Guideline
for Intensive Care Unit-based
Acute Respiratory Infection Surveillance

2015
This guideline was prepared by the Epidemiology Surveillance Program under the supervision of the Director General of the Ministry of Public Health.

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

Reference: MOPH circular no. 18 (2015)
Guideline
for Intensive Care Unit-based
Acute Respiratory Infection Surveillance
Introduction

The national guide for surveillance of autumnal upper respiratory infection

The introduction

Avian influenza virus (or the influenza or the bird flu) is a virus that is seasonal and unpredictable. It spreads via the avian influenza virus, which is transmitted from birds to humans. The virus spreads via the avian influenza virus, which is transmitted from birds to humans. The virus spreads via the avian influenza virus, which is transmitted from birds to humans. The virus spreads via the avian influenza virus, which is transmitted from birds to humans.

The guide, which is produced in collaboration with the World Health Organization, is intended for countries that have not yet experienced avian influenza outbreaks, and seeks to provide guidance on how to prepare for and respond to such events.

The guide is divided into six parts:

1. Introduction
2. Surveillance
3. Diagnosis
4. Treatment
5. Prevention
6. Post-exposure management

The guide is available in Arabic and English, and can be downloaded from the WHO website.
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   2. MOPH/Esumoh caza team
   3. MOPH/Esumoh mohafaza team
   4. MOPH/Esumoh central team

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Abbreviations

Annexes:
Annex 1: MOPH decision no. 617/1 (2005)
Annex 3: ICU-based weekly reporting form
Annex 4: Data-entry screen
Annex 5: ICD-10 chapters
Annex 6: ICD-10 core codes for chapter X
Annex 7: Instructions for specimen collection
   of nasopharyngeal and oropharyngeal swabs
Annex 8: Instructions for specimen packaging for national referral
Annex 9: Instructions for specimen packaging for international referral
A. Generalities

1. Context and regulations
Lower respiratory infections represent the third cause of death worldwide. In addition, the emerging of respiratory infectious diseases constitutes substantial risk for humans. Since 2003, several new agents have been emerging leading to high morbidity and/or mortality, as SARS, the novel influenza viruses AH5N1, AH1N1, AH7N9 and lately the MERS-CoV.

In 2005, an Intensive Care Unit ICU-based surveillance was established in Lebanon. The MOPH decision no. 617/1 dated on the 29th October 2005 requests from the ICUs in public and private hospitals in Lebanon to adopt a weekly reporting system [Annex 1]. The target event was to report any acute respiratory distress.

In 2013, the MOPH circular no. 2 dated on the 9th January 2013 modified the reporting form in order to include any ICU-based acute respiratory infection ARI [Annex 2].

2. Objectives
The main objectives of ICU-based surveillance are to:
- Measure and monitor on weekly basis morbidity indicators related to acute respiratory infections in Lebanon
- Detect abnormal pattern and novel agents at an early stage, and investigate them
- Assist decision makers on proper control measures.

3. Objectives and target audience of this guideline
This guideline aims to provide hospitals ICUs (both public and private) as well as the MOPH staff an easy tool to run the ICU-based surveillance system.

At the end of this guideline, our target audience will:
- Know the objectives of the ICU-based surveillance system
- Know how to fill adequately the ICU reporting form
- Understand how medical coding is performed
- Understand and compute the needed indicators
- Be able to recognize an alert and to understand the investigation procedures
- Know the terms of reference of key players
- Be able to interact with various key players in the system.
B. Information system and methods

1. Data sources
Data sources are both ICUs in public and private hospitals across Lebanon. The MOPH decision requests each hospital to designate a focal person from the ICU staff in charge of reporting to the MOPH.

2. Target cases and case definition

2.1 Case definition
The general case definition of Acute Respiratory Infection (ARI) is any patient with fever and respiratory symptoms. The general case definition of Severe Acute Respiratory Infection (SARI) is any patient with ARI requiring hospital admission.

For ICU-based surveillance, the target case definition is:
- Acute Respiratory Infection with fever and dyspnea
- Whatever was the etiological agent
- Admitted to ICU

The ARI can be due to various agents:
- Bacterial: Streptococcus pneumoniae, Haemophilus influenzae, Mycoplasma pneumoniae, Listeria, Staphylococcus, Chlamydia...
- Viral: seasonal influenza, novel influenza, adenovirus, classical coronavirus, novel coronavirus, hantavirus, human metapneumovirus, parainfluenza, respiratory syncytial virus...
- Parasitic.

2.2 Inclusion
Any new ICU admission for ARI is targeted for reporting. The ARI cases include:
- Community-acquired infections
- Hospital-associated infections.

2.3 Exclusion
a) Are excluded the patient who has been admitted to the ICU for any reason and who developed ARI in that ICU in later phase.
b) Are excluded the newborns admitted to ICU after birth and before discharge.
3. ICU logbook
At hospital level, the presence of ICU logbook will help to fill the ICU weekly form in adequate manner. The minimum data in the logbook are: name, age, date of admission to ICU, and medical etiology. Such logbook will provide:
- The number of new admissions and of those for ARI
- The basic demographic and medical information for ARI cases.

4. Weekly form
Data is collected using a specific form [Annex 3]. The form is sent every week by the hospital even if no cases were reported. The reporting form is a nominative line-listing. The name of the patient is specified.

4.1. Categories of variables
The form includes the following categories of variables:
- General information: hospital name, week identification, total number of new admissions to ICU and total number of new ARI cases
- Case-based information for each ARI patient including demographic and medical variables.

