, N</th>
<th>Complication, Yes</th>
<th>Complication, Yes %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumonia</td>
<td>1380</td>
<td>369</td>
<td>27%</td>
</tr>
<tr>
<td>Gastrenteritis</td>
<td>1378</td>
<td>401</td>
<td>29%</td>
</tr>
<tr>
<td>Encephalitis</td>
<td>1158</td>
<td>6</td>
<td>1%</td>
</tr>
</tbody>
</table>

The missing values are omitted.
Source: Lebanon, MOPH, Esumoh, 2014

3) Case fatality rate
The case fatality is an essential indicator reflecting severity and access to care.

\[
\text{Case fatality rate} = \frac{\text{Number of measles related deaths } \times 1000 \text{ (or 100)}}{\text{Number of measles cases}}
\]

It is expressed in percentage (%) or per thousand (‰).

Table (11): Case fatality rate, Lebanon, 1997-1998 and 2013

<table>
<thead>
<tr>
<th></th>
<th>Measles cases</th>
<th>Deaths</th>
<th>CFR /1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997-1998 outbreak</td>
<td>1111</td>
<td>3</td>
<td>2.7</td>
</tr>
<tr>
<td>2013 outbreak</td>
<td>1760</td>
<td>4</td>
<td>2.3</td>
</tr>
</tbody>
</table>

Source: Lebanon, MOPH, Esumoh, 2014
In 2013, the 4 deaths were for patients presenting multiple complications (pneumonia and/or gastroenteritis and/or encephalitis).

**F. Molecular surveillance**
For the period 2003-2007, the most probable circulating genotype in Lebanon was D4. Effectively, international literature review revealed genotype D4 related to exportation of measles cases to the United States (2003), Denmark (2006) and Canada (2007).

For the year 2013, the identified genotypes have changed. Mostly, the genotype D8 was isolated in addition to B3 and H1.

**G. Further analysis**

1) **Susceptibility profile**
The susceptibility profile aims to identify the generations where there are accumulation of susceptibles in need for vaccination activities. The inputs integrated both coverage data and surveillance data. Usually, the results are displayed by birth cohort.

2) **Coverage survey**
Two methods are used to compute the vaccine coverage for MCV:
- The administrative data provided by the medical centers and dispensaries in charge of administrating vaccine in the public and philanthropic sectors (NGO). Those figures are based on administered vaccines to children by age group.
- The household surveys conducted by the Central Administration for Statistics (CAS) or academic institutions. Those figures are based on received vaccines by children and include both public and private sectors.
3) Vaccine efficacy VE
Vaccine efficacy (VE) can be calculated by comparing the infection attack rates in the vaccinated (ARV) versus the unvaccinated groups (ARU) as per the following formula:

\[
VE(\%) = \frac{(ARU-ARV) \times 100}{ARU}
\]

or

\[
VE(\%) = [1 - \frac{ARV}{ARU}] \times 100
\]

The \(\frac{ARV}{ARU}\) is equivalent to the relative risk.

Various types of studies can be conducted to compute the VE:
- Cohort study in particular if the outbreak is confined in defined population group (school…) for whom the information on the vaccination status is available
- Household contact study where the secondary attack rate is measured among the household contacts of index cases
- Case-control study will calculate the odds ratio of vaccination, thus approximating the relative risk
- Screening method when vaccination status of cases is only available, and may be used for routine monitoring of VE.

H. Surveillance indicators
Surveillance performance indicators are essential to monitor the progress towards measles elimination, and are divided as surveillance and laboratory indicators.
Table (12): Measles surveillance indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Surveillance Indicators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completeness of reporting</td>
<td>Proportion of health facilities reporting to the MOPH the weekly form</td>
<td>≥80%</td>
</tr>
<tr>
<td>Timeliness of reporting</td>
<td>Proportion of health facilities reporting to the MOPH the weekly form on time</td>
<td>≥80%</td>
</tr>
<tr>
<td>Reporting rate of discarded (non-measles non-rubella) cases</td>
<td>Reporting rate of discarded (non-measles non-rubella) cases at national level</td>
<td>≥2 cases per 100 000 population per year</td>
</tr>
<tr>
<td>Representative-ness of reporting</td>
<td>Proportion of mohafaza/caza reporting at least 2 discarded (non-measles non-rubella) cases per 100 000 population</td>
<td>≥80%</td>
</tr>
<tr>
<td>Adequacy of investigation</td>
<td>Proportion of all suspected measles and rubella cases that had an adequate investigation initiated within 48 hours of notification</td>
<td>≥80%</td>
</tr>
<tr>
<td><strong>Laboratory Indicators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laboratory confirmation</td>
<td>Proportion of suspected cases with adequate specimens for detecting acute measles or rubella infection collected and tested in a proficient laboratory</td>
<td>≥80%</td>
</tr>
<tr>
<td>Timeliness of specimen transport</td>
<td>Proportion of specimens received at the laboratory within 5 days</td>
<td>≥80%</td>
</tr>
<tr>
<td>Timeliness of reporting laboratory results</td>
<td>Proportion of results reported by the laboratory within 4 days of receiving the specimen</td>
<td>≥80%</td>
</tr>
<tr>
<td>Viral detection</td>
<td>Proportion of laboratory-confirmed chains of transmission with adequate samples tested in an accredited laboratory for detecting measles or rubella virus</td>
<td>≥80%</td>
</tr>
</tbody>
</table>
I. Feedback

