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Organization**

REGIONAL OFFICE FOR **Europe**

**Overview of sentinel systems for hospitalized severe acute
respiratory infections (SARI) represented in the weekly
EuroFlu surveillance bulletin**

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Introduction

During the 2010/2011 influenza season the EuroFlu weekly influenza surveillance bulletin introduced data from sentinel surveillance systems on hospitalized severe acute respiratory infections (SARI). WHO/Europe continues to monitor SARI in the 2012/2013 season.

This document describes the SARI surveillance systems that are currently represented in the EuroFlu weekly bulletin. Countries whose SARI data are presented in the EuroFlu bulletin have SARI sentinel surveillance systems that meet the following two criteria:

- Hospitalized patients meeting a syndromic SARI case definition are routinely monitored, tested for influenza and reported to the national level on a weekly basis from a standard and generally stable number of sentinel hospitals.
- There was consistent weekly reporting of epidemiological and virological data from the sentinel SARI system to the EuroFlu surveillance platform during the 2010/2011 influenza season.¹

WHO/Europe wishes to extend its thanks to those who are working hard to establish sentinel SARI surveillance systems. One of the influenza surveillance gaps most highlighted by the emergence of the A(H1N1)pdm09 virus was the need for influenza surveillance systems to routinely monitor severe influenza in order to compare the severity of different influenza seasons, to monitor high-risk groups, and to track the viruses which specifically cause severe disease. As noted in the WHO European Guidance for Influenza Surveillance in Humans², surveillance systems which systematically monitor hospitalized SARI, and SARI confirmed with influenza, are directly addressing this gap. WHO/Europe looks forward to continued work with Member States to introduce surveillance data from more sentinel SARI systems into the weekly bulletin. As we do so, we will update this document accordingly.

¹ Reporting on a total all-cause hospitalization denominator was also deemed desirable but not essential for reporting of data to EuroFlu, as counts can be interpretable as long as a stable number of hospitals reports every week.

² http://www.euro.who.int/_data/assets/pdf_file/0020/90443/E92738.pdf

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Albania

SARI surveillance was implemented in Albania in 15 hospitals in 2009. Case-based data reporting of SARI cases occurs on a weekly basis all year round to the National Surveillance Center in the Department of Control of Infectious Diseases (Institute of Public Health). Data from 15 hospitals are reported to EuroFlu.

A) Location of sentinel hospitals and patients represented

The hospitals are located in large cities throughout the country and surveillance is conducted in paediatric and adult infectious diseases and pulmonary wards, as well as intensive care and treatment units (ICUs).

The hospitals are located as follows:

- north: 4 hospitals (Shkoder, Kukes, Diber, Lezhe)
- centre: 4 hospitals (Durrës, Tirana-capital with 2 hospitals, Elbasan)
- south: 5 hospitals (Lushnje, Fier, Vlora, Gjirokaster, Sarandë)
- south-east: 2 hospitals (Korca, Berat).



B) Respiratory specimen collection and case definitions

Respiratory specimens are collected from all SARI patients meeting the case definition. All age groups are represented in the surveillance system.

Standard SARI case definition for persons aged ≥ 5 years

Onset of the following symptoms ≤ 7 days prior to hospital admission:

- fever $>38^{\circ}\text{C}$ AND
- cough OR sore throat AND
- shortness of breath or difficulty in breathing.

For children aged <5 years the WHO case definition for pneumonia and severe pneumonia is

applied

Pneumonia:

- cough OR difficulty in breathing; AND
- breathing faster than 40 breaths/minute (12 – 59 months);
- breathing faster than 50 breaths/minute (2 – 11 months)

Severe pneumonia:

- cough OR difficulty in breathing AND
- any of the following general severe signs:
 - unable to drink or breastfeed OR
 - vomits everything OR
 - convulsions OR
 - lethargy or unconsciousness OR
 - chest indrawing or stridor in a calm child.

Armenia

Introduced in 2010, sentinel SARI surveillance currently takes place in 6 hospitals covering general medicine and paediatric wards. The hospitals are located in the capital city (Yerevan) and in two regions (Lori and Syunik). Surveillance for SARI occurs year round and case-based data are reported to the State Hygiene and Anti-epidemic Inspectorate on a daily basis. Data from all 6 hospitals are reported weekly to EuroFlu.