<table>
<thead>
<tr>
<th>Table (1): Variables included in the line-listing form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Categories</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>General information</td>
</tr>
<tr>
<td>Case-based information</td>
</tr>
</tbody>
</table>

- Number admissions
  - Number of new admissions for the week - Number of new admissions for ARI
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Place of residence:</td>
<td>locality and caza</td>
</tr>
<tr>
<td>Health worker</td>
<td></td>
</tr>
<tr>
<td>Laboratory worker</td>
<td></td>
</tr>
<tr>
<td>Animal-related occupation</td>
<td></td>
</tr>
<tr>
<td>Travel history in the previous 10 days before onset, and country</td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td></td>
</tr>
<tr>
<td>Use of mechanical ventilation</td>
<td></td>
</tr>
<tr>
<td>Death, and date</td>
<td></td>
</tr>
<tr>
<td>Etiologies</td>
<td></td>
</tr>
</tbody>
</table>

### 4.2 General recommendations

For better use and analysis of the form, it is highly recommended to:

a) Write clearly.
b) Avoid using abbreviations. Some abbreviations can be interpreted in different ways.
c) Fill with all available information. All variables are important.

### 4.3 Hospital and week identification

a) The hospital name is specified.
b) The ICU is specified. Hospitals may have several ICUs as ICU, PICU, NICU… Two options are available:
   - Option A: Each ICU may fill the form as individual unit. Later, at data-entry phase, all ICUs related to one hospital are considered as one ICU
   - Option B: One weekly form is filled for all ICUs in one hospital.
c) The year is specified.
d) The week is specified. In Lebanon, weeks start on Monday. The week is filled by specifying the date of the Monday. Weeks are numbered using the ISO 8601 norm. The first week of the year is the one containing the first Thursday or the 4th January.

Example: The first week for 2014 is the week starting on 29th December 2013, as it contains the first Thursday of 2014.
4.4. General information
Every week, the new admissions are reported:
- The new admissions to the ICU whatever was the medical diagnosis
- The new admissions with the diagnosis fitting with ARI/SARI.

Table (3): Two examples on filling the number of new admissions

<table>
<thead>
<tr>
<th>#</th>
<th>Variables</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>New admissions for the week</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>New admissions for the week, for SARI, number of cases</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>New admissions for the week</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>New admissions for the week, for SARI, number of cases</td>
<td>2</td>
</tr>
</tbody>
</table>

The patients already admitted to ICU for various etiologies and who developed ARI in later stage in the same ICU are not included in the counts.

4.5. Demographic variables
a) The name of the patient is mentioned. The name at birth is the recommended one.
b) The age is specified in years (ex: 50 y). For under 1 year, the age is specified in months with the unit (Ex: 7 months).
c) The gender of the patient is specified.
d) The date of admission is the date of admission to the ICU of the reporting hospital.
e) The place of residence is the current main place of living in Lebanon of the patient. The needed information is the caza and the locality. Mentioning the locality without the caza may be confusing as some localities may have the same names but in different cazas. Example: There are 3 localities named Bireh in Lebanon: one in Rashaya caza, one in Akkar caza and one in Chouf caza.
Table (4): Three fictive examples on filling the demographic variables

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Gender</th>
<th>Age</th>
<th>Date of admission</th>
<th>Residence</th>
<th>Locality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nour Nour</td>
<td>M ■ F □</td>
<td>58 y</td>
<td>04/03/2014</td>
<td>Chouf</td>
<td>Kfar Fakoud</td>
</tr>
<tr>
<td>2</td>
<td>Alia Alia</td>
<td>M ■ F □</td>
<td>23 y</td>
<td>05/03/2014</td>
<td>Zahleh</td>
<td>Kfar Zabad</td>
</tr>
<tr>
<td>3</td>
<td>Jad Jad</td>
<td>M ■ F □</td>
<td>10 m</td>
<td>06/03/2014</td>
<td>Koura</td>
<td>Kfar Saroune</td>
</tr>
</tbody>
</table>

4.6. Exposure variables
Two exposure variables are explored:
- The occupation of the patient
- The travel history.

The occupation variables focus on the following:
- Health care provider: medical and paramedical staff providing care to patients
- Laboratory worker dealing with human or animal specimen. Example: personal working in human laboratory, or in animal/food laboratory
- Animal related profession dealing with live, dead or slaughtered animals. Example: veterinarian, agriculture inspector, farmer, shepherd, slaughter, butcher …

If the answer is “yes”, the detailed information is specified.

The travel variable focuses on any travel history:
- In the 10 days before the onset of ARI symptoms
- In any country.

If the answer is “yes”, the country is specified.
### Table (5): Four examples on filling the exposure variables

<table>
<thead>
<tr>
<th>#</th>
<th>Health worker</th>
<th>Laboratory worker</th>
<th>Animal-related</th>
<th>Travel history 10 days before onset</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>□ No □ Yes, specify: Medical doctor</td>
<td>□ No □ Yes, specify:</td>
<td>□ No □ Yes, specify:</td>
<td>□ No □ Yes, specify: UAE</td>
</tr>
<tr>
<td>2</td>
<td>□ No □ Yes, specify:</td>
<td>□ No □ Yes, specify: Lab technician in hospital lab</td>
<td>□ No □ Yes, specify:</td>
<td>□ No □ Yes, specify:</td>
</tr>
<tr>
<td>3</td>
<td>□ No □ Yes, specify:</td>
<td>□ No □ Yes, specify:</td>
<td>□ No □ Yes, specify: farmer</td>
<td>□ No □ Yes, specify: China</td>
</tr>
<tr>
<td>4</td>
<td>□ No □ Yes, specify:</td>
<td>□ No □ Yes, specify:</td>
<td>□ No □ Yes, specify:</td>
<td>□ No □ Yes, specify:</td>
</tr>
</tbody>
</table>

#### 4.7. Medical variables

The medical variables include 4 items reflecting the known situation at the time of filling the report:

- The fever highlighting the diagnosis of infection. Some patients may not show fever at certain time of the course of the disease.
- The requirement of mechanical ventilation as supportive care, including intubation and any artificial ventilation.
- The outcome and the death. If death has occurred, the date of death is specified.
- The medical diagnosis. The patient may present several medical diagnosis. The ones that lead to ICU admission are specified. If the etiological infectious agent is known, it is also specified.
The comorbidities not related to the current admission to ICU are not needed to be specified.