1) Laboratory results
Currently, the laboratory results from reference laboratories are communicated to the reporting healthcare settings via MOPH/Esumoh. Further advanced communications tools are being explored for timely results feedback.

2) National figures
National measles figures are updated on a weekly basis on the MOPH website. Specific measles reports are issued on a monthly basis outside outbreak and on a weekly basis during outbreaks (www.moph.gov.lb).

3) Regional and international figures
The MOPH provide a national anonymous line listing to WHO in charge of editing regular bulletin related to measles in the Eastern Mediterranean Region and the world, available at the WHO websites:
- www.emro.who.int
- www.who.int and in particular:
  • www.who.int/immunization/monitoring_surveillance/bur
denvpd/surveillance_type/active/measles_monthlydata/en/
VI. Measles reference laboratories

A. Role of the reference laboratories
The role of national measles reference laboratories in measles and rubella is the following:
- Confirming the disease
- Characterizing the virus genotype for epidemiological mapping.

B. Reference laboratories for measles and rubella

1) At National Level
From 2002 to 2007, the Central Public Health Laboratory was the national measles laboratory.
Since 2008, the Rafik Hariri University Hospital (RHUH) laboratory was designated as the national measles laboratory, as the Central Public Health Central Laboratory was closed in 2007.

2) At Regional Level
There are two regional reference laboratories (RRL): The Central Public Health Laboratories in Sultanate Oman and the Pasteur Institute in Tunisia.
The functions of the RRL include:
- Supporting EMR countries in Measles and Rubella elimination program
- Confirming Measles/Rubella cases and monitoring virus strains
- Operating quality assurance/accreditation and biosafety programs
- Improving capacity building and conducting supervision activities to sustain surveillance data quality
- Cooperating and coordinating with national laboratory staff.
C. Performed tests
The laboratory tests for measles include: ELISA assay IgM antibody detection, viral RNA detection by RT-PCR, virus isolation in tissue culture, and genomic sequencing.

1) Serological assays
Measles infection is diagnosed serologically by detecting measles specific IgM antibodies. The serological methods used at the national measles laboratory in Lebanon are Measles IgM capture ELISA for oral fluids, dried blood, serum and plasma, and IgM indirect ELISA for serum, plasma and dried blood.

2) Reverse transcription polymerase chain reaction (RT-PCR)
This technique consists of reverse transcription of measles RNA (RNA/ DNA) and amplification of DNA fragments. DNA may be used for genetic characterization of measles and rubella virus. This technique is more sensitive than serological assays.

3) Virus isolation
The national measles reference laboratory does not have the capacity to perform virus isolation, and specimens for virus isolation are referred to the regional reference laboratories (RRL). Detection and identification of the virus in cell culture may take several weeks. Possession of a measles virus isolate permits genomic analysis and comparison with other strains from different locations and years, providing information on its origin and transmission history.

4) Genomic sequencing
The DNA fragment generated in the genotyping RT-PCR is used for genomic sequencing. Sequencing targets specific nucleotide regions in measles (and rubella) genes.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARU</td>
<td>Attack Rate among Unvaccinated</td>
</tr>
<tr>
<td>ARV</td>
<td>Attack Rate among Vaccinated</td>
</tr>
<tr>
<td>CAS</td>
<td>Central Administration for Statistics</td>
</tr>
<tr>
<td>CFR</td>
<td>Case Fatality Rate</td>
</tr>
<tr>
<td>DNA</td>
<td>Deoxyribonucleic acid</td>
</tr>
<tr>
<td>EMR</td>
<td>Eastern Mediterranean Region</td>
</tr>
<tr>
<td>GP</td>
<td>General Practitioner</td>
</tr>
<tr>
<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
</tr>
<tr>
<td>IATA</td>
<td>International Air Transport Association</td>
</tr>
<tr>
<td>ICD-9</td>
<td>International Classification of Diseases – 9th version</td>
</tr>
<tr>
<td>ICD-10</td>
<td>International Classification of Diseases – 10th version</td>
</tr>
<tr>
<td>MCV</td>
<td>Measles-Containing Vaccine</td>
</tr>
<tr>
<td>MEHE</td>
<td>Ministry of Education and High Education</td>
</tr>
<tr>
<td>MOPH</td>
<td>Ministry of Public Health</td>
</tr>
<tr>
<td>MMR</td>
<td>Measles, Mumps, Rubella</td>
</tr>
<tr>
<td>MR</td>
<td>Measles, Rubella</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>PCR</td>
<td>Polymerase Chain Reaction</td>
</tr>
<tr>
<td>R</td>
<td>Rubella</td>
</tr>
<tr>
<td>RNA</td>
<td>Ribonucleic acid</td>
</tr>
<tr>
<td>RRL</td>
<td>Regional Reference Laboratory</td>
</tr>
<tr>
<td>RT-PCR</td>
<td>Reverse Transcription – Polymerase Chain Reaction</td>
</tr>
<tr>
<td>SSPE</td>
<td>Subacute Sclerosing Panencephalitis</td>
</tr>
<tr>
<td>VE</td>
<td>Vaccine Efficacy</td>
</tr>
<tr>
<td>VTM</td>
<td>Viral Transport Media</td>
</tr>
<tr>
<td>WHA</td>
<td>World Health Assembly</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>
References

