Questionnaire for the evaluation of severe acute respiratory infection (SARI) surveillance within SiVIRA, the Spanish Acute Respiratory Infection Surveillance System, 2025

In 2025 the hospital-based component of SiVIRA, the Spanish Acute Respiratory Infection Surveillance System, was evaluated. SiVIRA conducts sentinel surveillance of acute respiratory infection in primary care and of severe acute respiratory infection (SARI) in hospitals. That component operates across a decentralised network coordinated by the 18 Regional Public Health Authorities (RPHA) under the common national protocol in force for the 2024/25 season[1]. This record contains the full research instrument used for that evaluation, which examined how surveillance was implemented locally, how closely reported practice followed the national case definition, and how those operating the system assessed its qualitative attributes.

Two questionnaires were administered in a single round between January and May 2025, one to the coordinators of all 18 RPHAs and one to the eligible participating hospitals of the SiVIRA network. Each comprised two parts. Part 1 (Sections 1 to 7) covered the structure and operation of the system, from case ascertainment through to data validation. Part 2 (Sections 8 to 14) covered the qualitative attributes of the system, the analysis of strengths, weaknesses, opportunities and threats (SWOT) and the overall assessment.

The two questionnaires are reproduced here as a single combined instrument, in the order in which they were administered. Table 1 summarises its structure. Questions common to both respondent types are unmarked. Questions asked only to hospitals are marked with †, and questions asked only to regional coordinators are marked with ‡. Where questions were asked separately for syndromic and systematic surveillance, this is indicated. All questions marked with an asterisk (*) required a response, with a "Don't know" option where applicable.

The instrument may be reused, adapted and translated with attribution under a Creative Commons Attribution 4.0 International licence. It was designed for a decentralised, hospital-based SARI surveillance network and will require adaptation to other SARI surveillance settings. It was administered in Spanish and the version deposited here is an English translation. No individual participant responses are included in this record.

We thank the hospitals and RPHA coordinators of the SiVIRA network, whose participation made this work possible.

Table 1. Structure of the instrument

Section	Content
1	System characteristics: respondent and hospital details, participating hospitals, reference population (denominator) and its adequacy
2	SARI case ascertainment: case identification methods and manual validation (2.1–2.2); perceived ascertainment biases and difficulties in ascertainment (2.3–2.4)
3 †	Diagnostic coding: computer-assisted coding support, coding practices and perceived coding quality by clinical encounter
4	Case definition: codes and diagnostic impressions used, diagnostic positions, inclusion and exclusion criteria, readmission period

[1] Red Nacional de Vigilancia Epidemiológica (RENAVE). Instituto de Salud Carlos III. Protocolo para la vigilancia de infección respiratoria aguda grave (IRAG) en hospitales. España Temporada 2024-25 [Internet]. Centro Nacional de Epidemiología. 2024. Available from: https://cne.isciii.es/documents/d/cne/protocolo-vigilancia-de-irag-en-espana-temporada-2024-25-1

Section	Content
5	Data extraction and automation: extraction method, perceived latency and perceived data quality by variable (5.1); requirements for further automation and existing automation plans (5.2–5.3)
6	Laboratory testing for systematic surveillance: patients tested on designated days and how test requests are generated
7	Data validation: internal and external validation procedures and consistency checks between the syndromic and systematic components
8	Utility: uses of surveillance information, perceived utility ratings, necessity of surveillance variables
9	Acceptability: perceived acceptance by the preventive medicine department, by other hospital wards and by the regional public health service
10	Simplicity: perceived complexity of performing surveillance and availability of channels to clarify procedures
11	Flexibility: perceived capacity to incorporate protocol changes and provision of training
12	Stability: occurrence, frequency and causes of interruptions, and perceived stability
13	Resilience: difficulties in recovering after unforeseen disruptive events and perceived recovery capacity
14	SWOT analysis, proposed improvements and overall assessment of the system

† Section asked only to hospitals.

