ecdc
EUROPEAN CENTRE FOR DISEASE PREVENTION AND CONTROL

REPORTING PROTOCOL

European Antimicrobial Resistance Surveillance Network (EARS-Net) surveillance data for 2025

Antimicrobial resistance (AMR) reporting protocol 2026

Contents

Introduction

This reporting protocol is for the 2026 data call for antimicrobial resistance (AMR) surveillance data, collected by the European Antimicrobial Resistance Surveillance Network (EARS-Net) for 2025.

The reporting protocol describes the reporting to **EpiPulse Cases**, which is replacing The European Surveillance System (TESSy).

Reporting protocols are data collection guidelines for the data managers of reporting countries and the protocol design is intended to improve user-friendliness by:

- introducing a uniform structure to make it easier for data managers to find data collection information across different subjects;
- removing information which is irrelevant for data managers.

The surveillance protocol will also contain some of the generic information previously contained in the reporting protocols.

Since the data managers in reporting countries often have multiple roles, subject-specific material is sometimes distributed together with a reporting protocol. To maintain the uniform structure, this type of material is included in Annex 2.

How to use this document

This reporting protocol provides information for the data managers of reporting countries in three main sections:

- Reporting to EpiPulse Cases, which contains guidelines on how to prepare data for submission to EpiPulse Cases, deadlines, subject-specific information (e.g. new changes to metadata), and links to further information.
- Annex 1 which contains:
  - the metadata set for the subject(s) covered by this reporting protocol.
  - a history of metadata changes for the subject(s) covered by this reporting protocol.
- Annex 2 which contains subject-specific material relevant for distribution with the reporting protocol.

Finding further information

Updated links to all the schedules, documentation and training materials mentioned in this reporting protocol are included in the EpiPulse Help, including links to:

- EpiPulse Cases Metadata
- EpiPulse Cases Machine to Machine Technical Documentation

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Reporting to EpiPulse Cases

In July 2023, TESSy migrated into the EpiPulse portal. In April 2025, EARS-Net antimicrobial resistance data reporting was fully launched in EpiPulse Cases. EpiPulse Cases replaced TESSy, with the aim of improving the process of reporting, reviewing, and updating surveillance data.

This section provides both an overview of the EpiPulse Cases reporting process and tips on where you can find useful information.

The overall process is as follows:

- Familiarise yourself with the data collection deadlines.
- Prepare (export and transform) your data.
- Check that your data complies with the EpiPulse Cases metadata – see EpiPulse Help.
- Check that your data sources are up-to-date.
- Submit your file(s) to EpiPulse Cases.
- Finalise and approve your submission.

Checking the data collection schedule

A link to the current data collections schedule can be found in the EpiPulse Help section.

Preparing data

After you have exported the data from your national database, you need to ensure that the data are in a format that EpiPulse Cases can accept. EpiPulse Cases accepts only CSV and XML files, optionally ZIP-compressed. The EpiPulse Cases metadata has been developed from the TESSy Metadata, with the aim to make only the minimal number of necessary changes, and to provide a better experience when reporting your datasets to ECDC.

A file converter tool is also available in EpiPulse Cases to support users in the transition period with the conversion of files in TESSy format to a format that would be compatible to EpiPulse Cases, see section 18 in the EpiPulse Cases Guide – see EpiPulse Help.

AMR-specific guidelines for data collection and preparation for EpiPulse Cases are provided in Annex 1 and Annex 2.

Checking metadata

The metadata defines the fields and data formats that are valid as input to EpiPulse Cases for a given subject. The EpiPulse Cases metadata includes a section that compares TESSy and EpiPulse Cases and highlights the changes, to facilitate the transition.

As the requirements for data to be reported by ECDC Stakeholders can change, the data format changes needed to support the new requirements are identified and agreed upon between the National Contact Points for Surveillance, the Network Coordination Groups and ECDC's Disease Experts. These changes are then implemented to the EpiPulse Cases metadata.

Changes to the metadata for the subject of this reporting protocol are described in:

- Changes to current metadata – changes since the last reporting protocol.
- Annex 1 – previous changes.

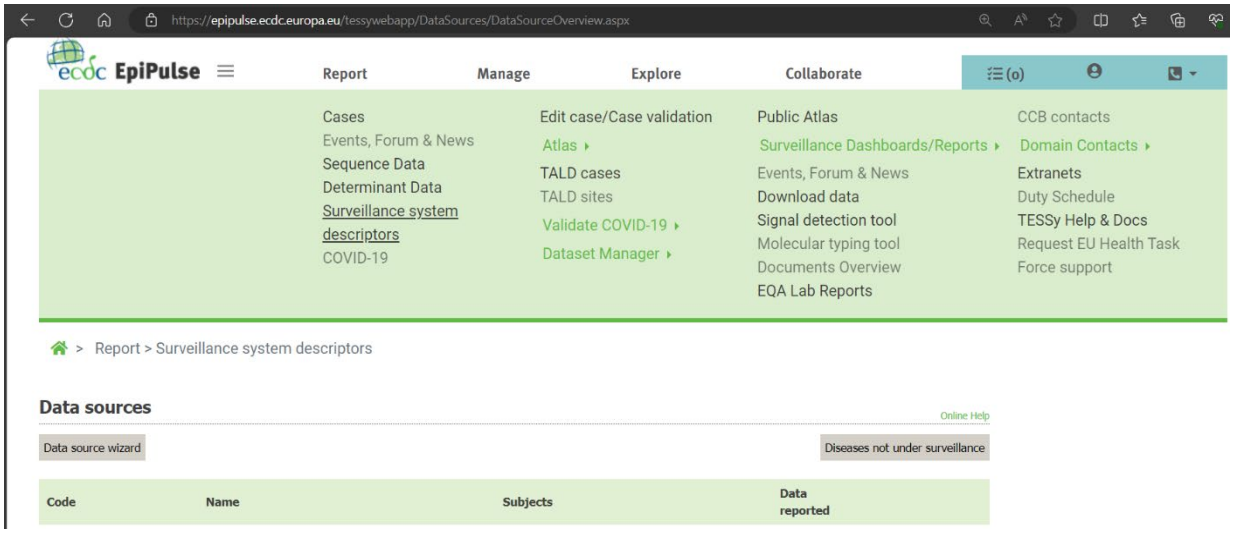
It is especially important to focus on:

- **Field formats**
  Many fields require the data to be formatted in a specific way. For example, dates must be in the YYYY-MM-DD format; dates in the DD/MM/YYYY format will be rejected.
- **Reference values (the equivalent of TESSy Coded Values)**
  Some fields only permit the use of specific values (reference values). For example, **M**, **F**, or **OTH** are the coded values for 'Gender' and any other value in a 'Gender' field will be rejected. Please note that **UNK** is no longer a valid code; you may leave the field empty instead.

The EpiPulse Cases metadata Excel file contains all the definitions and rules necessary to format data correctly. The READ ME sheet of the Excel document explains how to work with the metadata. It can be downloaded from the EpiPulse Help. Filtering the fields in the file by subject will enable you to see the fields required for your subject and the rules that apply to these fields.

Checking your Surveillance System Descriptors

Before submitting file(s), please review your data source(s) in EpiPulse (in the menu, go to 'Report' -> 'Surveillance systems descriptors') and update the information as necessary.