A) Location of sentinel hospitals and patients represented

The four hospitals located in Yerevan are:

- Erebuni Medical Centre (multi-profile hospital³)
- St. Grigor Lusavorich Medical Centre (multi-profile hospital)
- St. Astvatsamayr Medical Centre (multi-profile hospital)
- Arabkir Institute of Adolescent and Child Care (multi-profile hospital) – Institute of perinatology, obstetrics and gynecology.

The hospital located in the Lori region includes 1 adult pulmonary, 1 paediatric, and 1 maternity care department. The hospital located in Syunik region (Medical Centre of Kapan city) includes 1 adult pulmonary, 1 paediatric, and 1 maternity care department.



B) Respiratory specimen collection and case definitions

³ Unlike a specialty hospital, a multi-profile hospital encompasses various departments, offering for example general, paediatric, adult infectious diseases and pulmonary care.

Respiratory specimens are collected at all 6 hospitals from all SARI patients before the epidemic period, and from the most severe cases among patients meeting the below case definition for SARI during the epidemic period. All age groups are represented in the surveillance system.

SARI case definition in persons aged ≥ 5 years

A person with onset of all the following symptoms ≤ 7 days prior to hospital admission:

- fever $>38^{\circ}\text{C}$ AND
- cough OR sore throat AND
- shortness of breath or difficulty in breathing.

SARI in children aged < 5 years is defined as pneumonia or severe pneumonia according to the Integrated Management of Childhood Illness (IMCI)

Pneumonia:

any child aged 2 months to 5 years with cough or difficulty breathing; AND:

- breathing faster than 40 breaths/minute (ages 1–5 years);
- breathing faster than 50 breaths/minute (ages 2–12 months) (note that infants less than 2 months of age breathing 60 times or more per minute should be referred for serious bacterial infection).

Severe pneumonia:

- any child aged 2 months to 5 years with cough or difficult breathing; AND any of the following general danger signs:
 - unable to drink or breastfeed OR
 - vomits everything OR
 - convulsions OR
 - lethargy or unconsciousness OR
 - chest indrawing or stridor in a calm child.

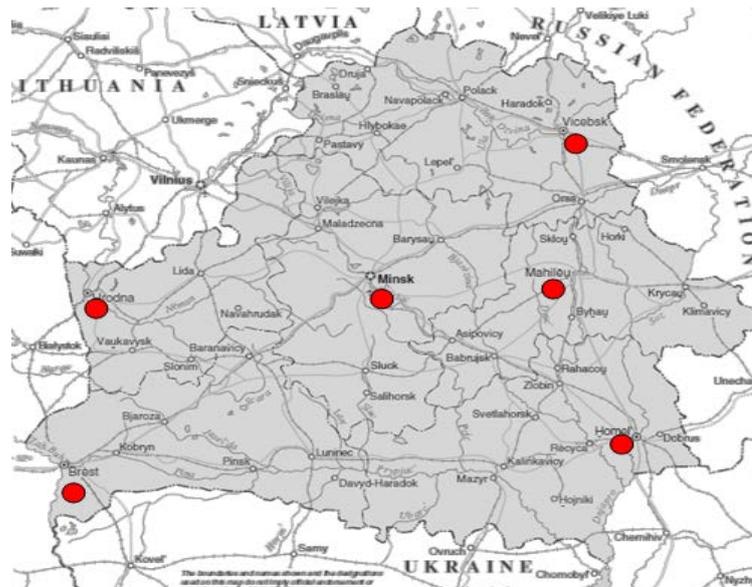
Belarus

Sentinel SARI surveillance was implemented in 2009 and currently takes place in 11 multi-profile hospitals. The wards participating in surveillance include paediatric, internal medicine, infectious disease, therapeutic medicine and respiratory disease. The hospitals are located in large cities of the country's 6 regions. Information about all hospitalized SARI cases from sentinel hospitals is reported to the central level. Data from all 11 hospitals are reported weekly to EuroFlu.