Abbreviations. API, application programming interface; ARDS, acute respiratory distress syndrome; ARI, acute respiratory infection; CMBD, Conjunto Mínimo Básico de Datos (Spanish hospital discharge database); COPD, chronic obstructive pulmonary disease; COVID-19, coronavirus disease 2019; EHR, electronic health record; ICD, International Classification of Diseases; ICU, intensive care unit; PCR, polymerase chain reaction; RPHA, Regional Public Health Authority; RSV, respiratory syncytial virus; SARI, severe acute respiratory infection; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2; SiVIRA, Sistema de Vigilancia de Infección Respiratoria Aguda (Spanish Acute Respiratory Infection Surveillance System); SWOT, strengths, weaknesses, opportunities and threats.

PART 1. STRUCTURE AND OPERATION OF THE SYSTEM

Section 1. System characteristics

1.1. Name of respondent, department/service and region.

1.2†. For your hospital, provide: hospital name, number of beds, population under surveillance, surveillance component (syndromic/systematic/both), days of participation in systematic surveillance (Monday–Sunday), and whether a maximum sample size limit exists for systematic surveillance; if yes, specify number.

1.2‡. For each participating hospital, provide: hospital name, number of beds, population under surveillance, surveillance component (syndromic/systematic/both), days of participation in systematic surveillance (Monday–Sunday), and whether a maximum sample size limit exists for systematic surveillance; if yes, specify number.

1.3‡. Total number of participating hospitals: total, syndromic component and systematic component.

1.4‡. Do all hospitals in the region participate, or only a selection? [All / Selection]

1.5*. How is the reference population (denominator) calculated? [Don't know / Health insurance cards assigned to catchment area / Census data / Other (specify)]

1.6‡. To which month does the estimated reference population correspond?

1.7‡*. Frequency of reference population updates. [Don't know / Annually / Quarterly / Other (specify)]

1.8*. Does the reference population adequately reflect the population actually served? [Don't know / Yes / No]

1.8.1. If no, indicate why (multiple responses allowed): [Hospital serves population from outside its catchment area / Part of the assigned population goes to other hospitals / More severe SARI cases are referred to other centres / ‡ Hospital has no assigned reference population / Other (specify)]

1.9. Comments.

Section 2. SARI case ascertainment

Asked separately for syndromic and systematic surveillance.

2.1*. How are SARI cases identified? [Manual review of all hospital admissions / Automated list based on ICD codes and/or diagnostic impressions / Mixed system: automated list with subsequent manual validation / Specific admission questions (e.g., "Does the patient present with ARI?"); if selected: mandatory or voluntary question / Other (specify)]

2.2*. If manual validation exists, who performs it? [Don't know / Preventive Medicine department / ‡ Regional public health services / Other (specify)]

2.3*. Indicate whether biases exist in SARI case ascertainment (multiple responses allowed): [Don't know / No biases perceived / Over-representation of paediatric cases / Over-representation of ICU cases / Low quality of diagnostic coding / Low percentage of coding or admission reason registration / Inability to correctly apply exclusion criteria / Limitation to a single diagnostic code or admission reason / False positives (e.g., non-acute COPD or asthma) / False negatives (SARI-compatible codes not captured) / Other (specify)]

2.4†. In your opinion, what are the main difficulties for SARI case ascertainment? (free text)

Section 3. Diagnostic coding †

This section was included only in the hospital questionnaire.

3.1*. Are there computer-assisted coding support systems for admission diagnoses (any diagnosis, not only SARI)? [No / Yes, the system suggests keywords based on clinical text, validated by the clinician / Yes, the system suggests ICD codes based on clinical text, validated by the clinician / Other (specify)]

3.2*. For each clinical encounter, indicate coding practices:

Timing	Required / Voluntary / Not coded	Approximate % coded	Perceived quality (1–5)*
Emergency department admission			
Emergency department discharge			
Ward admission or during stay			
Hospital discharge			

Quality scale: 1 = Very low (frequent errors), 2 = Low, 3 = Medium, 4 = High, 5 = Very high (exceptional errors).