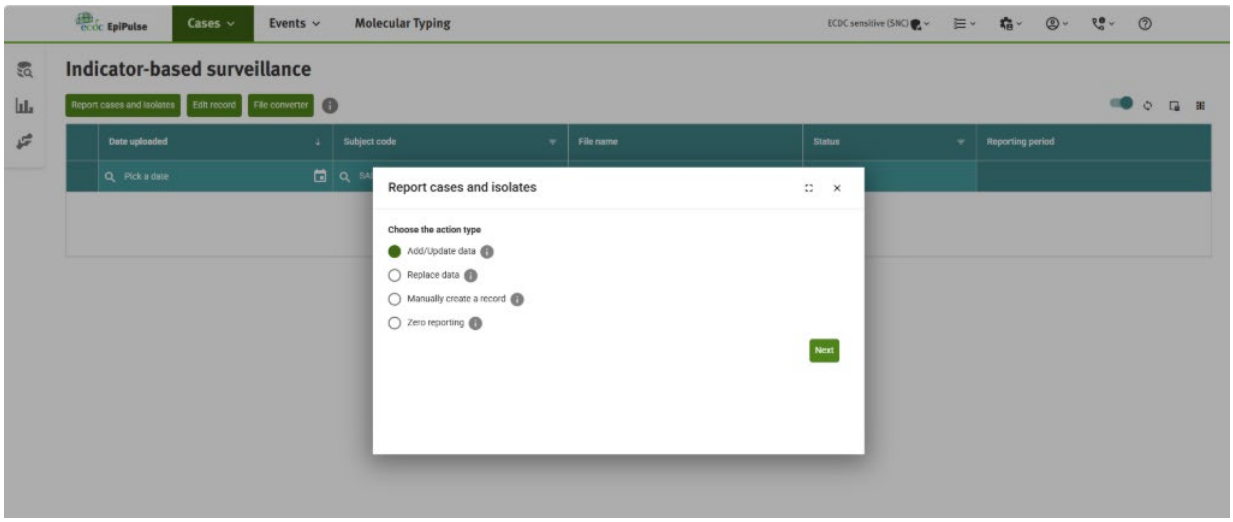
Complete and up-to-date data source information for each subject is important for improving the interpretation of data - each surveillance system has different features that need to be taken into account when comparing data at the European level.

If your data source information is out-of-date and you do not have access rights to update it, please ask your National Focal Point for Surveillance or National Coordinator to do so.

Information on data sources is available in the EpiPulse Cases Guide – see EpiPulse Help.

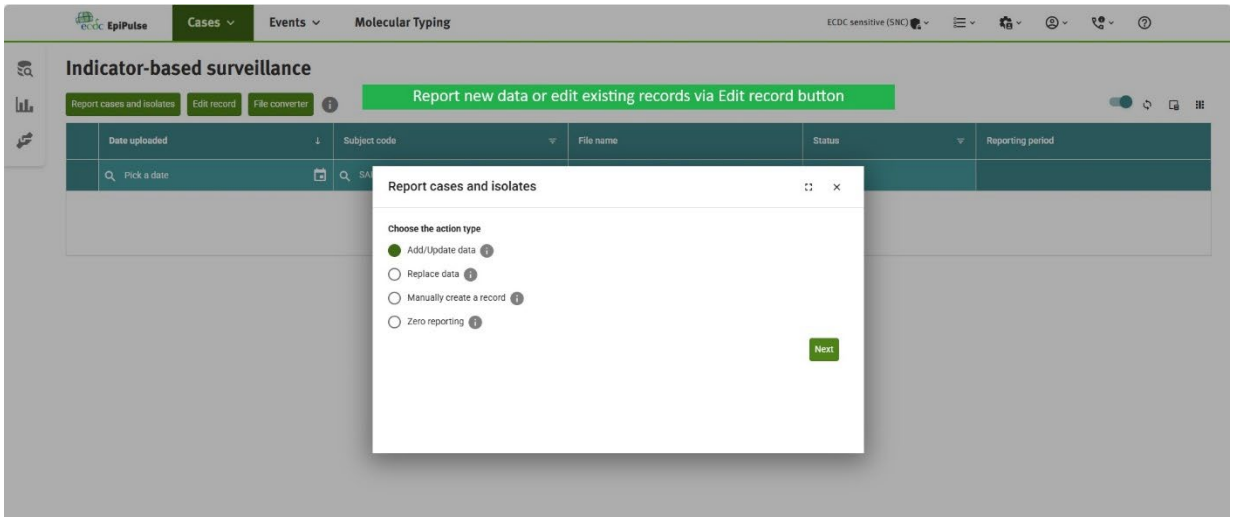
Uploading your data

Data are submitted through the EpiPulse web interface (in the menu, go to Report -> Cases).

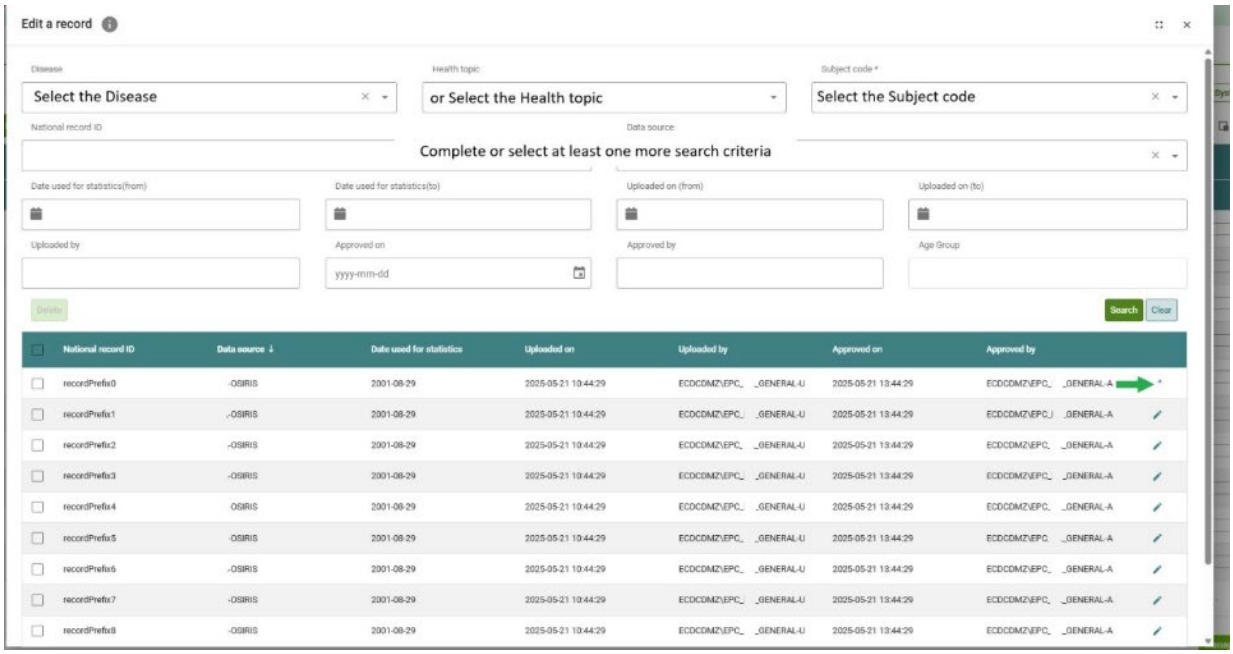


The visual interface for reporting new data and editing existing records has remained similar to that of TESSy.

As with TESSy, you can Add/Update or Replace data with new uploads, using either CSV or XML files. You can also manually create records for some diseases, and report zero cases where appropriate.



The functionality for manually editing existing records is also a familiar experience. Search for the record you wish to edit and modify the existing information as needed.



Finalising your submission

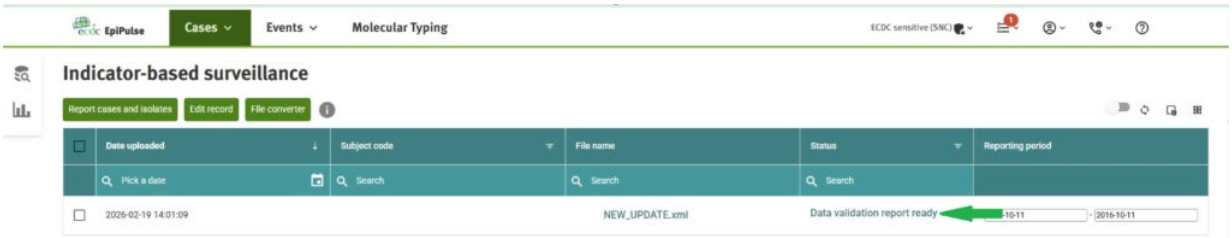
The compliance of your data with the validation rules in the metadata is checked automatically during the data upload process. In EpiPulse Cases this process is called "Technical Validation", and it is the only step where your upload can be rejected, for severe data quality issues, such as the file format not being readable by the system, or mandatory variables having missing values.