WHO. The Immunological Basis for Immunization Series. Module 7: measles. Update 2009


WHO. Measles elimination field guide, PAHO, 2nd edition, 2005

WHO. WHO guidelines for epidemic preparedness and response to measles outbreaks in measles endemic countries. 1999

WHO. Manual for the laboratory diagnosis of measles virus infection, 2000

http://www.who.int/wer

HPA. How to Take an Oral Fluid Swab (PDF, 1.6 MB) / http://www.hpa.org.uk/Topics/InfectiousDiseases/InfectionsAZ/MMR/mmroralfluidtesting/

WHO website: www.who.int


Annexes

Annex 1: Measles case definition
Annex 2: Reporting form for communicable diseases
Annex 3: Specific reporting form for measles and rubella
Annex 4: Hospital zero-reporting form
Annex 5: Hospital active surveillance form
Annex 6: Medical center and dispensary-based surveillance form
Annex 7: Ambulatory sentinel surveillance form
Annex 8: School-based reporting form
Annex 9: Measles/Rubella investigation form
Annex 10: School-based rash investigation form
Annex 11: Community-based rash investigation form
Annex 12: Collection of oral fluid specimen
Annex 13: Collection of dried blood spots
Annex 14: Collection of throat swab
Annex 15: Local packaging for national reference laboratory
Annex 16: Packaging for shipment to supranational reference laboratory
Annex 17: Contact details of MOPH and MOPH/Esumoh teams
تعريف حالات الحصبة / Measles / Rougeole

يعتمد التعريف التالي لحالات الحصبة، الواجب الإبلاغ عنها إلى وزارة الصحة العامة، بغضون 24 ساعة من تشخيصها:

<table>
<thead>
<tr>
<th>حالة المشتبهة</th>
<th>حالة مثبتة وبائياً</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Toute personne présentant une Fièvre et une éruption maculo-papulaire (non vésiculaire);</td>
<td></td>
</tr>
<tr>
<td>- Ou toute personne chez laquelle un clinicien suspecte une infection rougeoleuse.</td>
<td></td>
</tr>
<tr>
<td>- Any person with fever and maculo-papular (non-vesicular) rash;</td>
<td></td>
</tr>
<tr>
<td>- Or any person in whom a clinician suspects measles infection.</td>
<td></td>
</tr>
<tr>
<td>Cas suspect de rougeole/rubéole</td>
<td>Cas avec confirmation épidémiologique</td>
</tr>
</tbody>
</table>

حالة مشتبهة لم تجري لها فحص مصلي 

Un cas suspect chez qui on n’a pas procédé à un test sanguin, et qui présente un lien épidémiologique par contact direct avec un cas de rougeole confirmé par le laboratoire chez qui l’éruption est survenue de 7 à 18 jours plus tôt.

Epidemiologically-confirmed case

<table>
<thead>
<tr>
<th>حالة مثبتة وبائياً</th>
</tr>
</thead>
<tbody>
<tr>
<td>Un cas suspect confirmé par le laboratoire avec présence d’anticorps spécifiques IgM à la rougeole.</td>
</tr>
<tr>
<td>A suspect case with laboratory confirmation with presence of measles-specific IgM antibodies.</td>
</tr>
<tr>
<td>Cas confirmé par le laboratoire</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>حالة مثبتة وبائياً</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>A suspect case with laboratory confirmation with presence of measles-specific IgM antibodies.</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<td>Un cas suspect confirmé par le laboratoire avec présence d’anticorps spécifiques IgM à la rougeole.</td>
</tr>
<tr>
<td>A suspect case with laboratory confirmation with presence of measles-specific IgM antibodies.</td>
</tr>
<tr>
<td>Cas confirmé par le laboratoire</td>
</tr>
</tbody>
</table>