Section 4. Case definition

Asked separately for syndromic and systematic surveillance unless otherwise indicated.

4.1*. For SARI case identification, indicate what is used (multiple responses allowed): [ICD-10 codes / ICD-9 codes / Diagnostic impressions / Other (specify)]

4.2*. If ICD-10 codes are used, indicate which (multiple responses allowed): [J00–J06 (acute upper respiratory infections) / J09–J18 (influenza and pneumonia) / J20–J22 (other acute lower respiratory infections) / J40 (bronchitis) / J42 (unspecified bronchitis) / J44.0–J44.1 (COPD with acute exacerbation) / J80 (ARDS) / J96 (respiratory failure) / J98.8 (other specified respiratory disorders) / R06.0, R06.89, R06.9 (respiratory abnormalities) / J12.82 (COVID-19 pneumonia) / U07.1 (COVID-19) / U07.2 (COVID-19, virus not identified) / B34.9 (unspecified viral infection) / B97.2 (coronavirus as cause of diseases classified elsewhere) / R50.9 (fever) / Other (specify)]

4.3*. If ICD-9 codes are used, indicate which (multiple responses allowed): [460–466 (acute upper respiratory infections) / 480–488 (influenza and pneumonia) / 490 (bronchitis) / 491.9 (unspecified bronchitis) / 491.21 (obstructive chronic bronchitis with acute exacerbation) / 496 (chronic airway obstruction, not elsewhere classified) / 518.5 (ARDS) / 518.81, 518.82 (respiratory failure) / 519.8 (other specified respiratory disorders) / 786.0, 786.09 (respiratory abnormalities; dyspnoea) / 079.82 (coronavirus infection) / 079.99 (unspecified viral infection) / 079.89 (coronavirus as cause of diseases classified elsewhere) / 780.6 (fever) / Other (specify)]

4.4*. If diagnostic impressions are used, indicate which terms (multiple responses allowed): [Respiratory infection/ARI / Dyspnoea / Pneumonia / Pulmonary involvement / Bronchiolitis / Bronchopneumonia / Infiltrates / Opacities / Consolidation / COVID/SARS-CoV-2 / RSV infection / Influenza/influenza-like illness / Acute respiratory failure / COPD exacerbation / Asthma exacerbation / Other (specify)]

4.5*. For the specified codes or diagnostic impressions, indicate which diagnostic positions are considered: [Principal diagnosis only / Principal and secondary diagnosis / First three diagnostic positions / Any diagnostic position / Other criterion (specify)]

4.6*. Indicate whether the following exclusion/inclusion criteria are applied:

Asked separately for syndromic and systematic surveillance. Response options for each criterion: Don't know / Not applied / Partially applied / Fully applied. If "Partially applied" or "Not applied", indicate reason (free text).

Criterion
Symptom onset >10 days before admission
Hospital/emergency stays <24 hours
Death <24 hours after admission
Emergency stays ≥24 hours without ward admission

Criterion
Nosocomial SARI (symptom onset ≥48 hours after admission)
Aspiration pneumonia
Non-acute respiratory acidosis
Non-acute COPD
Non-acute asthma
Non-infectious conditions explaining respiratory symptoms (e.g., acute heart disease, pulmonary embolism)

4.7*. What is the period used to define a new SARI episode (readmission)? [7 days from discharge of previous episode / 14 days from discharge of previous episode / 30 days from discharge of previous episode / Other (specify)]

4.8. Comments.

Section 5. Data extraction and automation

Definitions provided to respondents: Automated extraction = data extracted via queries or APIs from information systems in structured formats requiring minimal or no further processing. Semi-automated extraction = data available in electronic systems but requiring substantial batch transformations. Manual extraction = a person reads and transcribes data individually for each case, including free text in EHRs, PDFs or paper records.

5.1*. For each variable, indicate: (A) extraction method, (B) minimum estimated time from patient admission until data are ready for submission to the † region / ‡ national level, and (C) perceived data quality.