If your file is rejected, there will be a message explaining each instance of non-compliance with the metadata that needs correcting.

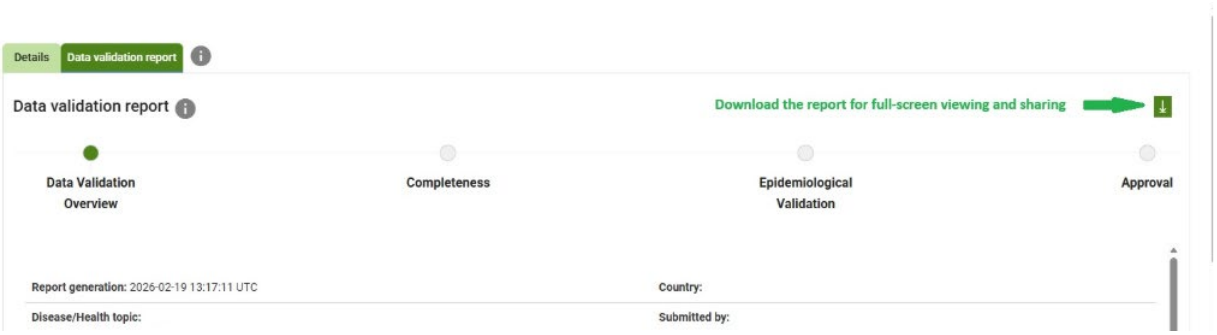
A key new feature in EpiPulse Cases is the Data Validation Report, which puts your data in the context of the already existing information reported by your country for the particular disease or special health issue, and provides you with a detailed overview of the new data in the latest uploaded file, as well as combined with historical data reported by your country. The Data Validation Reports will evolve based on your feedback in collaboration with the ECDC Disease Experts.

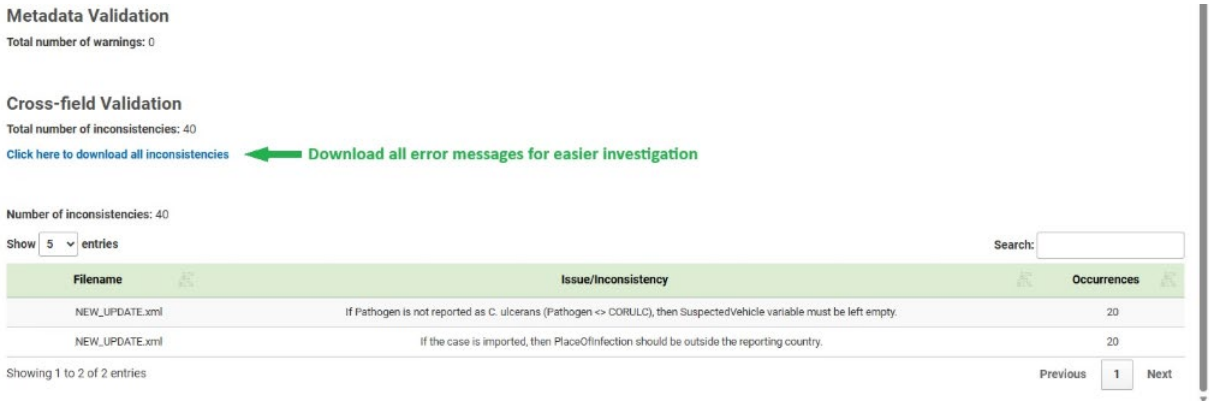
Below you can find a few screenshots of the Data Validation Report.

1. Begin by opening the report:



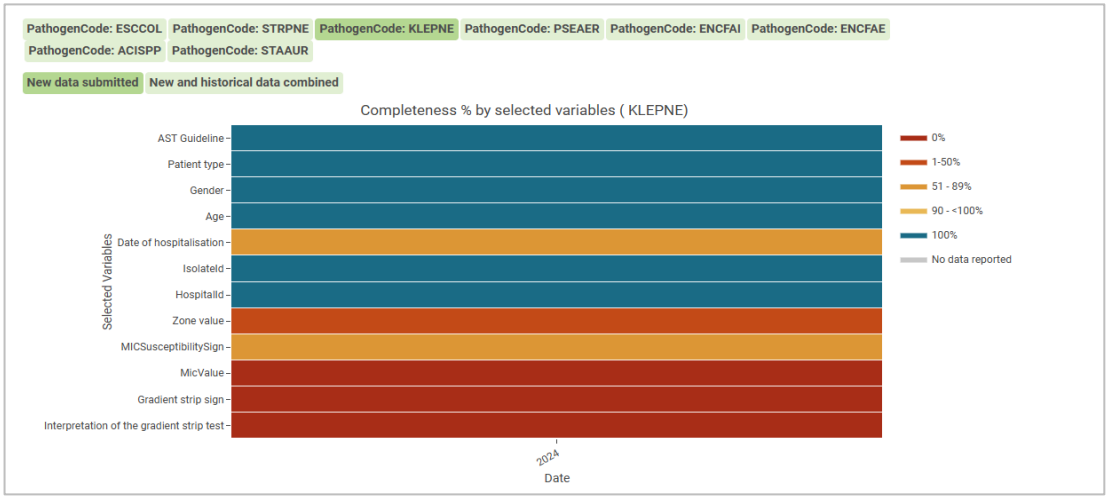
2. View the report in a window, download the list of eventual validation messages, or download the report





3. Check data completeness; both for the new upload, and for historical data.

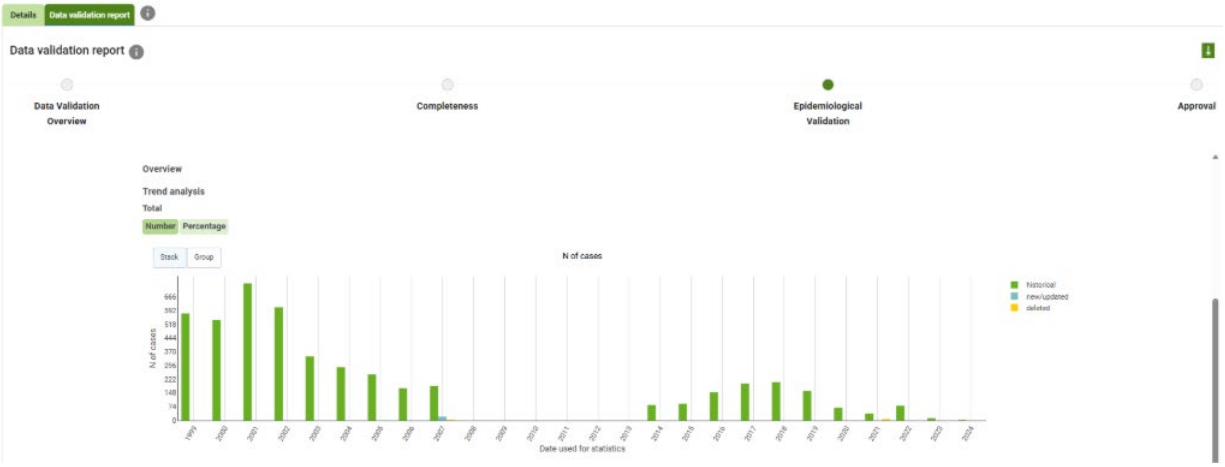
   a. The 'Completeness' of the raw data; both for the new upload, and in the context of historical data, and by pathogen.