الدكتور وليد عمار

Annex 1: Measles case definition

B05 / CIM-10

رمض المرض - ICD-10
Annex 2: Reporting form for communicable diseases

<table>
<thead>
<tr>
<th>Annex 2: Reporting form for communicable diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Immedaiately Reportable Cases</strong></td>
</tr>
<tr>
<td>Clinical cases should be reported within 24 hours</td>
</tr>
<tr>
<td>- Acute Flaccid Paralysis / Vibriosis / Guillain-Barré, Myelitis, Meningitis, Neuritis...</td>
</tr>
<tr>
<td>- Anthrax / Pneumoconiosis / Anthrax, Miliary \n</td>
</tr>
<tr>
<td>- Diphtheria / Anthrax / Diphtheria, Tetanus, Black Death...</td>
</tr>
<tr>
<td>- Food Poisoning / Salmonella / Food Poisoning, Shigellosis...</td>
</tr>
<tr>
<td>- Haemorrhagic Fever / Ebola / Ebola, Marburg, Crimean-Congo Fever, Lassa, Yellow Fever...</td>
</tr>
<tr>
<td>- Influenza / New Virus Subtypes / Influenza, SARS, MERS-CoV...</td>
</tr>
<tr>
<td>- Invasive Meningococcal Disease / Neisseria / Invasive Meningococcal Disease, Neisseria...</td>
</tr>
<tr>
<td>- Measles / Meningitis / Measles, Meningitis, All agents...</td>
</tr>
<tr>
<td>- Rabies /狂犬病 / Rabies, Rabies...</td>
</tr>
<tr>
<td>- Rubella / Congenital Rubella Syndrome / Rubella, Congenital Rubella Syndrome...</td>
</tr>
<tr>
<td>- Smallpox / Rabies / Smallpox, Rabies...</td>
</tr>
<tr>
<td>- Tetanus / Puerperal Tetanus / Tetanus, Puerperal Tetanus...</td>
</tr>
<tr>
<td>- Unusual or Unexpected Event / Unusual or Unexpected Event...</td>
</tr>
<tr>
<td><strong>Specify:</strong></td>
</tr>
</tbody>
</table>

| **Weekly Reportable Cases** |
| Laboratory-confirmed |
| Bilharzia / نسيان / Bilharzia, Камерунский нематодоз... |
| Brucellosis / نسيان / Brucellosis, Камерунский нематодоз... |
| Crohn's disease / Crohn's disease / Crohn's disease... |
| Gonorrhea / نسيان / Gonorrhea, Камерунский нематодоз... |
| Hepatitis A, B, C, D / نسيان / Hepatitis A, B, C, D... |
| Human T-Cell Lymphotropic Virus type 1 / نسيان / Human T-Cell Lymphotropic Virus type 1... |
| Kaposi's Sarcoma / نسيان / Kaposi's Sarcoma... |
| Intestinal Infection / نسيان / Intestinal Infection, Salmonellosis, Shigellosis... |
| Leishmaniasis / نسيان / Leishmaniasis, Cutaneous, Visceral... |
| Legions / نسيان / Legions, Malaria... |
| Malaria / نسيان / Malaria, Malaria... |
| Syphilis / نسيان / Syphilis, Syphilis... |
| Tbd / نسيان / Typhoid Fever, Tbd... |
| **Specify:** |

| **Technical Support Units** |
| - Epidemiology / معلومات زائفة / Epidemiology, معلومات زائفة... |
| - Laboratory / معلومات زائفة / Laboratory, معلومات زائفة... |
| - Vector Control / معلومات زائفة / Vector Control, معلومات زائفة... |
| - Water and Sanitation / معلومات زائفة / Water and Sanitation, معلومات زائفة... |
| - Pharmaceutical / معلومات زائفة / Pharmaceutical, معلومات زائفة... |

| **Contact Information:** |
| - Ministry of Health / 899/3/2014 |
| - Office of Health / 01/24, 240920 |
| - Telephone / 01/6094194 |
| - Fax / 01/6094194 |
Annex 3: Specific reporting form for measles and rubella

<table>
<thead>
<tr>
<th>نوع العينة</th>
<th>تاريغ جمع العينة</th>
<th>عينة أولى</th>
<th>عينة ثانوية</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dried blood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oral fluid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Throat swab</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. - اسم وعنوان المريض
   - الاسم الثلاثي للمريض: ..........................................................
   - العنوان: ..........................................................................

2. - المعطيات الطبية
   - تاريخ الولادة: .......................................................... 
   - الجنس: [ذكر] [أنثى]
   - المدينة / البلدة: .........................................................
   - الجنسية: [لبناني] [غير لبناني]
   - الاقامة: [مقيم] [زائر] [نازح/لاجئ]
   - رقم الهاتف: ..................................................................