Variable	(A) Extraction method	(B) Minimum latency	(C) Data quality
Demographics (date of birth, sex)			
Symptoms			
Symptom onset date			
Comorbidities			
ICU admission			
ICU admission date			
Death			
Date of death			
Microbiological results			
SARS-CoV-2 sequencing			
Influenza sequencing			
RSV sequencing			
COVID-19 vaccination			
Influenza vaccination			
RSV vaccination			

Response options, identical for every variable. (A) Extraction method: Don't know / Automated / Semi-automated / Manual / Not available. (B) Minimum latency: Don't know / <12 h / 12–24 h / 24–48 h / 48 h–1 week / 1–2 weeks / 2–4 weeks / 1–2 months / >2 months. (C) Data quality: Don't know / Good / Medium / Low.

5.2*. What would be needed to advance towards more automated data extraction without manual processing? (multiple responses allowed) [Don't know / Development or improvement of † hospital / ‡ regional information systems / Improved interoperability between systems / Standardisation of variables and coding / Staff training / Resources (specify) / Resolution of legal or privacy restrictions / Institutional prioritisation of this surveillance / Other (specify)]

5.2.1. If "Resources" was selected, specify (free text).

5.3*. Do plans currently exist to improve surveillance automation? [Don't know / No / Yes]

5.3.1. If yes, describe planned improvements (free text) and expected implementation timeline (free text).

5.4. Comments on automation.

Section 6. Laboratory testing for systematic surveillance

6.1*. On designated systematic surveillance days, to whom is triple PCR testing performed? [Don't know / All patients meeting the SARI case definition / Only a proportion of captured patients (specify)]

6.2*. How are laboratory test requests made for SARI patients captured by systematic surveillance? (multiple responses allowed) [Don't know / Test request generated automatically for all SARI cases / Clinician responsible for the patient requests the test / Preventive medicine professional requests the test (e.g., if not requested by clinician) / Other (specify)]

6.3. Comments on laboratory testing .

Section 7. Data validation

7.1*. Internal data quality validation: what internal validation procedures are performed? (multiple responses allowed) [Don't know / No internal validation performed / Automated validations at data entry / Out-of-range value checks / Consistency verification between related variables / Duplicate control / Random review of a sample of cases to verify inclusion/exclusion criteria / Retrospective retrieval of missing values / Other (specify)]

7.2*. External data quality validation: what external validation procedures are performed? (multiple responses allowed) [Don't know / No external validation performed / Comparison with hospital discharge database (CMBD) / † Comparison with other surveillance systems (specify) / Other (specify)]

7.3*. Is any consistency check performed between syndromic and systematic surveillance data during days when both operate simultaneously? [Don't know / Yes / No]

7.3.1. If yes, indicate: [Results concordant / Higher case count in systematic vs syndromic / Lower case count in systematic vs syndromic / Higher positivity in systematic vs syndromic / Lower positivity in systematic vs syndromic / Other (specify)]

7.4. Comments.

PART 2. SYSTEM ATTRIBUTES, SWOT ANALYSIS AND OVERALL ASSESSMENT

Section 8. Utility

8.1‡*. How has SARI surveillance information been used in your region in the last 2 years? (multiple responses allowed)

A. Prevention and response: [Don't know / Not used / Detection of epidemic activity and intensity / Characterisation of geographic spread / Characterisation of temporal evolution / Clinical characterisation of cases / Characterisation of circulating viruses / Severity assessment / Health system impact assessment / Alerts to authorities and health professionals / Informing public health decision-making / Vaccination recommendations]

B. Evaluation and research: [Not used / Vaccine effectiveness evaluation / Risk factor identification / Disease burden estimation]

C. System improvements: [Not used / Standardisation of diagnostic/surveillance protocols / Improvements in diagnostic capacity (subtyping/sequencing) / Improvements in data normalisation and availability / Improvements in automation of other surveillance activities]

D. Dissemination: [Not used / Periodic bulletins/reports / Technical reports for decision-making / Scientific publications/presentations]

8.2†*. Rate (1–5) the utility of SARI surveillance information for anticipating demand peaks and planning resources (beds, staff) in your hospital.