A) Location of sentinel hospitals and patients represented

The 11 hospitals participating in SARI surveillance are:

- **Brest** central state hospital;
- **Vitebsk** central state hospital and Vitebsk district paediatric clinical hospital;
- **Gomel** district infectious clinical hospital and Gomel district paediatric clinical hospital;
- **Grodno** district paediatric clinical hospital, state clinical hospital №1;
- **Minsk**: 6th state clinical hospital and 3rd state paediatric clinical hospital;
- **Mogilev** ambulance services and Mogilev district paediatric hospital.



B) Respiratory specimen collection and case definitions

Respiratory specimens are collected at all hospitals from all SARI cases meeting the case definition. All age groups are represented in the surveillance system.

SARI case definition for all ages

A person with onset of all the following symptoms ≤ 7 days prior to hospital admission:

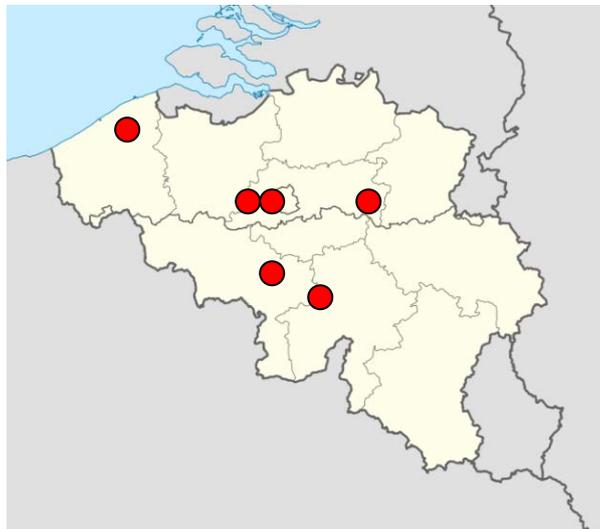
- measured or reported fever $> 38^{\circ}\text{C}$ AND
- cough OR sore throat AND
- shortness of breath or difficulty in breathing.

Belgium

Sentinel SARI surveillance was implemented in 2011 with the main objective of contributing to the early measurement of the severity of epidemics. Six general hospitals participate voluntarily in the surveillance. The selection criteria favoured larger hospitals with significant intensive care activity. The wards participating in the surveillance include emergency departments, paediatric (240 beds), internal medicine (1350 beds) and geriatric (518 beds) wards, and intensive care units (250 beds). All hospitals have extracorporeal membrane oxygenation (ECMO) treatment capability. The surveillance is funded by the Federal Public Service of Public Health, Directorate of Health Care Facilities.

A) Location of sentinel hospitals and patients represented

The 6 hospitals represent the 3 regions of the country: two are located in Wallonia, two in the capital city of Brussels and two in Flanders.



B) Respiratory specimen collection and case definitions

Respiratory specimens are collected in the 6 hospitals, in both paediatric and adult services, from all SARI cases meeting the case definition.

SARI case definition for all ages

An acute respiratory illness with onset within the last 7 days, including:

- history of fever or measured fever of $\geq 38^{\circ}\text{C}$ AND
- cough or dyspnoea (shortness of breath or difficulty in breathing)⁴; AND
- requiring hospitalization (24h or more).

⁴ One criterion of the SARI case definition was changed from “cough AND dyspnoea” in 2011-2012 to “cough OR dyspnoea” in the 2012-2013 season”.

Kazakhstan

Kazakhstan introduced SARI surveillance in 2008. Surveillance for SARI occurs year round and case-based data are reported to the Epidemiological Department, State Sanitary and Epidemiological Surveillance, Ministry of Health (Astana), on a weekly basis. Data from the 19 hospitals described below are currently reported to the EuroFlu platform.

A) Location of sentinel hospitals and patients represented

The hospitals reporting to EuroFlu are located in 7 regions of the country. The participating sites include general, paediatric and infectious diseases hospitals. The 7 regions of Kazakhstan represented are:

- Aktau
- Astana,
- Petropavlovsk
- Taldy-Kurgan
- Taraz
- Uralsk
- Ust-Kamenogorsk.



B) Respiratory specimen collection and case definitions

The hospitals collect respiratory specimens from all SARI cases admitted, with the exception of children aged <1 year.