3. - المعطيات الطبية
   - دخل مستشفى: [نعم] [لا]
   - تاريخ الولادة: ..........................................................
   - تاريخ الاصابة: ..........................................................
   - تاريخ الظهور: ..........................................................
   - اسم المستشفى: ................................................................
   - ipairs: [Maculopapular] [Vesicular] [Other rash]
   - عوارض مختلفة: [حمى] [حمى أطراف] [تهاب الرئة] [التهاب العين] [التهاب المعدة]
   - صحة العين: [نعم] [لا]
   - ألم في المفاصل: ..........................................................
   - وفاة: [نعم] [لا]

4. - عينات للفحص المصلي وعزل الفيروس
   - عينة أولى: [صل] [صلع] [صلم]
   - عينة ثانية: [صل] [صلع] [صلم]
   - عينة لعزل الفيروس: [صل] [صلع] [صلم]

5. - معلومات أخرى
   - اسم الطبيب المعالج: ......................................................
   - العنوان: ...........................................................................
   - رقم الهاتف: .....................................................................
Annex 4: Hospital zero-reporting form

<table>
<thead>
<tr>
<th>Week of Reporting</th>
<th>Number of Cases</th>
<th>Reference Hospital</th>
</tr>
</thead>
</table>

**Topics:**
- Acute Flaccid Paralysis
- Guillain Barre Syndrome
- Transverse Myelitis
- Acute Neuritis
- Acute Poliomyelitis
- Meningitis (Bacterial, Viral)
- Invasive Meningococcal Disease
- Measles & Rubella & Congenital Rubella Syndrome
- Cholera
- Novel Respiratory Viruses
- Novel Influenza Viruses
- Novel Coronavirus (SARS, MERS - CoV)

**Sections:**
- Pediatrics
- Internal Medicine
- Critical Care
- Emergency

**Contact Information:**
- Phone: ____________________________
- Fax: ____________________________
- Email: ____________________________

**Signatures:**
- ____________________________ (Pediatrician)
- ____________________________ (Internal Medicine)
- ____________________________ (Critical Care)
- ____________________________ (Emergency)

**Other Immediate Notifiable Diseases:**
- Anthrax
- Diphtheria
- Food Poisoning
- Hemorrhagic Fever
- Mumps
- Pertussis
- Plague
- Rabies
- Smallpox
- Tetanus
- Unusual/Unexpected Event

**Additional Comments:**

---

2014 for the year 2013, Ministry of Health.
<table>
<thead>
<tr>
<th>Date of Registration</th>
<th>Name of.Registrar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Information of General

- **Name of Physician in Ministry**: [Details]
- **Date of Visit**: [Details]
- **Week of Survey**: [Details]
- **Hospital**: [Details]

<table>
<thead>
<tr>
<th>Office Name</th>
<th>Code</th>
<th>ICD10 / CM10</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Details]</td>
<td>[Details]</td>
<td>[Details]</td>
</tr>
</tbody>
</table>

#### Examination of Sections and Records

- **Sections**
  - [Details]
  - [Details]
  - [Details]
  - [Details]
  - [Details]
  - [Details]

#### Case Registration

<table>
<thead>
<tr>
<th>Code</th>
<th>Name of the Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>51</td>
<td>Shaken Baby Syndrome</td>
</tr>
<tr>
<td>69</td>
<td>[Additional Condition]</td>
</tr>
</tbody>
</table>

#### Examination of Symbols

- **ICD10 / CM10**
  - [Details]
  - [Details]

#### Number of Cases

- [Details]

#### Name of Patient

- [Details]

#### Age

- [Details]

#### Condition

- [Details]

#### Reason for Admission

- [Details]

#### Date of Admission

- [Details]

#### Collection of Samples

- [Details]

#### Name of the Physician in Charge

- [Details]

#### Signature of Physician in Ministry

- [Details]

#### Signature of the Contact Officer in Hospital

- [Details]