Some medical terms are confusing. They represent non-specific health conditions, or signs and symptoms common to several diseases, or health conditions common to various diseases. It is recommended to avoid the unspecific medical terms. The table below includes some frequent ill-defined terms.

### Table (6): Four examples on filling the medical variables

<table>
<thead>
<tr>
<th>#</th>
<th>Fever (30°C &amp; above)</th>
<th>Mechanical ventilation</th>
<th>Death (date of death)</th>
<th>Etiologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>□ No</td>
<td>□ No</td>
<td>□ No</td>
<td>Viral pneumonia</td>
</tr>
<tr>
<td>2</td>
<td>□ No</td>
<td>□ No</td>
<td>□ No</td>
<td>Surinfection + Chronic Bronchitis</td>
</tr>
<tr>
<td>3</td>
<td>□ No</td>
<td>□ No</td>
<td>□ No</td>
<td>Acute Distress Respiratory Syndrome</td>
</tr>
<tr>
<td>4</td>
<td>□ No</td>
<td>□ No</td>
<td>□ No</td>
<td>Bacterial pneumonia due to Streptococcus pneumoniae</td>
</tr>
</tbody>
</table>

### Table (7): Examples of non-specific medical terms

<table>
<thead>
<tr>
<th>Unspecific medical terms</th>
<th>Rationale</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shock</td>
<td>There are 3 types of shock: 1) Hemodynamic; 2) Septic; 3) Cardiogenic. Each has its specific causes.</td>
<td>Specify the type of shock, and the cause.</td>
</tr>
<tr>
<td>Infection</td>
<td>There are several agents causing infections and there are several infection sites.</td>
<td>Specify the causative organism if known and the location (primary and secondary). If the causative agent was not identified, specify the suspected infectious group and the location of the infection.</td>
</tr>
</tbody>
</table>
Pneumonia

Pneumonia is due to various agents: bacterial, viral, parasitic... Also it can be caused by various conditions (immobility, lung disease...)

Specify the causative agent, and the underlying condition (if any).

Pulmonary edema

Pulmonary edema may be: 1) Hemodynamic (cardiac or extra-cardiac origin); or 2) Due to lung injury (respiratory origin).

Specify the cause of the pulmonary edema.

Respiratory/lung failure

Respiratory failure may be acute or chronic. It is the consequence of various diseases: asthma, emphysema, chronic bronchitis, interstitial lung diseases, neurologic diseases, muscular diseases, infection...

Specify the underlying cause of respiratory/lung failure.

4.8. Laboratory variables

This part verifies if any specimen was collected for virological testing for influenza and other emerging viruses. The variable is specified wherever the tests are performed in the same hospital, or in reference laboratories.

The target specimens are the respiratory specimens:
- Sputum
- Nasal wash
- Naso-pharyngeal swab or throat swab
- Tracheal aspirate
- Broncho-alveolar lavage
- Pulmonary biopsy.

The target tests are:
- Rapid test
- PCR test
- Virological culture.
Table (8): Four examples on filling the laboratory variable

<table>
<thead>
<tr>
<th>#</th>
<th>Specimen collection for virus investigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>□ No</td>
</tr>
<tr>
<td></td>
<td>□ Yes, specify:</td>
</tr>
<tr>
<td></td>
<td>■ Nasal wash for influenza rapid test: positive for influenza A</td>
</tr>
<tr>
<td>2</td>
<td>□ No</td>
</tr>
<tr>
<td></td>
<td>□ Yes, specify:</td>
</tr>
<tr>
<td></td>
<td>■ Tracheal aspirate for MERS-CoV (pending)</td>
</tr>
<tr>
<td>3</td>
<td>□ No</td>
</tr>
<tr>
<td></td>
<td>□ Yes, specify:</td>
</tr>
<tr>
<td></td>
<td>■ Throat swab for Influenza (pending)</td>
</tr>
</tbody>
</table>

The specimens and the tests are specified, even if the results are still pending.

4.9. Reporter
At the end of the form, the person who has filled the form mentions his/her full name and contact details. Such information is highly needed for any verification and/or investigation.

5. Data flow
a) At hospital ICU level, on weekly basis, the assigned focal person verifies the ICU logbook. Then he/she fills the weekly line-listing reporting form. The form is sent to the MOPH/Esumoh caza team. In case there are technical communication issues with the MOPH caza level, the hospital faxes the form to the higher level (MOPH mohafaza team or central team). In Beirut, forms are sent directly to the MOPH/Esumoh central team. Forms are sent on weekly basis, by fax. The hospital focal person may be assisted by a team.

b) At the MOPH caza level, the Esumoh team receives and reviews the form. In case of non-reporting or missing data, the team contacts the hospital. Received and verified forms are sent by fax to the MOPH/Esumoh corresponding mohafaza team.
c) At the MOPH mohafaza level, the Esumoh team receives the forms and performs coding and data entry in a specific application. Also, the team conducts data cleaning and data analysis. Descriptive outputs are generated. Indicators are monitored for potential alerts. In case of alert, case verification and investigation are conducted in coordination with the caza team. Once a week, a copy of the local database is sent to the central team.

d) At the MOPH central level, the Esumoh team receives copies all the local databases and merges them in a national database. National descriptive outputs are generated and screened for alert detection. The team follows on case verification and investigation. Validated outputs are published on the MOPH website.

**Figure (1): Data flow for hospital ICU surveillance**
C. Data management

1. Checking the form
Forms are checked for the following points:
- The hospital name is filled
- The specified date for starting the week is filled and is indeed a Monday
- The unspecific medical terms are checked with the hospital
- The missing information is checked with the hospital.

2. Data Coding
Medical coding is performed using the tenth revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10).

The ICD is a classification of diseases: a system of categories to which morbid entities are assigned according to established criteria. It translates diagnoses of diseases and other health problems from words to alphanumeric codes. Those codes enable:
- Easy storage, retrieval and analysis of the data
- Data comparison.