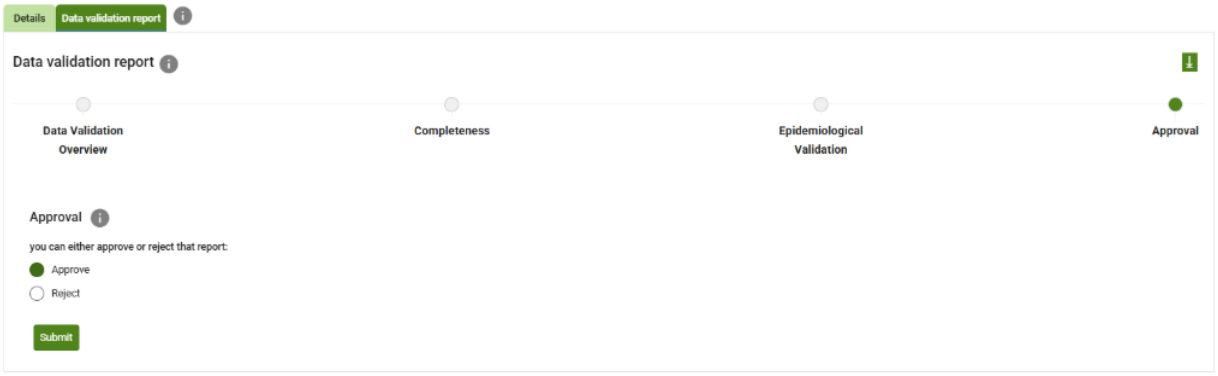
   b. By pathogen

1. The number of records and the reported reference guidelines and year.
2. The number of records uploaded by antimicrobial agent and year.
3. The number and percentage of records uploaded by year, antimicrobial agent and SIR.

4. The downloaded report can be opened and viewed in full screen for easier navigation. This is a preview of the currently developed epidemiological indicators/stratifications.



5. After reviewing the information in the 'Data Validation Report' you can choose to approve or reject it.



If you choose to reject it, no data will be saved in the EpiPulse Cases system, but your file will remain visible should you wish to re-download it, or resubmit it for a new Data Validation at a later date or after further checks. Please check the 'Data Validation Report' carefully, there might be warnings and remarks relating to possible data quality issues or potential overwriting of existing records that you should consider.

When your file has been validated and you are satisfied that all corrections have been made, please ensure prompt approval or rejection. Unapproved uploads can block the approval of other related uploads.

EpiPulse Cases Helpdesk

Email: EpiPulseCases@ecdc.europa.eu

Telephone number: +46-(0)8-5860 1601

Availability: 09:00–16:00 Stockholm time, Monday to Friday (with the exception of ECDC holidays).

Changes to current AMR metadata

No changes were made to the current AMR metadata.

Changes in 2025 to align AMR data with EpiPulse Cases

EARS-Net transitioned fully to EpiPulse Cases in 2025. The changes in Table 1 were implemented during the transition.

Table 1. Changes to EARS-Net metadata as part of the EpiPulse Cases transition in 2025

			Changes			
SubjectCode	**TESSy**	**EpiPulse Cases**	**Name/content/ removal**	**Required variable**	**Discontinued values**	**Reference values**
AMRTEST	RecordType	SubjectCode	Name changed			
AMRTEST	RecordTypeVersion		Variable removed			
AMRTEST	Status	Status	No change	Yes -> No		
AMRTEST	Subject	HealthTopic	Name changed	Yes -> No		
AMRTEST	RecordId	NationalRecordId	Name changed			
AMRTEST	PatientCounter	PatientId	Name changed, Format changed			Changed from NUM to TEXT
AMRTEST	patientType	PatientType	Content changed	Yes -> No	UNK	O -> OTH
AMRTEST	Age	Age	Content changed	Yes -> No	UNK	
AMRTEST	Gender	Gender	Content changed	Yes -> No	UNK	O -> OTH
AMRTEST	HospitalId	HospitalId	No change	Yes -> No		
AMRTEST	HospitalUnitType	HospitalUnitType	Content changed	Yes -> No	UNK	O -> OTH
AMRTEST	IsolateId	IsolateId	No change	Yes -> No		
AMRTEST	Serotype	Serotype	Content changed			*<serotype_code>* -> STRPNE_*<serotype_code>* NTYP -> STRPNE_NTYPNT; O; UNK -> STRPNE_UNK
AMRTEST	ResultPCRmec	ResultPCRmec	Content changed		UNK	Column changed from CODED VALUE to BOOLEAN! NEG -> 0 (FALSE) POS -> 1 (TRUE)
AMRTEST	ResultPbp2aAggl	ResultPbp2aAggl	Content changed		UNK	Column changed from CODED VALUE to BOOLEAN! NEG -> 0 (FALSE) POS -> 1 (TRUE)
AMRTEST	ESBL	ResultESBL	Name changed Content changed		UNK	Column changed from CODED VALUE to BOOLEAN! NEG -> 0 (FALSE) POS -> 1 (TRUE)
AMRTEST	ResultCarbapenemases	ResultCarbapenemase	Name changed Content changed		UNK	Column changed from CODED VALUE to BOOLEAN! NEG -> 0 (FALSE) POS -> 1 (TRUE)
AMRTEST	Antibiotic	AntimicrobialAgent	Content changed			"AZA" reference value added. Please note the updated validation

			Changes			
SubjectCode	**TESSy**	**EpiPulse Cases**	**Name/content/ removal**	**Required variable**	**Discontinued values**	**Reference values**
						rules as specific Pathogen - AntimicrobialAgent combinations are not requested and will be ignored during analysis.
AMRTEST	DiskLoad	ZoneTestDiskLoad	Name changed			
AMRTEST	ResultZoneValue	ZoneValue	Name changed			
AMRTEST	ResultZoneSIR	ZoneSIR	Name changed			
AMRTEST	ResultMICSign	MICSusceptibilitySign	Name changed			
AMRTEST	ResultMICValue	MICValue	Name changed			
AMRTEST	ResultMICSIR	MICSIR	Name changed			
AMRTEST	ResultGradSign	GradSusceptibilitySign	Name changed			
AMRTEST	ResultGradValue	GradValue	Name changed			
AMRTEST	ResultGradSIR	GradSIR	Name changed			
AMRTEST	ReferenceGuidelinesSIR	ReferenceGuidelinesSIR	Content changed			O -> OTH
AMRCOVER	RecordType	SubjectCode	Name changed			
AMRCOVER	RecordTypeVersion		Variable removed			
AMRCOVER	Subject	HealthTopic	Name changed Content changed	Yes -> No		AMRCOVER -> AMR
AMRCOVER	SameMicrSampleCov	IsAllPathogensCoverage	Name changed Content changed		UNK	Column changed from CODED VALUE to BOOLEAN! N -> 0 (FALSE) Y -> 1 (TRUE)
AMRCOVER	PropPopulationLabCov	ProportionPopulationCovered	Name changed			
AMRCOVER	PopGeoReprCov	PopGeoRepr	Name changed			
AMRCOVER	NumBedsHospCov	NumberOfCoveredBeds	Name changed			
AMRCOVER	NumPatDaysHospCov	NumberOfCoveredPatientDays	Name changed	Yes -> No		
AMRCOVER	HospitalReprCov	HospitalRepr	Name changed			
AMRCOVER	NumCultureSetsHospCov	NumberOfBloodCultureSets	Name changed	Yes -> No		
AMRCOVER	NumPatDaysForRateCov	NumberOfBloodCultureSetsPatientDays	Name changed	Yes -> No		

Metadata changes to AMRTEST and AMRCOVER are described in Annex 1.

Note: information on changes to the metadata for other subjects is available on the EpiPulse Help.

Annex 1. AMR metadata

This section describes:

- The AMR metadata set
- Changes to the AMR metadata.

AMR metadata set

The AMR metadata is described in three sections:

- Overview of EARS-Net AMR surveillance metadata
- Isolate-based reporting
- Coverage and representativeness.

Overview of EARS-Net AMR surveillance metadata

The metadata set for **isolate-based AMR reporting** (SubjectCode **AMRTEST**) consists of seven technical variables and 28 epidemiological variables, which are further classified as variables at the patient/isolate level and variables at the AMR test level. The first level includes data referring to the isolate which are repeated in all records reporting the antimicrobial susceptibility tests performed for that isolate (Tables 2, 3 and 4).