---

**Active Surveillance Form**
Annex 6: Medical center and dispensary-based surveillance form

<table>
<thead>
<tr>
<th>ملاحظة</th>
<th>اسم المستوصف</th>
<th>البلدة</th>
<th>القيادة</th>
<th>رقم الاستمارة</th>
<th>لغابة الأحد</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>الحالات</th>
<th>الملاحظات</th>
</tr>
</thead>
<tbody>
<tr>
<td>عن الأمراض المشمولة بالترصد</td>
<td>علمي من 5 سنوات أو أكثر</td>
</tr>
<tr>
<td>أ) أمراض مناعية / Vaccine preventable diseases</td>
<td></td>
</tr>
<tr>
<td>شلل رخو حاد / Acute flaccid paralysis</td>
<td></td>
</tr>
<tr>
<td>حصبة / Measles</td>
<td></td>
</tr>
<tr>
<td>حصبة ألمانية / Rubella</td>
<td></td>
</tr>
<tr>
<td>إسهال حاد / Acute diarrhoea</td>
<td></td>
</tr>
<tr>
<td>G) غيره / Others</td>
<td></td>
</tr>
<tr>
<td>B) أمراض انتقالية أخرى / Other communicable diseases</td>
<td></td>
</tr>
<tr>
<td>نكاف أو أبو كعب / Mumps</td>
<td></td>
</tr>
<tr>
<td>الحصبة / Measles</td>
<td></td>
</tr>
<tr>
<td>شلل رخو حاد / Acute flaccid paralysis</td>
<td></td>
</tr>
<tr>
<td>حصبة ألمانية / Rubella</td>
<td></td>
</tr>
<tr>
<td>إسهال حاد / Acute diarrhoea</td>
<td></td>
</tr>
<tr>
<td>G) غيره / Others</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>عن الحالات التي استدعت الاستشاف</th>
<th>اسم المستشفى</th>
</tr>
</thead>
<tbody>
<tr>
<td>ب) أمراض انتقالية أخرى واجب الإبلاغ عنها / Other notifiable diseases</td>
<td></td>
</tr>
<tr>
<td>ESCAPE, مراجعة سلامة، مراجعة السلامة، مراجعة السلامة، مراجعة السلامة، مراجعة السلامة، مراجعة السلامة، مراجعة السلامة، مراجعة السلامة، مراجعة السلامة، مراجعة السلامة</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>عن حالات الوفيات</th>
<th>اسم المستشفى</th>
</tr>
</thead>
<tbody>
<tr>
<td>ب) أمراض انتقالية أخرى واجب الإبلاغ عنها / Other notifiable diseases</td>
<td></td>
</tr>
<tr>
<td>ESCAPE, مراجعة سلامة، مراجعة السلامة، مراجعة السلامة، مراجعة السلامة، مراجعة السلامة، مراجعة السلامة، مراجعة السلامة، مراجعة السلامة، مراجعة السلامة</td>
<td></td>
</tr>
</tbody>
</table>

** لائحة الأمراض الانتقالية الواجب الإبلاغ عنها فور تشخيصها أو الشك فيها، الجمرة الخبيثة، الكولير، الخانوق، التسمم الغذائي، الحميات النزفية، الشلل الرخو الحاد: **
A, B, C, D, E

** لائحة الأمراض الانتقالية الواجب الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** لائحة الأمراض الانتقالية الواجب الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E

** قائمة الأمراض الانتقالية توبية الإبلاغ عنها أسبوعيا، **
A, B, C, D, E
**Weekly Form for the Ambulatory Sentinel Surveillance System**

### 1. Physician
- **Physician name:** 
- **Week, starting on Monday:** 
- **Date of report:** 
- **Physician name:** 
- **Week:** 
- **Signature:**

### 2. Data
- **Date received:** 
- **Form number:**

### 3. Aggregated data
- **Age:**
- **Gender:**
- **Locality/Caza:**
- **Phone contact:**
- **Lab results:**
- **Date consultation:**

### 4. Notifiable diseases

<table>
<thead>
<tr>
<th>Name</th>
<th>Disease</th>
<th>Gender</th>
<th>Age</th>
<th>Locality/Caza</th>
<th>Phone contact</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Measles</td>
<td>F</td>
<td>2-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rubella</td>
<td>F</td>
<td>2-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mumps</td>
<td>F</td>
<td>2-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pertussis</td>
<td>F</td>
<td>2-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>VHA</td>
<td>F</td>
<td>2-5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dysentery</td>
<td>F</td>
<td>2-5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5. Comments

### 6. Signatures

---

**Republic of Lebanon**
**Ministry of Public Health**

Please send the filled form(s) to the Epidemiological Surveillance Program.
Annex 8: School-based reporting form

الإحصاء الأسبوعي الخاص بإحصاءات الغياب

الاسم الرسمي للمدرسة
رقم الهاتف الثابت
رقم الهاتف الخلوي
التاريخ

<table>
<thead>
<tr>
<th>اسم المرشد الصحي</th>
<th>اسم المدرسة</th>
<th>البلدة</th>
<th>القضاء</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

التلاميد المسجلة

<table>
<thead>
<tr>
<th>الصفوف</th>
<th>الاثنين</th>
<th>الثلاثاء</th>
<th>الأربعاء</th>
<th>الخميس</th>
<th>الجمعة</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</table>

1) إحصاءات الغياب

<table>
<thead>
<tr>
<th>عدد الغياب</th>
<th>الاثنين</th>
<th>الثلاثاء</th>
<th>الأربعاء</th>
<th>الخميس</th>
<th>الجمعة</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