SARI case definition for all ages

Onset of acute respiratory infection requiring urgent hospitalization in the presence of the following symptoms ≤ 7 days prior to hospital admission:

- fever $\geq 38^{\circ}\text{C}$ AND
- cough AND
- shortness of breath or difficulty in breathing.

Kyrgyzstan

Sentinel surveillance for hospitalized SARI was first implemented in Kyrgyzstan in 2008 by the Sanitary and Epidemiological Service (SES), Ministry of Health. Currently 4 hospitals (2 referral hospitals for infectious disease and 2 general hospitals) take part in SARI surveillance. Surveillance for SARI occurs year round and case-based data are reported to SES weekly.

A) Location of sentinel hospitals and patients represented

The hospitals are located in the capital Bishkek (2) and in Osh (2), the second largest city in the country. The surveillance system includes both intensive care units and infectious disease wards. All age groups are represented in the system. Data from all 4 hospitals are reported to EuroFlu.



B) Respiratory specimen collection and case definitions

The hospitals systematically screen all hospital admissions using a standard SARI case definition. All patients meeting the case definition are reported to SES. Respiratory specimens are collected from those SARI cases with reported onset of symptoms ≤ 72 hours prior to admission using a standardized selection procedure. The surveillance protocol stipulates that specimens be collected from the first eligible patient per age group per day (Monday to Friday) with a maximum of 3 samples per age group per week. Respiratory specimens are not collected from children aged < 1 year.

SARI case definition for all ages

Onset of the following symptoms ≤ 7 days prior to hospital admission:

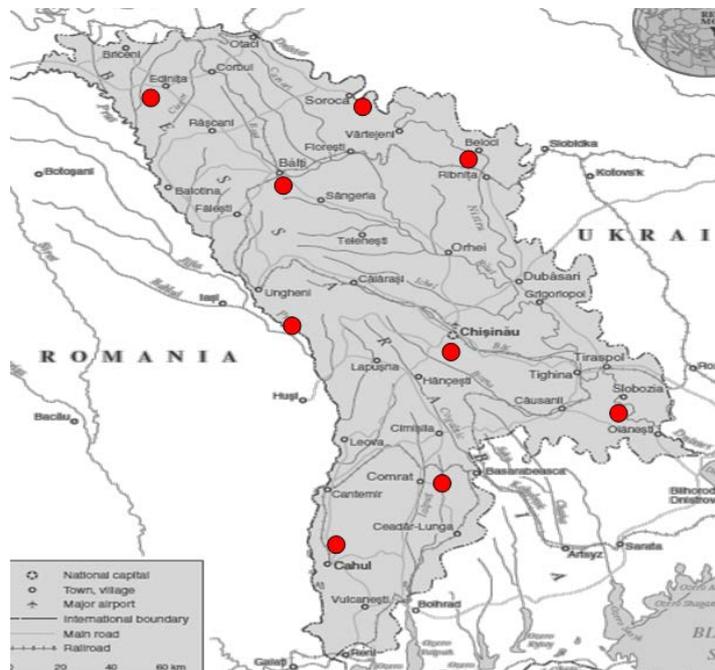
- fever $> 38^{\circ}\text{C}$ AND
- cough OR sore throat AND
- shortness of breath or difficulty in breathing.

Republic of Moldova

Sentinel SARI surveillance was established in the Republic of Moldova in 2009. Nine sentinel districts report data to EuroFlu. Sentinel surveillance for SARI occurs year round and aggregated data are reported on a weekly basis to the National Centre for Public Health, which coordinates SARI surveillance in the country.

A) Location of sentinel hospitals and patients represented

Nine sentinel districts across the country, including the capital Chisinau, take part in the surveillance. At the 9 sentinel hospitals, surveillance is performed in the ICUs and infectious, paediatric, chronic disease and respiratory disease wards.



B) Respiratory specimen collection and case definitions

Respiratory specimens are collected in severe cases of respiratory infections in non-sentinel sites for the following risk groups: 1) children aged <5 years, 2) pregnant woman, 3) patients with chronic diseases (diabetes, obesity, cardiovascular, respiratory), and 4) persons aged ≥ 65 years. Post-mortem samples may also be collected from severe cases with respiratory infection.