The variables used for **reporting coverage and representativeness** (SubjectCode **AMRCOVER**) according to aggregated format include: SubjectCode; HealthTopic; DataSource; ReportingCountry; DateUsedForStatistics; IsAllPathogensCoverage; Pathogen; PropoprtionPopulationCovered; PopGeoRepr; NumberOfCoveredBeds; NumberOfCoveredPatientDays; HospitalRepr; NumberOfBloodCultureSets; NumberOfBloodCultureSetsPatientDays; IsolateMicroRepr.

The variables of AMRTEST and AMRCOVER SubjectCodes are described in more detail, including the validation rules, in the sections 'Isolate-based reporting' and 'Coverage and representativeness'.

Isolate-based reporting

The following set of variables applies for isolate-based reporting of AMR. The dataset is sub-divided into a common set of system-related variables (technical variables) and epidemiological variables. The epidemiological variables can be classified into two levels: isolate information and susceptibility test information. The first level includes data referring to the specific isolate which are repeated for each antimicrobial agent where the susceptibility of that isolate has been tested.

The variables are described in the following tables:

- Table 2: Technical variables
- Table 3: Epidemiological variables at isolate level
- Table 4. Epidemiological variables at AMR test level.

Variables 1,2,4,5,6,8,9,10,17,24,25 are required; EpiPulse Cases will reject the data submission unless these fields have been completed.

When data are entered that fail to meet the requested combination for both 'Pathogen' and 'AntimicrobialAgent', EpiPulse Cases inserts the data into the database but the individual record is ignored during the analysis.

Table 2. Technical variables

VariableName	1 – NationalRecordID
Description	Unique anonymised identifier for each record within and across the national surveillance system and subject – selected and generated by the reporting country. Recommended format: '[ReportingCountry][LaboratoryCode] [PatientId][Pathogen] [Specimen][AntimicrobialAgent][DateUsedForStatistics]'
Required (what happens if not submitted)	Yes (Error)
Data type	String (max length: 80)
VariableName	**2 – SubjectCode**
Description	A reporting model for a disease/health topic. It identifies the reporting structure and format of a record.
Required (what happens if not submitted)	Yes (Error)
Data type	Coded value
Code	AMRTEST
VariableName	**3 – HealthTopic**
Description	The topic of the data that is being reported.
Required (what happens if not submitted)	No
Data type	Coded value
Code	AMR
VariableName	**4 – DataSource**
Description	The data source (surveillance system) that the record originates from.
Required (what happens if not submitted)	Yes (Error)
Data type	Coded value
Code	See metadata
VariableName	**5 – ReportingCountry**
Description	The country reporting the record.
Required (what happens if not submitted)	Yes (Error)
Data type	Coded value
Code	See metadata
VariableName	**6 – DateUsedForStatistics**
Description	The most epidemiologically relevant date for the isolate. Equal to the date of sampling if available. If not, equal to the date of receipt in the source laboratory, and if that is not available, the date of receipt in the reference laboratory.
Required (what happens if not submitted)	Yes (Error)
Data type	Date
Code	Exact date only: 'YYYY-MM-DD'
VariableName	**7 – Status**
Description	The Status value is used to provide the functionality for a record within the EpiPulse Cases database. Default value: NEW/UPDATE. If set to DELETE, the record with the specified NationalRecordId is deleted (invalidated) from the EpiPulse Cases database, if it exists. If set to NEW/UPDATE, the record is inserted into the database: If the same NationalRecordId already exists for the same data source and subject code, then the current submitted record updates (replaces) the existing one.
Required	No
Data type	Coded value
Code	NEW/UPDATE or DELETE.

Table 3. Epidemiological variables at isolate level

VariableName	8 – LaboratoryCode
Description	Laboratory code unique for each laboratory within the country.
Required (what happens if not submitted)	Yes (Error)
Data type	Coded value
Code	See metadata If a country has a need for additional codes in the list, they must contact EpiPulse Cases Helpdesk to get the codes added. Recommended format: [ReportingCountry]-[code of three characters]
VariableName	**9 – Specimen**
Description	Isolate source The source of the isolate (i.e. blood or cerebrospinal fluid)
Required	Yes (Error)
Data type	Coded value
Code	BLOOD = blood CSF = Cerebrospinal fluid
VariableName	**10 – PatientId**
Description	Code for each patient unique for each laboratory. Anonymous code assigned by the laboratory to specify patient.
Required (what happens if not submitted)	Yes (Error)
Data type	Text
Code	Requires laboratories to anonymise the PatientId.
VariableName	**11 – Gender**
Description	Gender
Required (what happens if not submitted)	No
Data type	Coded value
Code	M = Male F = Female OTH = Other
VariableName	**12 – Age**
Description	Age of the patient when the sample was taken.
Required (what happens if not submitted)	No
Data type	Numeric
Code	Integer
VariableName	**13 – IsolateId**
Description	Isolate identifier; code for each isolate, unique for laboratory and year. Text code assigned by the laboratory to specify isolate.
Required (what happens if not submitted)	No
Data type	Text
VariableName	**14 – HospitalId**
Description	Unique identifier for the hospital within each laboratory.
Required (what happens if not submitted)	No
Data type	Text
Code	Recommended format: [LaboratoryCode]-[letter assigned to a hospital – starting from A, B, C, etc.]

VariableName	15 – PatientType
Description	Origin of patient. Inpatient (admitted to the hospital when the sample was taken) or outpatient (not admitted when the sample was taken). Patients receiving dialysis or other types of day hospital care should be classified as 'OTH' in the field 'PatientType'. All other patients admitted to the hospital as inpatients should be classified as 'INPAT'.
Required (what happens if not submitted)	No
Data type	Coded value
Code	INPAT=Admitted (Inpatient) OUTPAT=Outpatient (e.g. emergency room) OTH=Other
VariableName	**16 – HospitalUnitType**
Description	Hospital department (at the time of sample collection)
Required (what happens if not submitted)	No
Data type	Coded value
Code	INTMED=Internal Medicine PEDS=Paediatrics/neonatal PEDSICU=Paediatrics/neonatal ICU SURG=Surgery ONCOL=Haematology/Oncology OBGYN=Obstetrics/Gynaecology ICU=Intensive Care Unit ED=Emergency Department URO=Urology Ward INFECT=Infectious Disease Ward OTH=Other
VariableName	**17 – Pathogen**
Description	Pathogen Species and genus of the pathogen which has been isolated from the sample.
Required (what happens if not submitted)	Yes (Error)
Data type	Coded value
Code	STRPNE=*Streptococcus pneumoniae* STAAUR=*Staphylococcus aureus* ENCFAE=*Enterococcus faecalis* ENCFAI=*Enterococcus faecium* ESCCOL=*Escherichia coli* KLEPNE=*Klebsiella pneumoniae* PSEAER=*Pseudomonas aeruginosa* ACISPP=*Acinetobacter* species
VariableName	**18 – DateOfHospitalisation**
Description	Date of admission to hospital
Required	No
Data type	Date
Code	Exact date only: 'YYYY-MM-DD'
VariableName	**19 – ResultPCRmec**
Description	Detected PCR *mecA* gene
Required	No
Data type	Boolean
Code	1=(TRUE) positive 0=(FALSE) negative Leave empty if unknown or not applicable.
Validation rule	To be reported only if Pathogen=STAAUR.