2) بعد قراءة التقارير الطبية المتوفرة للمتغيبين

<table>
<thead>
<tr>
<th>مجموع التقارير المتوفرة للمتهمين</th>
<th>التلاميد المشتبه بالتيار المتغير</th>
<th>الامراض المتغير</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

3) نتائج الكشف الأسبوعي

<table>
<thead>
<tr>
<th>حالة حر</th>
<th>حالة حر</th>
<th>حالة حر</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4) ملاحظات:

- تقارير الأمراض
  - التهاب التنفسي: حمى مع سعال أو نزلة أنفية أو تشنجات في الحنجرة أو ألم في الرأس. مثال: الزكام، التهاب رئة، التهاب المريء، التهاب القصبات الهوائية، سرطان الرئة...
  - التهاب معوي: وجود إسهال حاد مائي أو دموي مخاطي
  - الحصبة: حمى مع طفح جلدي حيث لا تحتوي الحبيبات على أي سائل
  - التهاب الماربوم: إفراز في ملتحمة العينين أو الجلد
  - التهاب الملتحمة أو الرمد: عين حمراء

الجمهورية اللبنانية
وزارة التربية والتعليم العالي
الجمهورية اللبنانية - وزارة الصحة العامة - برنامج الترصد الوبائي

استمارة تقصي حالة حبوبية الألمانية

تعلنا الاستمارة من قبل وزارة الصحة العامة / فريق الترصد الوبائي

Annex 9: Measles/Rubella investigation form

1. معلومات عن الحبوب

<table>
<thead>
<tr>
<th>اسم المريض</th>
<th>الجنس</th>
<th>الحالة المحافظة</th>
<th>المنطقة</th>
<th>البلد</th>
<th>العوام الكمال</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

2. المرض وعوائنه

<table>
<thead>
<tr>
<th>تاريخ الولادة</th>
<th>الجنس</th>
<th>الديانة</th>
<th>العائل</th>
<th>الحالة</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

3. التعرض

<table>
<thead>
<tr>
<th>نوع الطفح</th>
<th>تاريخ الطفح</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

4. التعرض المنفي للمرض

<table>
<thead>
<tr>
<th>ما علل السفر؟</th>
<th>الوصلات المنفي للمرض</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

5. محلة المريض

<table>
<thead>
<tr>
<th>اسم الشخص</th>
<th>المدينة</th>
<th>العمل</th>
<th>العائل</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>

6. الاختلاط مع حالات في المحيط

<table>
<thead>
<tr>
<th>تاريخ العودة</th>
<th>اختلاط مع مريض بعد؟</th>
<th>عنوانه</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

7. السفر إلى الخارج خلال الأسابيع الثلاثة قبل ظهور الطفح

<table>
<thead>
<tr>
<th>السفر إلى الخارج؟</th>
<th>تاريخ العودة</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

تم إصدار وزارة الصحة العامة رقم 55 تاريخ 31 توزير 2013

71
### Annex 10: School-based rash investigation form

<table>
<thead>
<tr>
<th>Class</th>
<th>Section</th>
<th>Name</th>
<th>Age</th>
<th>Sex</th>
<th>Rash type</th>
<th>Rash appearance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
- **Rash type**: MP, OR, PS, VS
- **Rash appearance**: Small, Large, Blistered, Haemorrhagic

**Checkboxes:**
- [ ] Yes, [ ] No

**Date:**
- [ ] Yes, [ ] No

**Remarks:**

---

**References:**

[MMR1, MMR2] Measles and Mumps Vaccination Schedule.

---

**Table:**

- Students with rash
- Students without rash
- Students with symptoms
- Students with fever

---

**Form:**

- School-based rash investigation
- Student information
- Medical history
- Vaccination status

---

**Legend:**

- [ ] Yes
- [ ] No

---

**Instructions:**

- Complete all fields
- Attach supporting documents
- Return to school administrator

---

**Signature:**

- [ ] Parent/Guardian
- [ ] Teacher
## Annex 11: Community-based rash investigation form

<table>
<thead>
<tr>
<th>Case number</th>
<th>Name</th>
<th>Age</th>
<th>Sex</th>
<th>Date of Birth</th>
<th>Vaccination Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>MMR1, MMR2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **MMR1**: Measles
- **MMR2**: Measles and German measles

<table>
<thead>
<tr>
<th>Rash Type</th>
<th>MP vs OrVs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes, No</td>
</tr>
</tbody>
</table>

- **Type of Rash**: MP
- **Rash After**: Yes, No

<table>
<thead>
<tr>
<th>Fever</th>
<th>Yes, No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Fever**: Yes, No

<table>
<thead>
<tr>
<th>Diarrhea</th>
<th>Yes, No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Diarrhea**: Yes, No

<table>
<thead>
<tr>
<th>Hospital Admission</th>
<th>Yes, No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Hospital Admission**: Yes, No