The ICD-10 is developed, adapted and promoted by WHO. Training on ICD-10 is available at the WHO website, at the following link: http://apps.who.int/classifications/apps/icd/ICD10Training/

Other websites provide technical guidance to use the ICD-10 as:
- www.icd10data.com
- www.findacode.com

2.1. Volumes
ICD-10 has 3 volumes:
- Volume 1: The tabular list. The classification in this volume is divided into chapters, each of which is identified by a Roman numeral (i.e. I, II, III, IV, V etc.) and a title.
- Volume 2: The instruction manual. It contains rules and guidelines for the use of the classification for coding of
The ICD-10 includes 21 chapters [Annex 5] and over 11400 four-character codes.

2.2. Code format
The format of the tabular list includes chapters, blocks, categories and codes:
- Each chapter is divided into blocks which group together categories having some common factors
- Blocks are divided into categories represented by three-character codes (or core codes)
- The 3-character code (category) may be subdivided into codes with four characters. Certain codes also have optional supplementary characters to add more detail.

Medical coding may be performed using:
- The 3-character codes (or category or core code)
- The 4-character codes.

![Figure (2): Format of ICD-10 chapter, block, category and 4-character code](WHO, ICD-10)
2.3. NOS and NEC
“NOS” stands for "Not Otherwise Specified". It is the equivalent of saying: “unspecified”, “unqualified”, or “no further information”.

“NEC” stands for "Not Elsewhere Classified". It indicates that certain specified variants of the listed conditions may appear in other parts of the classification, and that, where appropriate, a more precise code should be looked for in the Index.

2.4. Dagger and asterisk
Certain conditions use two codes – dual coding:
- Primary code represented by a dagger (†)
- Optional code represented by an asterisk (*).

Primary code or dagger refers to the code that must always be used for single condition coding. It represents the underlying disease.

Optional code or asterisk refers to an additional code for a specific manifestation of the underlying condition.
Example: A patient suffers from pneumonia due to whooping cough:
- The primary code is A37.9†: Whooping cough
- The optional code is J17.0*: Pneumonia in diseases classified elsewhere.

2.5. Chapter X
Chapter X is related to respiratory diseases.
Ten blocks are identified, as specified in table (9).

<p>| Table (9): The blocks included in the chapter X in ICD-10 |
|-----------------|----------------|
| <strong>Label</strong> | <strong>Block</strong> |
| Block: Acute upper respiratory infections | J00-J06 |
| Block: Influenza and pneumonia | J10-J18 |
| Block: Other acute lower respiratory infections | J20-J22 |
| Block: Other diseases of upper respiratory tract | J30-J39 |
| Block: Chronic lower respiratory diseases | J40-J47 |</p>
<table>
<thead>
<tr>
<th>Block: Lung diseases due to external agents</th>
<th>J60-J70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Block: Other respiratory diseases principally affecting the interstitium</td>
<td>J80-J84</td>
</tr>
<tr>
<td>Block: Suppurative and necrotic conditions of lower respiratory tract</td>
<td>J85-J86</td>
</tr>
<tr>
<td>Block: Other diseases of pleura</td>
<td>J90-J94</td>
</tr>
<tr>
<td>Block: Other diseases of the respiratory system</td>
<td>J95-J99</td>
</tr>
</tbody>
</table>

Source: WHO. ICD-10

The category/code J81 refers to pulmonary edema excluding the cardiogenic origin and toxic origin.

The list of categories for chapter X is available in Annex 6.

3. Data entry
A specific application is developed by Esumoh for data entry and data analysis for ICU-based surveillance.

The data-entry includes two components:
• A screen for ICU identification. For each ICU, the information related to hospital coordinates (caza and locality), focal person name, and contact details is entered. Such screen is entered once a year for each hospital and updated when needed. For each hospital, one ICU is specified. If the hospital has several Intensive Care Units, there are merged into one in the database.
• A screen for the weekly reporting form [Annex 4].
  - In case no new ARI admission was reported, the parts (1) and (2) of the screen are filled with the information related to ICU and week identification with the mention of no ARI/SARI case. The ICU may have new admissions but not ARI/SARI cases.
  - In case new ARI/SARI admissions are reported, part (3) is filled in addition to parts (1) and (2). The part (3) includes the demographic, exposure, medical and laboratory information. A screen is filled for every ARI patient.

Data entry is performed at the mohafaza and central levels.
4. Data cleaning
Forms and database are checked. Data cleaning searches the database for missing and unspecified information. In order to retrieve the needed information, Esumoh teams contact the ICUs.

4.1. Missing data
Cases with unspecified core variables are checked. The target core variables are:
- Week
- Age
- Etiology.

4.2. Unspecified medical information
Cases are screened for ill-defined medical terms:
- Medical terms related to symptoms, signs and abnormal clinical and laboratory findings (Chapter XVIII)
- Unspecified medical terms.

5. Data Analysis
Data analysis is performed at MOPH/Esumoh mohafaza and central levels.
Cases are analyzed by:
- Time: week, month, year
- Place: hospital, place of residence
- Person: age group, gender
- Disease: diagnosis, fever, mechanical ventilation, death
- Exposure: occupation and travel history.

The used indicators are the following:
- ICU participation
- ICU completeness of weekly reporting from participating hospitals
- ICU with nil ARI cases
- Proportion of verified ARI
- ARI weekly counts
- ARI weekly ratios
- ICU-based ARI incidence.

For analysis purpose, all ICUs related to one hospital are considered as one ICU.
5.1. ICU participation proportion
The ICU participation proportion is the proportion of reporting ICUs at any week divided by the number of all ICUs. It is usually computed on annual basis.

\[
\text{ICU participation proportion} = \frac{\text{Number of reporting ICUs at any time} \times 100}{\text{Number of all ICUs}}
\]

The ICU participation proportion can be computed at caza, mohafaza and national level. The target is to reach 100%.