VariableName	20 – ResultPbp2aAggl
Description	Detected PBP2a-agglutination
Required	No
Data type	Boolean
Code	1=(TRUE) positive 0=(FALSE) negative Leave empty if unknown or not applicable.
Validation rule	To be reported only if Pathogen=STAAUR.
VariableName	**21 – Serotype**
Description	Serotype of the pathogen isolated from the sample.
Required	No
Data type	Coded value
Code	See metadata
Validation rule	To be reported only if Pathogen=STRPNE.
VariableName	**22 – ResultESBL**
Description	Detected Extended-Spectrum Beta-Lactamase
Required	No
Data type	Boolean
Code	1=(TRUE) positive 0=(FALSE) negative Leave empty if unknown or not applicable.
Validation rule	To be reported only if Pathogen=ESCCOL or KLEPNE.
VariableName	**23 – ResultCarbapenemase**
Description	Detected carbapenemase
Required	No
Data type	Boolean
Code	1=(TRUE) positive 0=(FALSE) negative Leave empty if unknown or not applicable.
Validation rule	To be reported only if Pathogen=ESCCOL or KLEPNE or PSEAER or ACISPP

Table 4. Epidemiological variables at AMR test level

VariableName	24 – AntimicrobialAgent
Description	Antimicrobial agent code
Required	Yes: data entry is required. However, if you enter data that does not meet the requested combination of 'Pathogen' and 'AntimicrobialAgent', the record is ignored during the analysis, but the batch is NOT rejected.
Data type	Coded Value
Code	See 'Implementation of AMR case definitions for EpiPulse Cases' where a list of all antimicrobial agent codes is provided
VariableName	**25 – SIR**
Description	Final result of interpretation of all different susceptibility tests performed, based on EUCAST[1] breakpoints. Starting with data collected for 2019, the updated EUCAST definitions of susceptibility testing categories are used: S - Susceptible, standard dosing regimen: a microorganism is categorised as 'Susceptible, standard dosing regimen' when there is a high likelihood of therapeutic success using a standard dosing regimen of the agent. I – Susceptible, increased exposure: a microorganism is categorised as 'Susceptible, increased exposure' when there is a high likelihood of therapeutic success because exposure to the agent is increased by adjusting the dosing regimen, or by its concentration at the site of infection. R - Resistant: a microorganism is categorised as 'Resistant' when there is a high likelihood of therapeutic failure, even when there is increased exposure.
Required (what happens if not submitted)	Yes (Error)
Data type	Coded value
Code	S=Susceptible, standard dosing regimen I=Susceptible, increased exposure R=Resistant
VariableName	**26 – ZoneValue**
Description	Zone (Value in mm)
Required	No
Data type	Numeric
Code	Integer
VariableName	**27 – ZoneSIR**
Description	Interpretation of the zone test.
Required	No
Data type	Coded value
Code	S=Susceptible, standard dosing regimen I=Susceptible, increased exposure R=Resistant
VariableName	**28 – MICSusceptibilitySign**
Description	Minimum inhibitory concentration (MIC) (> < =) This field can indicate if a MIC-value of the exact value is 'equal to' (=); 'equal to or less than' the value (<=value); 'greater than' the value (>value); or 'equal to or greater than' the value (>=value). The value is indicated in the subsequent field.
Required	No
Data type	Coded value
Code	<= = >= >

[1] EUCAST - European Committee on Antimicrobial Susceptibility Testing

VariableName	29 – MICValue
Description	MIC (Value in mg/L)
Required	No
Data type	Numeric
Code	If <1 then float, if >=1 then integer
VariableName	**30 – MICSIR**
Description	Interpretation of the MIC test.
Required	No
Data type	Coded value
Code	S=Susceptible, standard dosing regimen I=Susceptible, increased exposure R=Resistant
VariableName	**31 – GradSusceptibilitySign**
Description	Gradient strip (> < =) This field can indicate if a value of the zone diameter of the gradient strip is the exact value 'equal to' (=); 'equal to or less than' the value (<= value); 'greater than' the value (>value); or 'equal to or greater than' the value (>=value). The value is indicated in the subsequent field.
Required	No
Data type	Coded value
Code	<= = >= >
VariableName	**32 – GradValue**
Description	Gradient strip value (value in mg/L)
Required	No
Data type	Numeric
Code	If <1 then float, if >=1 then integer. The value 1.5 is also allowed.
VariableName	**33 – GradSIR**
Description	Interpretation of the gradient strip test.
Required	No
Data type	Coded value
Code	S=Susceptible, standard dosing regimen I=Susceptible, increased exposure R=Resistant
VariableName	**34 – ZoneTestDiskLoad**
Description	Disk content (only if zone) This field can be used to mention the load of the antimicrobial disk used. Please mention the value and the units (e.g. mcg, units or IU).
Required	No
Data type	Text
Code	Value and units: i.e. IU, mcg.
VariableName	**35 – ReferenceGuidelinesSIR**
Description	Starting with data collected for 2019, only EUCAST clinical guidelines are accepted. The variable is kept to enable data validation.
Required	No
Data type	Coded value
Code	EUCAST=European Committee on Antimicrobial Susceptibility Testing CLSI=Clinical and Laboratory Standards Institute NAT=National OTH=Other

Coverage and representativeness

The following set of variables applies for country aggregate reporting of coverage and representativeness of laboratories participating in EARS-Net. The dataset is sub-divided into a common set of system related variables (technical variables) and epidemiological variables. If coverage and representativeness differ by species the epidemiological variables must be provided at microorganism level. Otherwise, if coverage and representativeness are the same for all species, one AMRCOVER record per DataSource and year is expected.

The variables are described in the following tables:

- Table 5: Technical variables
- Table 6: Epidemiological variables

Variables 1,3,4,5,6,7,8,9,12,15 are technically mandatory. EpiPulse Cases will reject the data submission unless these fields have been completed.

Table 5. Technical variables

VariableName	**1 – SubjectCode**
Description	Structure and format of the data.
Required (what happens if not submitted)	Yes (Error)
Data type	Coded value
Code	AMRCOVER
VariableName	**2 – HealthTopic**
Description	The topic of the data that is being reported.
Required (what happens if not submitted)	No
Data type	Coded value
Code	AMR
VariableName	**3 – DataSource**
Description	The data source (surveillance system) that the record originates from.
Required (what happens if not submitted)	Yes (Error)
Data type	Coded value
Code	See metadata
VariableName	**4 – ReportingCountry**
Description	The country reporting the record.
Required (what happens if not submitted)	Yes (Error)
Data type	Coded value
Code	See metadata
VariableName	**5 – DateUsedForStatistics**
Description	The reference year for which the data are valid.
Required (what happens if not submitted)	Yes (Error)
Data type	Date
Code	'YYYY'.

Table 6. Epidemiological variables

VariableName	6 – IsAllPathogensCoverage
Description	Estimated coverage and representativeness are the same for all microorganism species under surveillance. If coverage and representativeness are the same for all microorganism species, one AMRCOVER record per DataSource and year is expected (the code 'PATAMR' should be used for the variable 'Pathogen'). If coverage and representativeness differ by species, eight AMRCOVER records per DataSource and year are expected (all codes other than 'PATAMR' should be used for the variable 'Pathogen').
Required (what happens if not submitted)	Yes (Error)
Data type	Boolean
Code	1 (TRUE) = estimated coverages and representativeness are the same for all microorganism species. 0 (FALSE) = estimated coverages and representativeness are not the same for all microorganism species.
VariableName	**7 – Pathogen**
Description	Pathogen. The code 'PATAMR' should be used if coverage is the same for all pathogens. The other eight codes are specific for each microorganism under surveillance.
Required (what happens if not submitted)	Yes (Error)
Data type	Coded value
Code	PATAMR=All EARS-Net pathogens (to be used if coverage is the same for all pathogens) STRPNE=*Streptococcus pneumoniae* STAAUR=*Staphylococcus aureus* ENCFAE=*Enterococcus faecalis* ENCFAI=*Enterococcus faecium* ESCCOL=*Escherichia coli* KLEPNE=*Klebsiella pneumoniae* PSEAER=*Pseudomonas aeruginosa* ACISPP=*Acinetobacter* species.
VariableName	**8 – ProportionPopulationCovered**
Description	Best available estimate for the proportion of the national population covered by the laboratories reporting to EARS-Net in the specific year. Use '.' as decimal delimiter: e.g. 0.32.
Required (what happens if not submitted)	Yes (Error)
Data type	Numeric
Code	Float
VariableName	**9 – PopGeoRepr**
Description	Population sample geographical representativeness.
Required (what happens if not submitted)	Yes (Error)
Data type	Coded value
Code	HIGH = all main geographical regions of the country are covered MEDIUM = most geographical regions of the country are covered LOW = only a few geographical areas of the country are covered.
VariableName	**10 – NumberOfCoveredBeds**
Description	Total number of beds for hospitals served by laboratories reporting to EARS-Net.
Required (what happens if not submitted)	No
Data type	Numeric
Code	Integer