Three out of nine sentinel sites are involved in collecting respiratory samples to monitor influenza viruses, i.e. one naso-pharyngeal swab from the **first patient** hospitalized with clinical signs (Monday – Thursday), samples from patients diagnosed with acute bronchiolitis (bronchiolitis syndrome) and samples from patients meeting the below case definition.

SARI case definition for persons aged ≥ 5 years

Severe Acute Respiratory Infection

Onset of the following symptoms ≤ 7 days prior to hospital admission:

- fever > 38 ° C AND
- cough OR sore throat AND
- difficulty in breathing or shortness of breath, broken (breathe in and out soon).

SARI case definition for children aged <5 years

Pneumonia:

- cough OR shortness of breath AND
- breathing faster than 40 breaths/minute (child aged 12–59 months) OR
- breathing faster than 50 breaths/minute (child aged 2-11 months), with or without clinical syndrome, or radiological pulmonary condensation

Severe pneumonia:

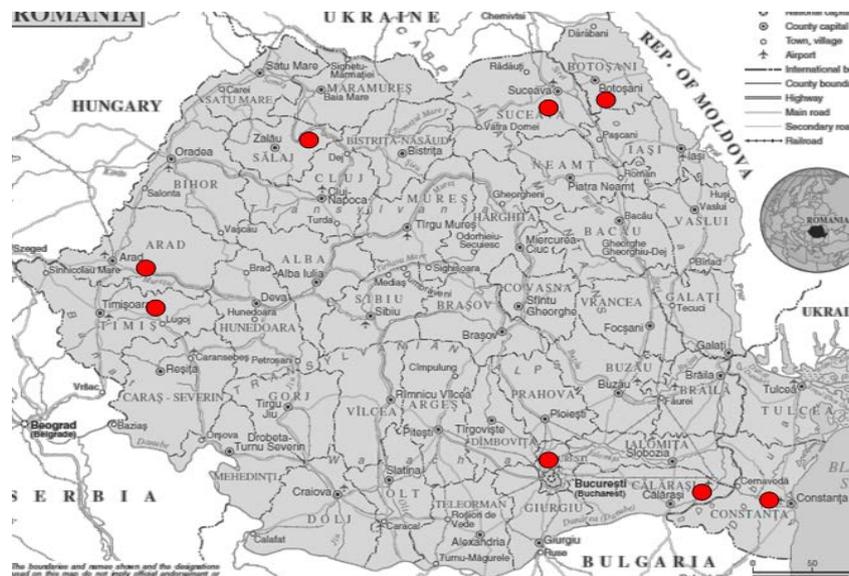
- Any child aged 2-59 months with: cough OR shortness of breath AND
- any of the following severity signs:
 - failure to drink (from a spoon, bottle or cup) or
 - failure to suckle at the breast
 - vomiting OR
 - seizure OR
 - lethargy or unconsciousness
 - dyspnea or stridor inspired effort (wheezing) in a quiet child.

Romania

SARI surveillance was established in 2009 by the National Centre for Surveillance and Control of Communicable Diseases, the National Institute of Public Health, Romania. The number of hospitals participating in SARI surveillance has ranged from 12 (2009/2010) to 26 (2010/2011). For the 2011/2012 season, data from a total of 21 hospitals were reported to EuroFlu. Case-based data reporting of SARI cases occurs on a weekly basis to the National Centre, from week 46 until week 20. SARI surveillance is usually discontinued during the summer period pending recommendations from the National Centre for Surveillance and Control of Communicable Diseases.

A) Location of sentinel hospitals and patients represented

The sentinel hospitals are located in 7 counties throughout the country and in Bucharest Municipality. They include emergency, infectious diseases, pulmonology and pediatric hospitals. Wards participating in SARI surveillance include infectious diseases, internal medicine and paediatric, as well as ICUs. Patients of all age groups are represented in the surveillance system.