Figure (3): ICU participation by caza in Mount-Lebanon, 2013

5.2. Completeness of weekly reporting from participating ICUs
Weekly completeness is the proportion of ICUs who reported the weekly form (even if no ARI cases) among the expected number of forms to be received from participating ICUs.

\[
\text{Weekly completeness of zero-reporting} = \frac{\text{Number of received forms from ICUs for a specific week} \times 100}{\text{Number of expected forms from participating ICUs for that specific week}}
\]
The completeness is computed for the ICU, caza, mohafaza and national levels. The target of good reporting is to reach at least 80% of completeness.

**Figure (4): Weekly completeness of ICU reports, Mount-Lebanon, 2013**

![Weekly completeness of ICU reports, Mount-Lebanon, 2013](image)

Source: Lebanon, MOPH, Esunoh, 2014

Cumulative completeness is the proportion of weekly received forms among the total expected forms from participating ICUs for a specific time period.

**Figure (5): Annual cumulative completeness of ICU reports by caza, Mount-Lebanon, 2013**

![Annual cumulative completeness of ICU reports by caza, Mount-Lebanon, 2013](image)

Source: Lebanon, MOPH, Esunoh, 2014
5.3. Proportion of ICUs with nil ARI case
The proportion of ICUs with nil ARI admission is the number of ICUs who reported zero ARI admission among the total number of reporting ICUs for a specific period of time.

Proportion of ICUs with nil ARI admission = \( \frac{\text{Number of ICUs with zero ARI admission} \times 100}{\text{Number of reporting ICUs}} \)

Also, the proportion of ICU with at least one ARI admission can be computed.

Proportion of ICUs with ≥ 1 ARI admission = \( \frac{\text{Number of ICUs with ≥ 1 ARI admission} \times 100}{\text{Number of reporting ICUs}} \)

Those indicators reflect the quality of reporting.

Figure (6): Proportion of ICUs with and without ARI admission, Mount-Lebanon, 2013

Source: Lebanon, MOPH, Esumoh, 2014
5.4. Verified ARI

ICU may report cases who are ARI patients and those who are not. There is need to verify the diagnosis of reported ARI cases in order to select only the ARI cases in later analysis stages.

The verification includes:
- Verifying the ICD-10 codes
- Select the group of patients compatible with ARI.

In ICD-10, the ARI may be found in 4 different chapters:
- Chapter I: Infectious diseases
- Chapter X: Respiratory diseases
- Chapter XVI: Certain perinatal conditions
- Chapter XVIII: Symptoms and signs.

The diseases selected for ARI includes 29 ICD-10 categories codes, found in 3 chapters. They are listed in the table (10).

<table>
<thead>
<tr>
<th>Table (10): the diseases selected as ARI</th>
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<tbody>
<tr>
<td><strong>ICD-10</strong></td>
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<td>J80</td>
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<tr>
<td>R05</td>
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<td>R06</td>
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</table>

Upper respiratory infections

Epiglottitis

Influenza

Lower respiratory infections

Acute respiratory Distress

Respiratory signs: cough, dyspnea
For simplicity, the 29 ICD-10 core codes are organized in 9 groups used to ICU-based ARI cases analysis and presentation. The 9 groups are:

- Diphtheria
- Whooping cough
- Pulmonary tuberculosis
- Upper respiratory infection
- Influenza
- Epiglottitis
- Lower respiratory infection
- Acute respiratory distress
- Breathing abnormalities.

Two indicators can be computed:
- Proportion of reported cases related to respiratory diseases, infectious or not
- Proportion of reported cases related to ARI.

\[
\text{Proportion of verified ARI} = \frac{\text{Number of verified ARI based on ICD-10 codes} \times 100}{\text{Number of reported ARI by ICUs}}
\]

\[
\text{Proportion of respiratory cases} = \frac{\text{Number of patients related to respiratory diseases} \times 100}{\text{Number of reported ARI by ICUs}}
\]

Both indicators reflect the quality of reporting.

**Figure (7): Proportion of verified ARI cases, Mount-Lebanon, 2013**

Source: Lebanon, MOPH, Esumoh, 2014
The proportion of verified ARI can be computed:
- On weekly-basis
- On cumulative manner for a period of time.

The following indicators are computed using the count of verified ARI (according to case definitions).

5.5. Weekly counts
Weekly counts are used to monitor ARI admissions by time (week) and place (mohafaza, caza, hospital).

Source: Lebanon, MOPH, Esumoh, 2014
5.6. Weekly ratios of ARI

Weekly ratios can be used to compute the weekly ratio of verified ARI admission by ICU and by week.

Weekly ratio of ARI per ICU = \[ \frac{\text{Number of verified ARI per week}}{\text{Number of received ICU weekly reports}} \]

If the ratio shows figures less than 1, then, the weekly ratio of ARI per 10 ICUs can be used.

Weekly ratio of ARI per 10 ICU = \[ \frac{\text{Number of verified ARI per week} \times 10}{\text{Number of received ICU weekly reports}} \]

This indicator is dependent of two main factors:
- The adequate reporting by ICU
- The incidence of ARI in the community.

Figure (10): Weekly ratio of ARI per 10 ICU, Mount-Lebanon, 2013

Source: Lebanon, MOPH, Esumoh, 2014

Compared to historical data, this indicator can be used to detect abnormal increase.
5.7. ICU-based ARI incidence rate
In case of high participation from the ICUs with at least 80% of ICUs participating in the reporting with high weekly reporting completeness (at least 80%), the incidence rate of ICU-based ARI can be computed.

\[
\text{ICU-based ARI incidence rate} = \frac{\text{Number of verified ICU-ARI patients} \times 100000}{\text{Population at mid-year}}
\]

The denominator is estimated based on various sources:
- Estimation of the Lebanese population from national surveys conducted by the Central Administration for Statistics CAS (excluding the Palestinian residing in camps)
- Registered population of the Palestinian residing in camps provided by UNRWA
- Registered population of Syrian refugees residing in Lebanon provided by UNCHR.

