

# Severe viral respiratory disease surveillance

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# Outline

- Approaches in the EU/EEA – some historical background
- Variables collected and description of surveillance systems used for severe disease
- Use and adaptation of surveillance instruments during the COVID-19 pandemic (examples from Germany)



## Surveillance and Studies in a Pandemic – a short History of severe disease surveillance in Europe

- After the 2009 influenza pandemic, the need to assess the severity of an epidemic/pandemic became clear.
- The results of some approaches (CFR) came too late for timely decisions or were not flexible enough.
- The establishment of surveillance systems for severe disease was strongly recommended but was challenging to implement in many European countries with already existing strong and robust sentinel surveillance systems in primary care.



## **Component 3. Surveillance of severe acute respiratory infection and fatal cases related to pandemic influenza in the EU/EEA**

### **1 Objectives**

#### **1.1 Objectives for severe acute respiratory infection (SARI)**

The objectives for the surveillance of severe acute respiratory infection are:

- to contribute to the monitoring of the severity of the pandemic so as to detect indicators of increasing severity at an early stage, which may justify more robust public health measures;
- to monitor and describe SARI and deaths, in order to inform public health stakeholders to better coordinate measures such as:
  - determining the proportion of SARI due to the influenza A(H1N1) 2009 virus;
  - monitoring co-circulating subtypes (if possible);
  - determining the frequency of underlying conditions among individuals with SARI;
  - monitoring the frequency of healthy individuals presenting with SARI; and
- to generate hypotheses on risk factors for severe disease associated with pandemic influenza, to be tested with ad hoc studies as required.

#### **1.2 Objectives for influenza-related fatal cases**

The objectives for the surveillance of influenza-related fatal cases are:

- to monitor deaths in persons with SARI;
- to determine the proportion of death due to influenza; and
- to capture information related to post-mortem diagnosis in unexpected deaths that are found to be due to influenza.



## Patterns of Influenza Infection and Disease in Europe 2010-2011 and Future Severe End Influenza Surveillance in Europe – an ECDC Expert Meeting May 3-4th, 2011 Stockholm

2. **Determining future severe-end influenza surveillance for ECDC.** One of the most important weak-points of European influenza surveillance identified by Member States and ECDC is surveillance of severe disease and premature mortality, so-called *severe-end flu surveillance*. This was a recurrent theme in the evaluations of the pandemic surveillance but is equally true for seasonal influenza. There is therefore a need to look at how surveillance should be carried out in the future. Since the start of the 2009 pandemic, ECDC and Member States have been trying to implement a system of severe-end surveillance based on a Severe Acute Respiratory Infection (SARI) case definition, and initially developed for moderate and low-resource countries. Results have been mixed with a few countries having partial success but most finding this difficult to implement.



# Surveillance of severe influenza in the EU/EEA

## Background document

Annual Influenza Meeting, Warsaw, Poland (May 30<sup>th</sup> – June 1<sup>st</sup> 2012)

## 1. Background

At the beginning of the 2009 influenza pandemic, a surveillance of severe disease was implemented at the EU level and has continued since. Although planned as a syndromic surveillance, some countries reported laboratory-confirmed hospitalised influenza cases, reflecting the coexistence of various surveillance schemes in Europe.

This update aims at clarifying and simplifying ECDC data collection on severe influenza cases. From now on, only hospitalised laboratory-confirmed influenza cases will be reported in the weekly bulletin. However, it will remain possible to report SARI cases, which will be analysed in the annual influenza report.



**WHO Regional Office for Europe and European Centre for Disease Prevention and Control  
Joint Annual European Influenza Surveillance Meeting 11- 13 June, 2014 Vienna, Austria**

## 3. Working groups: Influenza surveillance

### Background

To support the coordination of influenza surveillance by ECDC and WHO/Europe and in the light of the launching of a joint bulletin in the 2014-2015 season, this working group session will discuss key aspects of influenza surveillance and the data reported by the Member States:

#### 1. Severe disease surveillance

Since the 2009-10 influenza pandemic, ECDC and WHO have collected, analysed and disseminated data from severe disease surveillance. With various surveillance systems, populations under surveillance and case definitions, analyses at the European level have always been challenging. Preliminary results from a Regional survey sent by WHO/Europe in 2014 to 50 Member States highlight the diversity of influenza surveillance systems throughout the Region. In particular, the survey showed that there are currently 37 surveillance systems for severe respiratory disease including laboratory confirmed influenza in hospitals and ICU, and sentinel SARI surveillance. In 2013, an evaluation of severe influenza surveillance in EU/EEA countries by ECDC also described highly heterogeneous systems across Europe and suggested that the surveillance at the European level only partly met its objectives<sup>1</sup>. In February 2014, these findings were discussed at the ECDC Advisory Forum (AF) which recommended restricting the analysis to cases admitted to intensive care units (ICU). This session will focus on gaining a better overview of the current surveillance systems for severe disease, the data being collected and how to collate and analyse the data in the ECDC/WHO/Europe bulletin.