VariableName	11 – NumberOfCoveredPatientDays
Description	Total number of patient-days for hospitals served by laboratories reporting to EARS-Net.
Required (what happens if not submitted)	No
Data type	Numeric
Code	Integer
VariableName	**12 – HospitalRepr**
Description	Hospital sample representativeness.
Required (what happens if not submitted)	Yes (Error)
Data type	Coded value
Code	HIGH = the hospital sample is representative of the acute care hospital distribution in the country; MEDIUM = the hospital sample is partly representative of the acute care hospital distribution in the country; LOW = the hospital sample is insufficiently representative of the acute care hospital distribution in the country.
VariableName	**13 – NumberOfBloodCultureSets**
Description	Total number of blood culture sets taken in hospitals served by laboratories reporting to EARS-Net and sent to these laboratories. The provided data should be suitable for calculating the blood culture rate in the specific year: number of sets refers to the hospital sample for which the aggregated denominator (NumberOfBloodCultureSetsPatientDays) is provided.
Required (what happens if not submitted)	No
Data type	Numeric
Code	Integer
VariableName	**14 – NumberOfBloodCultureSetsPatientDays**
Description	Total number of patient-days for hospitals served by laboratories which provided the number of blood culture sets taken. This number can be equal to 'NumberOfCoveredPatientDays' or lower if only some of the laboratories provided the number of blood culture sets taken in hospitals served by laboratories reporting to EARS-Net, and sent to these laboratories.
Required (what happens if not submitted)	No
Data type	Numeric
Code	Integer
VariableName	**15 – IsolateMicroRepr**
Description	Isolate sample invasive infection causing microorganism representativeness.
Required (what happens if not submitted)	Yes (Error)
Data type	Coded value
Code	HIGH = the isolate sample is representative of microorganisms causing invasive infections in the included hospitals; MEDIUM = the isolate sample is partly representative of microorganisms causing invasive infections in the included hospitals; LOW = the isolate sample is insufficiently representative of microorganisms causing invasive infections in the included hospitals.

AMR metadata change history

Previous metadata changes

Metadata changes prior to 2014 can be found on the TESSy documents section under EpiPulse.

Table 7. Summary of implemented changes in AMRTEST and AMRCOVER SubjectCodes for Antimicrobial Resistance (AMR), 2014-2026

Year	Subject	Description
2025	**AMRTEST**	The coded value list for AntimicrobialAgent was updated and now also contains: AZA: aztreonam-avibactam. The validation rule was adjusted for *E. coli* and *K. pneumoniae* to allow analysis of aztreonam-avibactam for these pathogens. The validation rule was adjusted for *Acinetobacter* spp., *E. coli* and *K. pneumoniae* to indicate that ceftolozane-tazobactam will not be included in the analysis for these pathogens. The validation rule was adjusted for *Acinetobacter* spp. to indicate that imipenem-relebactam will not be included in the analysis for this pathogen. The validation rule was adjusted for *Acinetobacter* spp. to indicate that meropenem-vaborbactam will not be included in the analysis for this pathogen. The validation rule was adjusted for *Acinetobacter* spp. to indicate that ceftazidime-avibactam will not be included in the analysis for this pathogen.
2025	**AMRTEST**	Changes made to EARS-Net metadata as part of the EpiPulse Cases transition in 2025 (please see table 1).
2025	**AMRCOVER**	Changes made to EARS-Net metadata as part of the EpiPulse Cases transition in 2025 (please see table 1).
2024	**AMRTEST**	The coded value list for Serotype was updated to also contain: 15B/C: Type 15B/C. The coded value list for Antibiotic was updated and now also contains: FDC: cefiderocol; CZT: ceftolozane-tazobactam; IMR: imipenem-relebactam; MEV: meropenem-vaborbactam. The validation rule was adjusted for *E. coli, K. pneumoniae, P. aeruginosa* and *Acinetobacter* spp. to allow reporting of resistance to cefiderocol, ceftazidime-avibactam, ceftolozane-tazobactam, imipenem-relebactam, and meropenem-vaborbactam.
2023	**AMRTEST**	The coded value list for ResultMICSign, and ResultEtestSign was updated to only contain: <= : Less than or equal; = : Equal; > : Greater than; >= : Greater than or equal. The variable ResultZoneSign, was removed from reporting. A validation rule was added to the variable ResultZoneValue; Acceptable values: 0-50. The variable ResultEtestSign was renamed ResultGradSign. The variable ResultEtestValue was renamed ResultGradValue. The variable ResultEtestSIR was renamed ResultGradSIR.
2022	**AMRCOVER**	Variables PopulationReprCov and IsolateReprCov were replaced by PopGeoReprCov and IsolateMicroRepr respectively. PopGeoReprCov, IsolateMicroRepr and HospitalReprCov were given the following value options: High, Medium, Low. The descriptions of variables NumCultureSetsHospCov and NumPatDaysForRateCov were changed.
2021	**AMRTEST**	AMRTEST validation rules were updated in 2021. The validation rules were adjusted to ignore the following combinations: for *E. coli*, NET and POL; for *K. pneumoniae*, NET, POL and TGC; for *P. aeruginosa*, NET, GEN and POL; for *Acinetobacter* spp., NET and POL. 14 July 2021: these changes were retracted in a TESSy metadata to allow for full reporting of data from before 2020.
	AMRTEST	AMRTEST description of the SIR variable was updated in the metadata set. S = Susceptible, standard dosing regimen; and I = Susceptible increased exposure.
2020	**AMRTEST**	Update of validation rules associated to the requested combination of 'Pathogen' and 'Antibiotic'.
	AMRTEST	Update of validation rules associated to the requested combination of 'Pathogen' and 'Specimen'.
2019	**AMRCOVER**	The new metadata subject was introduced in place of AMRDENOM.
2018	**AMRDENOM**	The metadata subject was discontinued.
2014	**AMRTEST**	Addition of new codes to coded value list for antibiotics.
	AMRTEST	Update of validation rules associated with these new antibiotics.
	All	Update NUTS codes according to the NUTS Codes 2010 classification from EUROSTAT.

Annex 2. AMR-specific material

Contacts

Questions regarding coding, upload of data etc. should be directed to the EpiPulse Cases helpdesk at EpiPulseCases@ecdc.europa.eu

Questions regarding the AMR reporting and content will be dealt with by the ECDC EARS-Net contact (e-mail: EARS-Net@ecdc.europa.eu)

Questions regarding the use of WHONET to prepare data for EpiPulse Cases upload can be directed to the ECDC contractor for WHONET support: E-mail help@whonet.org (please copy EARS-Net@ecdc.europa.eu).

Microbiological guidelines for EARS-Net

EARS-Net requires the use of the European Committee on Antimicrobial Susceptibility Testing (EUCAST) guidelines and breakpoints to determine clinical antimicrobial susceptibility (available at http://www.eucast.org/). Until 2019, laboratories using other guidelines were also welcome to report data to EARS-Net however, since 2020 the use of EUCAST has become an essential requirement for participation.

In 2012, the EUCAST steering committee established a sub-committee for detection of resistance mechanisms and specific resistances of clinical and/or epidemiological importance. The sub-committee was established partly in response to frequently-asked questions from users of EUCAST guidelines on this issue, and partly at ECDC's request, as expert microbiology guidance was needed for EARS-Net participants.

The remit of the sub-committee was to develop practical guidelines for the detection of specific antimicrobial resistance mechanisms of clinical and/or epidemiological importance. The document was developed by conducting systematic literature searches, and most recommendations are based on multi-centre studies, as these provide the best measure of robustness of the methods. Prior to publication of these guidelines, they were subjected to wide consultation through the EUCAST consultation contact lists, the EUCAST website and ECDC focal point contacts. An updated version of the results of this work can be found in the EUCAST guidelines for detection of resistance mechanisms and specific resistances of clinical and/or epidemiological importance[2].