B) Respiratory specimen collection and case definitions

From week 46 until the onset of influenza activity (i.e. the week in which 10% of respiratory samples test positive for the same subtype/variant), samples from the first 3 detected SARI cases in each sentinel hospital are tested for influenza. Of the samples testing negative, 25% are investigated for other etiologies, including RSV, hMPV, parainfluenza viruses, coronaviruses and pneumococcus depending on available resources.

After onset of influenza activity (season), one sample per week for each sentinel hospital is collected from the first SARI case detected and the sample is tested only for influenza.

In the 2011/2012 season, the following new SARI case definition proposed by the WHO Regional Office for Europe was used.

Acute respiratory illness with onset ≤ 7 days prior to hospital admission that results in overnight hospitalization and includes:

- history of fever or measured fever of $\geq 38^{\circ}\text{C}$ AND
- cough AND
- shortness of breath or difficulty in breathing.

Russian Federation

The Russian Federation introduced sentinel SARI surveillance in 2010. A total of 19 hospitals, located in 9 cities within 6 federal districts, participate. Sentinel surveillance for SARI occurs year round and case-based data are reported on a weekly basis to the National Influenza Centre at the Research Institute of Influenza (St. Petersburg, Russian Federation).

A) Location of sentinel hospitals and patients represented

Surveillance takes place in ICUs and respiratory disease wards of infectious diseases hospitals. In all cities except St. Petersburg, surveillance includes both children and adults (in St. Petersburg only children are included).



B) Respiratory specimen collection and case definitions

Respiratory specimens are collected from a sub-sample of SARI cases of all ages in the surveillance system. No standard selection procedure exists, although the samples are taken from all patients in the beginning of the season. With an increasing number of SARI cases as influenza season progresses, specimens are taken from the majority of SARI patients. The number of hospitals that report to EuroFlu generally varies from 11 to 15 of the 19 hospitals included in SARI surveillance.

SARI case definition for persons aged ≥ 5 years

Onset of the following symptoms ≤ 7 days prior to hospital admission:

- fever $>38^{\circ}\text{C}$ AND
- cough OR sore throat AND
- shortness of breath or difficulty in breathing.

SARI case definition for children aged < 5 years

For children aged < 5 years, the following case definitions for pneumonia and severe pneumonia from the Integrated Management of Childhood Illness (IMCI) programme are used.

Pneumonia:

- cough OR difficulty in breathing; AND
- breathing faster than 40 breaths/minute (ages 1–5 years);

- breathing faster than 50 breaths/minute (ages 2–12 months) (note that infants less than 2 months of age breathing 60 times or more per minute should be referred for serious bacterial infection).

Severe pneumonia:

Any child aged 2 months to 5 years with

- cough OR difficulty in breathing AND
- any of the following general severe signs:
 - unable to drink or breastfeed OR
 - vomits everything OR
 - convulsions OR
 - lethargy or unconsciousness OR
 - chest indrawing or stridor in a calm child.

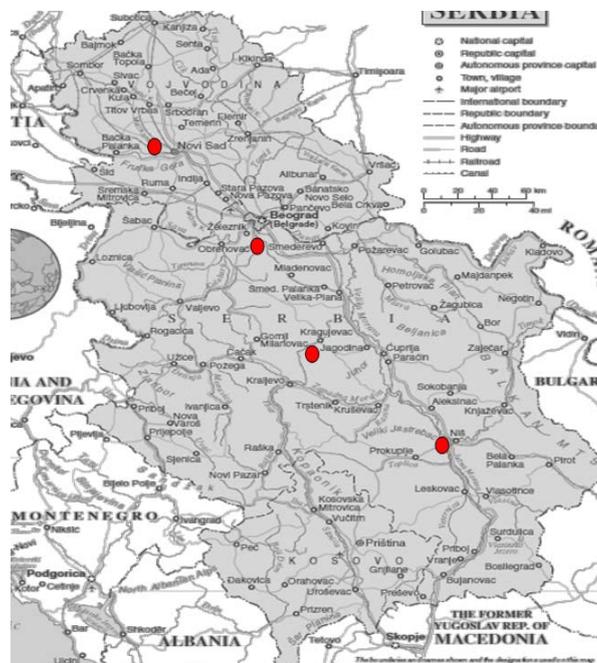
Serbia

Sentinel SARI surveillance was implemented in Serbia in November 2009. During the 2009/2010 pandemic season, SARI surveillance was performed year round. Since the 2010/2011 influenza season, sentinel SARI surveillance has been carried out during the winter season only, from week 40 to week 20.