5.8. Other indicators
Other indicators are computed and monitored for the verified ICU-based ARI patients:
- Count and proportion of health care workers with ARI
- Count and proportion of laboratory workers with ARI
- Count and proportion of animal-related occupation with ARI
- Count and proportion of cases with travel history in the 10 days before onset
- Proportion of ARI cases requiring mechanical ventilation
- Reported case fatality rate of ARI at ICU.

\[
\text{Reported case fatality rate of ICU-based ARI} = \frac{\text{Number of death among ARI patients} \times 100}{\text{Number of ARI}}
\]

The reported case fatality rate reflects the data provided by the ICU at the time of reporting. One patient may die in later stages.
D. Alert detection, verification and investigation

1. Alert detection
Data is screened on weekly basis in order to detect alerts.

Alert detection is based on detecting abnormal patterns:
- Relative increase of ARI cases: current week is compared with previous weeks in order to detect any increase
- Unexpected increase of ARI based on historical data of the previous years
- Unexpected increase of ARI cases outside the influenza season
- Presence of ARI cases among specific groups: health care workers, laboratory workers and animal-related occupation, travelers
- Unexpected increase of case fatality rate.

Figure (11): National figures: Weekly ARI cases from the MOPH visa system, Lebanon 2007-2012 (excluding 2009)

Source: Lebanon, MOPH, Esumoh, 2014
2. Alert verification
Once alerts are generated, the verification process is launched.

Verification includes:
- Case verification and collection of additional information related to clinical picture, exposure history, imagery findings, laboratory results, and outcomes
- Search for any cluster.

Verification is done by:
- Contacting the ICU
- Verifying if similar alert was detected by other surveillance systems.

The verification aims primarily to find out if any etiological agent was suspected or confirmed.

3. Laboratory investigation
Laboratory investigation aims to collect respiratory specimens for virological testing.
The target agents are mainly viral agents causing ARI in particular influenza viruses and novel coronavirus (MERS-CoV).

For influenza, the best specimens are naso-pharyngeal and oro-pharyngeal swabs. The national reference laboratory is the Research Laboratory at Rafic Hariri University Hospital RHUH. The reference test is PCR with various primers.

For MERS-CoV, the best specimens are deep respiratory specimens as deep sputum, tracheal aspirates, broncho-alveolar lavage. The national reference laboratory is the Clinical Laboratory at Rafic Hariri University Hospital RHUH, where PCR is performed.

Respiratory specimens are conserved at 4-8°C if referred to reference laboratory within 48 hours. Beyond that, it is recommended to conserve specimens at minus 20°C.
Annex 7 provides instructions for specimen collection of nasopharyngeal and oropharyngeal swabs. Annex 8 provides instructions for packaging for national laboratory. Annex 9 provides instructions for packaging for international laboratory.

4. Outbreak investigation steps
Investigation includes 10 steps:
  1) Confirming the outbreak
  2) Confirming the disease
  3) Establishing a case definition
  4) Searching for cases via passive or active methods
  5) Describing cases by time, place and person
  6) Generating hypothesis
  7) Testing hypothesis by carrying out additional studies
  8) Documenting the investigation
  9) Recommending control measures
 10) Continuing surveillance.
E. Information dissemination

Summary tables are posted at the MOPH website: www.moph.gov.lb. (--> Prevention, --> Surveillance).

The tables are displayed for national and mohafaza levels.

Figure (12): MOPH website

www.moph.gov.lb
F. Terms of reference of key players

1. ICU focal person
Hospitals designate an ICU focal person from the health staff. The focal point may be assisted by other health professionals from the ICU staff.
Hospitals communicate to the MOPH the name of the ICU focal person via an official letter specifying the contact details. In case of any modifications, they are shared with the MOPH.

The terms of reference of the ICU focal person are to:
- Ensure the presence and the regular update of the ICU logbook
- Collect data related to ICU admissions and to ARI patients
- Fill the weekly ICU line-listing form and send it to MOPH/Esumoh
- Discuss with the medical staff for potential specimen collection for virological testing in reference laboratories
- Coordinate with MOPH and reference laboratories for specimen referral testing
- Coordinate with the MOPH staff in case of verification and investigation.

2. The MOPH/Esumoh caza team
At MOPH caza level, the Esumoh team is in charge to receive the filled forms from ICUs.

The terms of reference of MOPH/Esumoh caza team are to:
- Receive the forms
- Follow up with the ICUs in case of no reporting
- Check received forms and contact the ICU focal point to check for missing or unspecified information
- Send the ICU forms to the MOPH/Esumoh corresponding mohafaza team
- Ensure specimen referral in coordination with ICU and MOPH/Esumoh mohafaza and central teams
- Conduct case verification and investigation in coordination with ICU and MOPH/Esumoh mohafaza and central teams.
3. MOPH/Esumoh mohafaza team
At the mohafaza, the MOPH/Esumoh team is in charge of data management for the ICU-based surveillance system. Usually, for each mohafaza, one person is designated to ensure necessary tasks.

The terms of reference are to:
- Receive ICU forms from MOPH/Esumoh caza teams
- Check the forms information and contact the MOPH/Esumoh caza teams and/or the ICUs for any verification and clarification
- Code the etiology in the ICU weekly form, using the 10th Revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10)
- Perform data entry and data cleaning
- Send a copy of the local database to the Esumoh central team
- Perform data analysis
- Monitor indicators
- Detect alert
- Initiate necessary verification and investigation
- Coordinate with partners for verification and investigation.

4. MOPH/Esumoh central team
At the central level, the MOPH/Esumoh central team is in charge to ensure the overall running of the ICU-based surveillance system, and conducting adequate data management. For mohafaza without dedicated person for ICU-based surveillance, the central team designates necessary staff to ensure the needed data management.