8.3‡*. Rate (1–5) the utility of the system for contributing to its objectives.

Scale: 1 = Very low utility (never used), 2 = Low, 3 = Moderate, 4 = Good, 5 = Excellent.

8.4‡*. Surveillance variables: are any of the following variables NOT necessary for achieving the system's objectives? (multiple responses allowed) [List of demographic, clinical, risk factor, paediatric, outcome and virological variables provided]

8.5‡*. Should any additional variables be added? [No / Yes (specify)]

8.6. Comments on utility.

Section 9. Acceptability

Acceptability refers to the degree of commitment and willingness of staff to participate in SARI surveillance in a sustained manner and with the required quality.

9.1†*. Rate (1–5) the degree of acceptance of the surveillance system by: (a) the Preventive Medicine department; (b) other hospital services/wards.

9.2‡*. Rate (1–5) the degree of acceptance of the surveillance system by the regional public health service.

9.3. Comments on acceptability.

Section 10. Simplicity

Simplicity refers to the ease with which the system can be operated and understood.

10.1*. Rate (1–5) the complexity of performing SARI surveillance † in your hospital / ‡ at the coordination level.

Scale: 1 = Very complex, 5 = Very simple.

10.2*. Are there clear channels for † hospital staff / ‡ hospitals to ask questions or clarify surveillance procedures? [Don't know / No communication channels exist / Yes, and they are effective / They exist but are not always effective]

10.3. Comments on simplicity.

Section 11. Flexibility

Flexibility is the system's capacity to adapt to planned changes such as modifications in case definitions, inclusion of new variables, or adaptation to new applications.

11.1*. Rate (1–5) the system's capacity to incorporate protocol changes or adapt to changes.

Scale: 1 = Very low (changes take >1 year), 2 = Low (6 months–1 year), 3 = Moderate (3–6 months), 4 = Good (1–3 months), 5 = Excellent (<1 month).

11.2*. When planned changes occur in the surveillance system, does the regional public health service provide training to hospital staff? [Don't know / No training provided / Yes, training provided in advance / Yes, but training arrives late or is insufficient]

11.3. Comments on flexibility.

Section 12. Stability

Stability refers to the system's capacity to maintain its usual functioning without interruptions due to expected situations (e.g., high winter demand, staff rotation).

12.1*. Have interruptions occurred in weekly surveillance (reporting or specimen collection/processing) due to holidays, technical changes, high winter demand, or other expected circumstances in recent years? [Don't know / No / Yes]

12.1.1. If yes, indicate the frequency of interruptions (free text) and their causes (free text).

12.2*. Rate (1–5) the system's capacity to maintain its usual functioning without interruptions due to expected situations.

Scale: 1 = Very low stability, 5 = Excellent stability.

12.3. Comments on stability.

Section 13. Resilience

Resilience measures the system's capacity to return to normal operations after unforeseen disruptive situations such as health crises, cyberattacks, etc.

13.1*. Has the surveillance system had difficulties recovering after unforeseen disruptive situations in recent years? [Don't know / No such circumstance has occurred / No / Yes (specify)]

13.2*. Rate (1–5) the system's capacity to recover normal functioning.

Scale: 1 = Normal functioning not recovered after 2 months, 2 = Recovery in 1–2 months without retrospective review, 3 = Full recovery in 1–2 months with retrospective review, 4 = Recovery in 2–4 weeks, 5 = Full recovery in <2 weeks.

13.3. Comments on resilience.

Section 14. SWOT analysis and overall assessment

14.1‡. Please identify the 3 main strengths, opportunities, weaknesses and threats of the SARI surveillance system in your region.

14.2‡. What improvements would you propose for the weaknesses and threats identified? (free text)

14.3*. Rate (1–5) the SARI surveillance system overall.

Scale: 1 = System barely functions or has serious problems, 2 = Functions but with considerable failures, 3 = Intermediate functioning, 4 = Functions well overall, 5 = System functions excellently.

14.4†. What solutions would you propose to improve the system? (free text)