<table>
<thead>
<tr>
<th>Hospital Discharge</th>
<th>Yes, No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Hospital Discharge**: Yes, No

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Yes, No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Diagnosis**: Yes, No

<table>
<thead>
<tr>
<th>Follow-up</th>
<th>Yes, No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Follow-up**: Yes, No

<table>
<thead>
<tr>
<th>Contact Details</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Contact Details**: Phone

---

**Mention any other comments or observations here.**
# Annex 12: Collection of oral fluid specimen

<table>
<thead>
<tr>
<th>1) The Material</th>
<th>2) Collecting the oral fluid</th>
</tr>
</thead>
<tbody>
<tr>
<td>The tube includes an Orocol swab, which is a sponge-collection device. Check the expiration date of the oral fluid material.</td>
<td>Rub the sponge swab against the gum line (cheek side) for 1-2 minutes, on both right and left sides until the sponge gets thoroughly wet.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3) Sealing the tube</th>
<th>4) Labeling the tube</th>
</tr>
</thead>
<tbody>
<tr>
<td>Replace the sponge swab (A) in the clear tube (B).</td>
<td>Document the specimen: write the name, date of birth, date of specimen collection</td>
</tr>
</tbody>
</table>

*Source: HPA website.*
# Annex 13: Collection of dried blood spots

<table>
<thead>
<tr>
<th>1) Material for dried blood spots</th>
<th>2) Skin puncture on the finger</th>
</tr>
</thead>
<tbody>
<tr>
<td>A rectangular filter card with four empty delimited circles and a labelling area is used.</td>
<td>Clean the finger with alcohol solution.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3) The drops</th>
<th>4) Labelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collect full blood drop each time to fill each circle. No smearing on the filter paper. Allow filter paper to dry for one hour at ambient temperature.</td>
<td>Fill the filter paper with the needed information: full name, date of birth, and date of collection.</td>
</tr>
</tbody>
</table>
Annex 14: Collection of throat swab

1) The material

The set includes a swab and a transport vial containing Viral Transport Media VTM. Verify the expiration date.

2) Throat swab

Ask the patient to be seated, and open the mouth. Depress the tongue and swab the posterior pharynx and both tonsils vigorously.

3) Transfering the swab

Transfer the swab into the vial containing the VTM.

4) Sealing the vial

Break the applicator’s stick and close the screw capped vial. Add the labeling.
Annex 15: Local packaging for national reference laboratory

- Outer plastic bag
- Inner zippered plastic bag
- Specimen
- Label: Name, date of birth, date of specimen collection
- Document & form
Annex 16: Packaging for shipment to supranational reference laboratory

a) Leak proof primary container

b) Packaging instructions

c) Marking outside package
### Annex 17: Contact details of MOPH and MOPH/Esu-moh teams

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Phone</th>
<th>Mobile</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>ميشال كفوري</td>
<td>Director</td>
<td>05/920175</td>
<td>03/620615</td>
<td></td>
</tr>
<tr>
<td>زاهر أبوشقرا</td>
<td>Surgeon</td>
<td>05/554614</td>
<td>70/983372</td>
<td></td>
</tr>
<tr>
<td>وهيب نجم</td>
<td>Surgeon</td>
<td>05/920860</td>
<td>03/501374</td>
<td></td>
</tr>
<tr>
<td>ناديا يحيى</td>
<td>Surgeon</td>
<td>05/920211</td>
<td>03/422626</td>
<td></td>
</tr>
<tr>
<td>ناظم متى</td>
<td>Surgeon</td>
<td>05/920860</td>
<td>03/292940</td>
<td></td>
</tr>
<tr>
<td>جورج الحاج</td>
<td>Surgeon</td>
<td>09/914923</td>
<td>09/644496</td>
<td></td>
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<tr>
<td>ميشال المر</td>
<td>Surgeon</td>
<td>09/914923</td>
<td>09/644496</td>
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<tr>
<td>جورج أبي خليل</td>
<td>Surgeon</td>
<td>01/890916</td>
<td>01/879014</td>
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<tr>
<td>هوين عبدو</td>
<td>Surgeon</td>
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<tr>
<td>غسان زلاقط</td>
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<tr>
<td>وليد عبدو</td>
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<td>رضوان حيث</td>
<td>Surgeon</td>
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<td>حسن علوية</td>
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<tr>
<td>حبيب السبع أعين</td>
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<tr>
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<td>Surgeon</td>
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<tr>
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<tr>
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<tr>
<td>د. طه السماوي</td>
<td>Surgeon</td>
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<tr>
<td>د. منصور السماوي</td>
<td>Surgeon</td>
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<tr>
<td>د. طه السماوي</td>
<td>Surgeon</td>
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<td>06/671047</td>
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<tr>
<td>د. منصور السماوي</td>
<td>Surgeon</td>
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<td></td>
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