In addition to the terms of reference mentioned for mohafaza teams, the central team has to:
- Prepare any necessary official texts
- Develop the application for ICU-based ARI surveillance
- Train the staff on the application
- Conduct necessary sessions for ICU focal persons and staff
- Receive copies of the local databases and merge them in national database
- Conduct analysis and generate the national data
- Identify needed indicators and thresholds
- Monitor trends and detect alerts
- Coordinate with partners for necessary verification and investigation
- Coordinate with partners for necessary response measures
- Disseminate the general tables on the MOPH website
- Prepare the national reports.
References

WHO. International Statistical Classification of Diseases and Related Health Problems, 10th revision. 1992

WHO: www.who.int


## Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Complete term</th>
</tr>
</thead>
<tbody>
<tr>
<td>ARI</td>
<td>Acute Respiratory Infection</td>
</tr>
<tr>
<td>CAS</td>
<td>Central Administration for statistics</td>
</tr>
<tr>
<td>Esumoh</td>
<td>Epidemiological Surveillance Program</td>
</tr>
<tr>
<td>HCW</td>
<td>Health Care Worker</td>
</tr>
<tr>
<td>ICD-10</td>
<td>International Classification of Diseases-10th revision</td>
</tr>
<tr>
<td>ICU</td>
<td>Intensive Care Unit</td>
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<tr>
<td>ISO</td>
<td>International Organization for Standardization</td>
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<tr>
<td>MERS-CoV</td>
<td>Middle East Respiratory Syndrome – Novel Coronavirus</td>
</tr>
<tr>
<td>MOPH</td>
<td>Ministry of Public Health</td>
</tr>
<tr>
<td>NEC</td>
<td>Not Elsewhere Classified</td>
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<tr>
<td>NICU</td>
<td>Neonatal Intensive Care Unit</td>
</tr>
<tr>
<td>NOS</td>
<td>Not Otherwise Specified</td>
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<tr>
<td>PICU</td>
<td>Pediatric Intensive Care Unit</td>
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<tr>
<td>RHUH</td>
<td>Rafic Hariri University Hospital</td>
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<td>SARI</td>
<td>Severe Acute Respiratory Infection</td>
</tr>
<tr>
<td>UNHCR</td>
<td>United Nations High Commissioner for Refugees</td>
</tr>
<tr>
<td>UNRWA</td>
<td>United Nations Relief and Works Agency for Palestine refugees</td>
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<tr>
<td>VTM</td>
<td>Viral Transport Medium</td>
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<tr>
<td>WHO</td>
<td>World Health Organization</td>
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</tbody>
</table>
Annexes

Annex 1: MOPH decision no. 617/1 issued on the 29th October 2005

الجمهورية اللبنانية
وزارة الصحة العامة
الوزير

قرار رقم 617/1

تتعلق بالإبلاغ عن حالات 
في أقسام العناية الفائقة

وزير الصحة العامة
الدكتور محمد جواد خليفة
Annex 2: MOPH circular no. 2 issued on the 9th January 2013

الجمهورية اللبنانية
وزارة الصحة العامة
المديرية العامة

رقم الموافقة: 1/1
بيروت في 9 كانون الثاني 2013

تعميم رقم 2
تدعيم استمارة ترصد الإبلاغ من أقسام العناية الفائقة

في إطار تحديث نظام الإبلاغ من أقسام العناية الفائقة واستهداف الاكتئابات الرئوية دون سواها، يطلب الإبلاغ
عن حالات الاكتئاب الرئوي التي أدت إلى ضائقة تنفسية ودخول العناية الفائقة
severe acute respiratory infection

بناء عليه، تم تعديل استمارة الإبلاغ الإسبوعي (مرفقة ربط).

يتم عبئتها الاستمارة من قبل قسم العناية الفائقة في المستشفى، بتوقيع إسبوعي، وترسل إلى قسم الصحة العامة
في القضاء. في بيروت، ترسل الاستمارات مباشرة إلى الوحدة المركزية للرصد الوبائي.

مدير عام وزارة الصحة العامة
الدكتور وليد عمار
### New admissions for the week, total number __ __
New admissions for the week, for Severe Acute Respiratory Infection, number of cases __ __

If new admissions of Severe Acute Respiratory Infection, cases details:

<table>
<thead>
<tr>
<th>Name</th>
<th>Gender</th>
<th>Age (years)</th>
<th>Date of admission</th>
<th>Residence</th>
<th>Locality</th>
<th>Health worker</th>
<th>Laboratory worker</th>
<th>Animal-related</th>
<th>Travel history 10 days prior to onset</th>
<th>Fever ($\geq 38^\circ C$)</th>
<th>Mechanical ventilation</th>
<th>Death (date of death)</th>
<th>Etiologies</th>
<th>Specimen collection for virus investigation</th>
<th>For MOPH: Num</th>
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Name of physician:     Signature:     Date:     Phone:

Severe Acute Respiratory Infection is defined as any person with: fever, dyspnea, and requiring hospitalization.
Specimen collection includes: sputum, bronchoalveolar lavage, tracheal aspirate, nasopharyngeal aspirate, nose/throat swab, lung biopsy, lung autopsy.

Ministry of Public Health Circular no. 2 dated on the 9th January 2013
Annex 4: Data-entry screen

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<th>1 REPORT</th>
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</table>
### Annex 5: ICD-10 chapters