Aggregated data from the surveillance system are reported on a weekly basis to the Institute of Public Health of Serbia.

A) Location of sentinel hospitals and patients represented

Currently 10 sentinel hospitals in 4 cities (Belgrade, Kragujevac, Novi Sad and Niš) participate in the SARI surveillance system. ICUs and infectious disease, paediatric and respiratory disease wards are all represented.



B) Respiratory specimen collection and case definitions

Respiratory specimens are collected from a selection of SARI cases from hospital, but the number of collected and tested samples varies according to the capacity of the reference laboratory for influenza.

SARI case definition for all ages

An acute respiratory illness with onset of the following symptoms ≤ 7 days prior to hospital admission, requiring overnight hospitalization:

- history of fever or measured fever of $\geq 38^{\circ}\text{C}$ AND
- cough AND
- shortness of breath or difficulty in breathing.

For all laboratory/confirmed cases, case-based data are collected including patient demographics, clinical signs and symptoms, underlying chronic conditions and risk factors, antiviral use during current illness, vaccination history for current season, severity of illness and patient outcomes.

Slovakia

Sentinel SARI surveillance was implemented in 2009 in Slovakia. SARI case-based data are reported by the regional public health authorities to the central level on a daily basis.

A) Location of hospitals and patients represented

SARI surveillance is performed by all hospitals in the country. The wards that can be used for SARI surveillance are not strictly defined, but most of the cases are reported from the infectious, pulmonary, internal medicine, paediatric, geriatric and cardiovascular disease wards and intensive care units. The regional public health authority is contacted upon admission of a patient meeting the SARI criteria. All SARI cases are entered into the Epidemiological Information System (EPIS – the epidemiological system on the central level) by the regional public health authority on an individual basis, including both epidemiological and laboratory data. All age groups are represented in the surveillance system. Data on all SARI cases are reported weekly to EuroFlu.

B) Respiratory specimen collection and case definition

Respiratory specimens are collected in all patients who are admitted to hospital with severe influenza-like disease; in cases with breathing difficulties; or in lethal cases that suffered influenza-like disease. The samples are sent to the laboratory for virus detection.

SARI case definition for all ages:

- disease with sudden onset of temperature
- cough OR sore throat AND
- shortness of breath or difficulty in breathing.

Ukraine

Sentinel SARI surveillance was initiated in Ukraine in 2007. SARI surveillance is year round and data are reported to the central level on a weekly basis.

A) Location of sentinel hospitals and patients represented

Ukraine selected 10 hospitals located in Kiev City, Odessa, Khmel'nitsky and Dnipropetrovsk to participate in SARI surveillance. The surveillance sites within each city represent adult infectious disease, adult pulmonology, children's infectious disease and general hospitals. The sentinel reporting units within the selected hospitals are represented by ICUs and/or infectious wards of the selected hospitals. Data from all 10 hospitals are reported to EuroFlu and all age groups are represented.



B) Respiratory specimen collection and case definitions

Currently, specimens are taken from the first 8 patients per week meeting the SARI case definition in each of the selected hospitals during the influenza season (40–20 weeks) and the first 4 patients per week meeting the SARI case definition in each of the selected hospitals during the inter-season period (weeks 21–39).

SARI case definition for persons aged ≥5 years

Acute respiratory disease of the lower respiratory tract requiring hospitalization with the following symptoms:

- fever $>38^{\circ}\text{C}$ AND
- cough OR sore throat AND
- shortness of breath or difficulty in breathing.

SARI case definition for children aged <5 years:

- fever $>38^{\circ}\text{C}$ AND
- tachypnea (>60 per minute for infants aged 0-1 months; >50 per minute in children aged 2-11 months; >40 per minute in children 12-59 months); AND
- at least one of the following symptoms:
 - inability to drink or eat or breastfeed OR
 - lethargy or unconsciousness OR

- repeated vomiting OR
- seizures OR
- retraction of the chest.