Variable collected	Description of the surveillance system for the disease / respiratory pathogens
Legal character	<b>Compulsory:</b> The surveillance system has a legal basis (at the national administrative level or other) where it is stated that reporting of cases of the disease/s under surveillance is compulsory.
	<b>Voluntary:</b> The surveillance system has is based on a voluntary agreement (at the national level or other) where it is stated that reporting of cases of the disease/s under surveillance is on a voluntary basis.
Comprehensiveness	<b>Comprehensive:</b> Reporting is based on cases occurring within the whole population of the geographical area where the surveillance system is set up (national, regional, etc).
	<b>Sentinel:</b> Reporting is based on a selected group of physicians/hospitals/laboratories/or other institutions' notifications and/or cases occurring within a selected group of population defined by age group, gender, exposure or other selection criteria.
Case-based	<b>Case-based:</b> Each individual case of the disease/s under surveillance is reported separately.
	<b>Aggregated:</b> Only the total number of cases of the disease/s under surveillance are reported (possibly broken down by age, sex and/or other criteria).
Case definition used	<b>Confirmed:</b> hospitalised laboratory confirmed influenza/COVID-19/RSV cases
	<b>SARI:</b> severe acute respiratory infection/illness

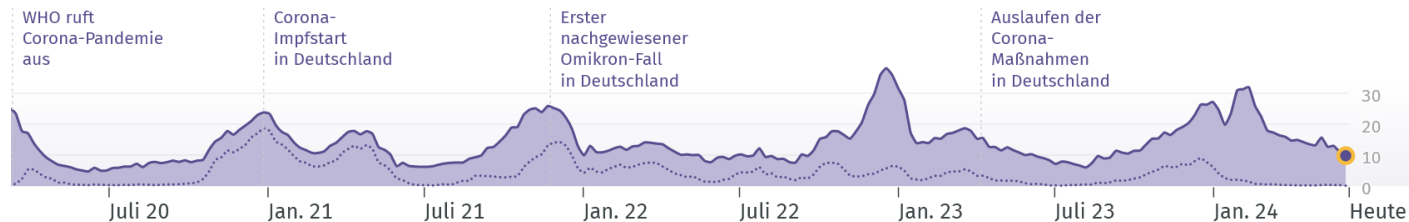




## Severe disease surveillance – **Hospital** surveillance systems

- **Sentinel surveillance** = representative sample of all cases in a hospital according to a certain case definition: how many hospitals? Selection criteria for sentinel sites?
- **SARI case definition**: how sensitive / specific ?
- **EHR Surveillance**: case definition based on ICD10 codes: how sensitive/specific? Admission or discharge diagnosis?
- **Surveillance of laboratory confirmed cases** (SARS-CoV-2, Influenza virus, RSV) in **hospital**, in **ICU** or **both**?

# Severe disease data from different sources in Germany

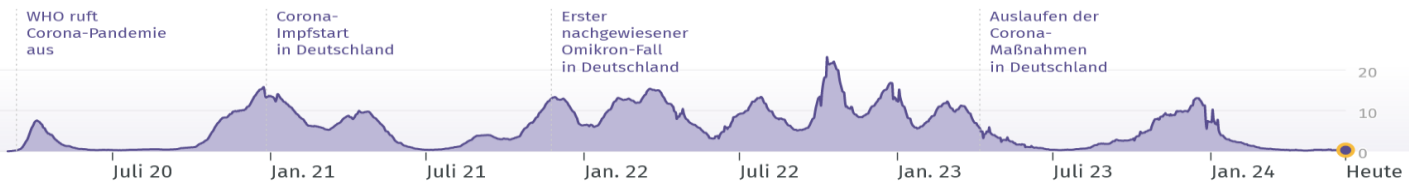


**Incidence of SARI cases**  
 (per 100 000 pop.)

dotted line:

**Incidence of COVID-SARI**

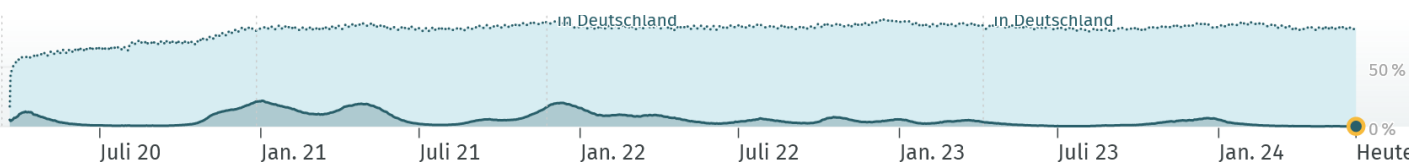
→ Sentinel



**Incidence of**  
**lab confirmed, hospitalised**  
**COVID-19 cases**

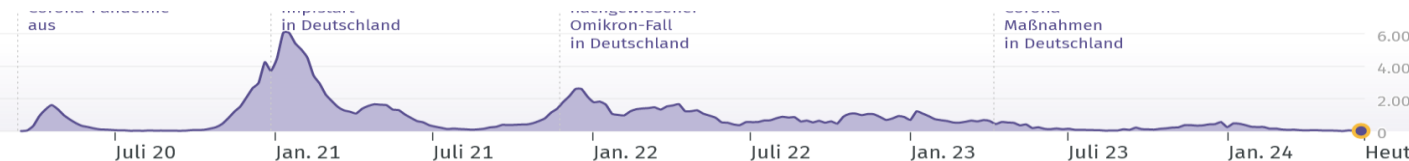
→ mandatory notification

■ Hospitalisierungen mit COVID-19



**% COVID-19 of all**  
**ICU occupancy**

→ mandatory notification



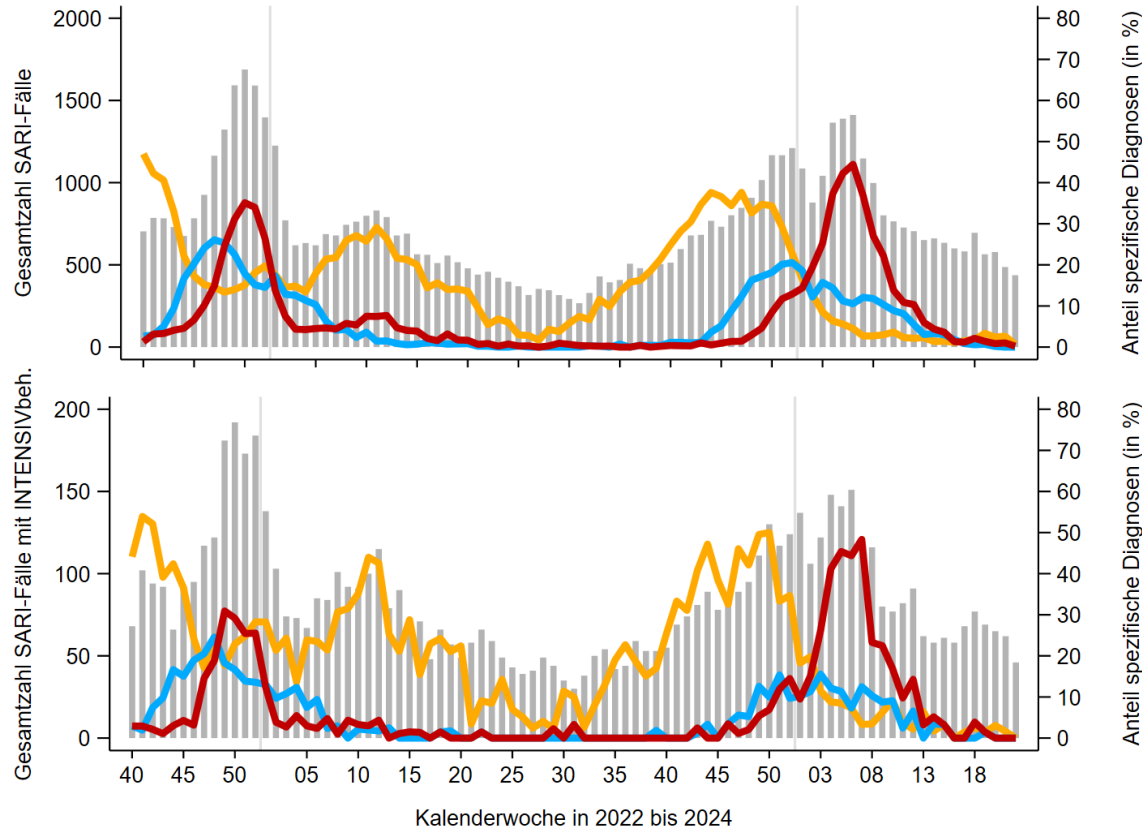
**fatal cases of COVID-19**

→ mandatory notification

■ Wöchentliche Todesfälle

<https://infektionsradar.gesund.bund.de/de>

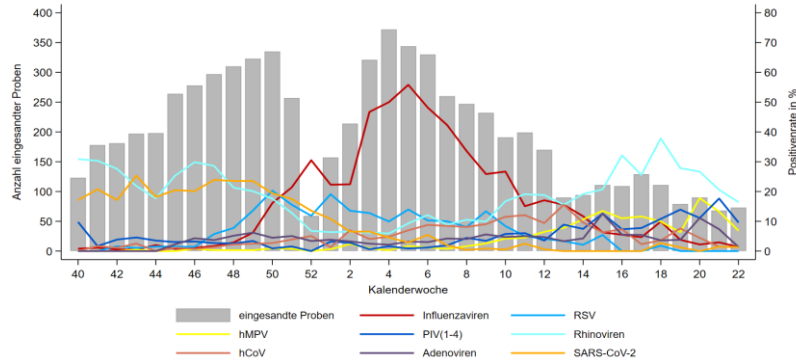
# Integrated SARI surveillance for COVID-19, Influenza, RSV



Syndromic SARI  
surveillance  
(EHR-SARI)

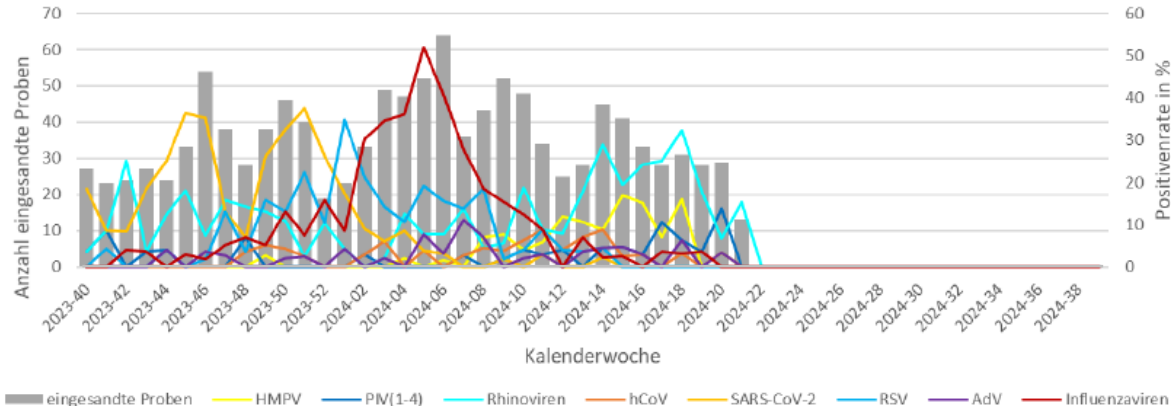
70 Sentinel hospitals  
covering ~6 % of  
hospitalised cases  
in Germany

# Integrated virological surveillance of COVID-19, Influenza, RSV



**Virological surveillance**  
**National Influenza Centre at RKI**  
**Primary care**  
 (~ 100 Sentinel sites: GP, Paed.)

Erregernachweise im virologischem SARI-Sentinel, Saison 2023/24



**Secondary care**  
 (14 Sentinel hospitals)



## Conclusion and Outlook

- Since the 2009 influenza pandemic, countries in Europe have been trying to establish surveillance for severe disease
- The implementation of new surveillance systems is complicated, expensive and not always sustainable
- The COVID-19 pandemic has added another level of complexity to our surveillance systems that were all more or less focused on influenza
- The increasing use of multiplex PCR and digital health data offers new opportunities, but also new challenges

## Acknowledgement

- Local health authorities
- Physicians in sentinel primary care practices and in sentinel hospitals
- Data center Helios Kliniken GmbH
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**Thank you for your attention**