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<th>Category</th>
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<tbody>
<tr>
<td>I</td>
<td>Certain infectious and parasitic diseases</td>
<td>Special diseases</td>
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<td>II</td>
<td>Neoplasms</td>
<td>Special diseases</td>
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<tr>
<td>III</td>
<td>Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism</td>
<td>Diseases of a specific body system</td>
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<tr>
<td>IV</td>
<td>Endocrine, nutritional and metabolic diseases</td>
<td>Special diseases</td>
</tr>
<tr>
<td>V</td>
<td>Mental and behavioral disorders</td>
<td>Special diseases</td>
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<td>VI</td>
<td>Diseases of the nervous system</td>
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<tr>
<td>VII</td>
<td>Diseases of the eye and adnexa</td>
<td>Diseases of a specific body system</td>
</tr>
<tr>
<td>VIII</td>
<td>Diseases of the ear and mastoid process</td>
<td>Diseases of a specific body system</td>
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<tr>
<td>IX</td>
<td>Diseases of the circulatory system</td>
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<tr>
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<td>Diseases of the respiratory system</td>
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</tr>
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<td>Diseases of the digestive system</td>
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<td>Diseases of the musculoskeletal system and connective tissue</td>
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</tr>
<tr>
<td>XIV</td>
<td>Diseases of the genitourinary system</td>
<td>Diseases of a specific body system</td>
</tr>
<tr>
<td>XV</td>
<td>Pregnancy, childbirth and the puerperium</td>
<td>Special diseases</td>
</tr>
<tr>
<td>XVI</td>
<td>Certain conditions originating in the perinatal period</td>
<td>Special diseases</td>
</tr>
<tr>
<td>XVII</td>
<td>Congenital malformations, deformations and chromosomal abnormalities</td>
<td>Special diseases</td>
</tr>
<tr>
<td>XVIII</td>
<td>Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified</td>
<td>Special diseases (ill defined)</td>
</tr>
<tr>
<td>XIX</td>
<td>Injury, poisoning and certain other consequences of external causes</td>
<td>Special diseases</td>
</tr>
<tr>
<td>XX</td>
<td>External causes of morbidity and mortality</td>
<td>Special diseases</td>
</tr>
<tr>
<td>XXI</td>
<td>Factors influencing health status and contact with health services</td>
<td>Special diseases</td>
</tr>
</tbody>
</table>
Annex 6: ICD-10 core codes for chapter X (diseases of the respiratory system)

Block: Acute upper respiratory infections (J00-J06)

J00 Acute nasopharyngitis [common cold]
J01 Acute sinusitis
J02 Acute pharyngitis
J03 Acute tonsillitis
J04 Acute laryngitis and tracheitis
J05 Acute obstructive laryngitis [croup] and epiglottitis
J06 Acute upper respiratory infections of multiple and unspecified sites

Block: Influenza and pneumonia (J10-J18)

J10 Influenza due to identified influenza virus
J11 Influenza, virus not identified
J12 Viral pneumonia, not elsewhere classified
J13 Pneumonia due to Streptococcus pneumoniae
J14 Pneumonia due to Haemophilus influenzae
J15 Bacterial pneumonia, not elsewhere classified
J16 Pneumonia due to other infectious organisms, not elsewhere classified
J17* Pneumonia in diseases classified elsewhere
J18 Pneumonia, organism unspecified

Block: Other acute lower respiratory infections (J20-J22)

J20 Acute bronchitis
J21 Acute bronchiolitis
J22 Unspecified acute lower respiratory infection

Block: Other diseases of upper respiratory tract (J30-J39)

J30 Vasomotor and allergic rhinitis
J31 Chronic rhinitis, nasopharyngitis and pharyngitis
J32 Chronic sinusitis
J33 Nasal polyp
J34 Other disorders of nose and nasal sinuses
J35 Chronic diseases of tonsils and adenoids
J36 Peritonsillar abscess
J37 Chronic laryngitis and laryngotracheitis
J38  Diseases of vocal cords and larynx, not elsewhere classified
J39  Other diseases of upper respiratory tract

**Block: Chronic lower respiratory diseases (J40-J47)**
J40  Bronchitis, not specified as acute or chronic
J41  Simple and mucopurulent chronic bronchitis
J42  Unspecified chronic bronchitis
J43  Emphysema
J44  Other chronic obstructive pulmonary disease
J45  Asthma
J46  Status asthmaticus
J47  Bronchiectasis

**Block: Lung diseases due to external agents (J60-J70)**
J60  Coalworker's pneumoconiosis
J61  Pneumoconiosis due to asbestos and other mineral fibres
J62  Pneumoconiosis due to dust containing silica
J63  Pneumoconiosis due to other inorganic dusts
J64  Unspecified pneumoconiosis
J65  Pneumoconiosis associated with tuberculosis
J66  Airway disease due to specific organic dust
J67  Hypersensitivity pneumonitis due to organic dust
J68  Respiratory conditions due to inhalation of chemicals, gases, fumes and vapours
J69  Pneumonitis due to solids and liquids
J70  Respiratory conditions due to other external agents

**Block: Other respiratory diseases principally affecting the interstitium (J80-J84)**
J80  Adult respiratory distress syndrome
J81  Pulmonary oedema
J82  Pulmonary eosinophilia, not elsewhere classified
J84  Other interstitial pulmonary diseases

**Block: Suppurative and necrotic conditions of lower respiratory tract (J85-J86)**
J85  Abscess of lung and mediastinum
J86  Pyothorax
Block: Other diseases of pleura (J90-J94)
J90 Pleural effusion, not elsewhere classified
J91* Pleural effusion in conditions classified elsewhere
J92 Pleural plaque
J93 Pneumothorax
J94 Other pleural conditions

Block: Other diseases of the respiratory system (J95-J99)
J95 Postprocedural respiratory disorders, not elsewhere classified
J96 Respiratory failure, not elsewhere classified
J98 Other respiratory disorders
J99* Respiratory disorders in diseases classified elsewhere
Annex 7: Instructions for specimen collection of nasopharyngeal and oropharyngeal swabs

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

2) Size of the swab
With thin swab, nasal (3) and throat swab (4) can be collected. With large swab, only throat swab can be collected.

3a) Nasal swab
Keep the patient in a horizontal position, laying down.

3b) Nasal swab
Pass the swab at the vertical in one nostril and rotate. Repeat for the second nostril.

4a) Throat swab
Ask the patient to be seated, and open the mouth.

4b) Throat swab
Depress the tongue and swab the posterior pharynx and both tonsils vigorously.

5) Transfering the swab
Transfer the swab into the vial containing the VTM.

6) Sealing the vial
Break the applicator’s stick and close the screw capped vial.
Annex 8: Instructions for specimen packaging for national referral

Outer plastic bag

Inner zippered

Specimen

Label: Name, date of birth, date of specimen collection, type of specimen

Document & form
Annex 9: Instructions for specimen packaging for international referral

Based on the type of considered pathogens, various instructions of packaging are followed according to the IATA rules (international air transport association). Three points are to be considered:

a) Leak proof primary container

b) Triple packaging instructions

c) Marking outside package