The guidelines describe the definition of the mechanisms of resistances, recommended methods of detection and references to detailed descriptions of the methods for:

1. Carbapenemase-producing Enterobacteriaceae
2. Extended-spectrum β-lactamase (ESBL)-producing Enterobacteriaceae
3. Acquired AmpC β-lactamase-producing Enterobacteriaceae
4. Polymyxin resistance in gram-negative bacilli
5. Carbapenem resistance in *Pseudomonas aeruginosa* and *Acinetobacter*
6. Meticillin-resistant *Staphylococcus aureus* (MRSA)
7. Glycopeptide non-susceptible *Staphylococcus aureus*
8. Vancomycin resistant *Enterococcus faecium* and *Enterococcus faecalis*
9. Penicillin non-wild-type *Streptococcus pneumoniae.*

[2] EUCAST. 2017. EUCAST guidelines for detection of resistance mechanisms and specific resistances of clinical and/or epidemiological importance. Version 2.0, July 2017 Available at: https://www.eucast.org/fileadmin/src/media/PDFs/EUCAST_files/Resistance_mechanisms/EUCAST_detection_of_resistance_mechanisms_170711.pdf

Implementation of AMR case definitions for EpiPulse Cases

Given the typology of data for AMR surveillance, which refers to laboratory isolates rather than cases of disease, the following case definition has been implemented in the SubjectCode 'AMRTEST' for reporting to EpiPulse Cases:

The bacterial species under surveillance are:

- *Streptococcus pneumoniae* (STRPNE)
- *Staphylococcus aureus* (STAAUR)
- *Enterococcus faecalis* (ENCFAE)
- *Enterococcus faecium* (ENCFAI)
- *Escherichia coli* (ESCCOL)
- *Klebsiella pneumoniae* (KLEPNE)
- *Pseudomonas aeruginosa* (PSEAER)
- *Acinetobacter* species (ACISPP).

All isolates from blood and/or cerebrospinal fluid for which a susceptibility test has been performed must be included.

The generic case definition of antibiotic resistance is defined in the Commission Implementing Decision stipulating case definitions for reporting communicable diseases to the Community network.[3] EARS-Net requires the use of EUCAST clinical breakpoints in line with the EU case definitions. As of 2020 (2019 data), countries and laboratories using other guidelines are not eligible to participate in EARS-Net surveillance. Reporting of quantitative susceptibility data is strongly encouraged.

Duplicates from the same patients should be eliminated, taking only the first sample by date of collection and isolate source. Table 8 lists all microorganism and antibiotic agent combinations under EARS-Net surveillance. According to the EUCAST guidelines, when a specific type of test is to be used, the method is indicated next to the antimicrobial. When possible, and starting with 2021 data, it is recommended that EU/EEA countries that generate the susceptibility categorisation of isolates at national level apply 'non-meningitis' breakpoints for all interpretations when there are different EUCAST meningitis and non-meningitis breakpoints, although EARS-Net accepts data as they are.

If records referring to additional combinations are uploaded, they will not be included in the analysis.

Table 8. Microorganism and antimicrobial agent combinations under surveillance by EARS-Net (isolates from blood and/or cerebrospinal fluid)

Microorganism	Antimicrobial agent
***Streptococcus pneumoniae* (STRPNE)**	Oxacillin (OXA) – Disk diffusion Penicillin (PEN) – MIC test Clarithromycin (CLR) – MIC test Erythromycin (ERY) Azithromycin (AZM) – MIC test Levofloxacin (LVX) Moxifloxacin (MFX) Norfloxacin (NOR) – Disk diffusion Cefotaxime (CTX) – MIC test Ceftriaxone (CRO) – MIC test
***Staphylococcus aureus* (STAAUR)**	Cefoxitin (FOX) – Disk diffusion Oxacillin (OXA)* – MIC test Levofloxacin (LVX) Ciprofloxacin (CIP) Norfloxacin (NOR) – Disk diffusion Vancomycin (VAN) – MIC test Rifampicin (RIF) Linezolid (LNZ) Daptomycin (DAP) – MIC test
***Enterococcus faecalis* (ENCFAE)**	Ampicillin (AMP) Amoxicillin (AMX) – MIC test Gentamicin-High (GEH) Vancomycin (VAN) Teicoplanin (TEC) Linezolid (LNZ)

3. Commission Implementing Decision on the communicable diseases and related special health issues to be covered by epidemiological surveillance – Annex 1 (replacing Commission Decision No 2000/96/EC). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018D0945&from=EN

Microorganism	Antimicrobial agent
Enterococcus faecium **(ENCFAI)**	Ampicillin (AMP) Amoxicillin (AMX) – MIC test Gentamicin-High (GEH) Vancomycin (VAN) Teicoplanin (TEC) Linezolid (LNZ)
Escherichia coli **(ESCCOL)**	Ampicillin (AMP)] Amoxicillin (AMX) – MIC test Amoxicillin-clavulanic acid (AMC) Piperacillin-tazobactam (TZP) Cefotaxime (CTX) Ceftazidime (CAZ) Ceftazidime-avibactam (CZA) Ceftriaxone (CRO) Cefepime (FEP) Cefiderocol (FDC) Gentamicin (GEN) Tobramycin (TOB) Amikacin (AMK) Ciprofloxacin (CIP) Levofloxacin (LVX) Ofloxacin (OFX) Moxifloxacin (MFX) Imipenem (IPM) Imipenem-relebactam (IMR) Meropenem (MEM) Meropenem-vaborbactam (MEV) Ertapenem (ETP) Tigecycline (TGC) Aztreonam-avibactam (AZA) Colistin (COL) - Broth microdilution
Klebsiella pneumoniae **(KLEPNE)**	Amoxicillin-clavulanic acid (AMC) Piperacillin-tazobactam (TZP) Cefotaxime (CTX) Ceftazidime (CAZ) Ceftazidime-avibactam (CZA) Ceftriaxone (CRO) Cefepime (FEP) Cefiderocol (FDC) Gentamicin (GEN) Tobramycin (TOB) Amikacin (AMK) Ciprofloxacin (CIP) Levofloxacin (LVX) Ofloxacin (OFX) Moxifloxacin (MFX) Imipenem (IPM) Imipenem-relebactam (IMR) Meropenem (MEM) Meropenem-vaborbactam (MEV) Ertapenem (ETP) Aztreonam-avibactam (AZA) Colistin (COL) - Broth microdilution
Pseudomonas aeruginosa **(PSEAER)**	Piperacillin/Tazobactam (TZP) Piperacillin (PIP) Ceftazidime (CAZ) Ceftazidime-avibactam (CZA) Cefepime (FEP) Cefiderocol (FDC)

Microorganism	Antimicrobial agent
	Ceftolozane-tazobactam (CZT) Tobramycin (TOB) Amikacin (AMK) Ciprofloxacin (CIP) Levofloxacin (LVX) Imipenem (IPM) Imipenem-relebactam (IMR) Meropenem (MEM) Meropenem-vaborbactam (MEV) Colistin (COL) - Broth microdilution
***Acinetobacter* species (ACISPP)**	Cefiderocol (FDC) Gentamicin (GEN) Tobramycin (TOB) Amikacin (AMK) Ciprofloxacin (CIP) Levofloxacin (LVX) Imipenem (IPM) Meropenem (MEM) Colistin (COL) - Broth microdilution

** Meticillin (MET), flucloxacillin (FLC), cloxacillin (CLO) or dicloxacillin (DIC) are accepted as markers for oxacillin (OXA) resistance if oxacillin is not reported.*

Objectives for AMR surveillance

Surveillance of AMR within the European Union (EU) is assured by European law. AMR is listed as a special health issue in the Commission Implementing Decision (EU) 2018/945 of 22 June 2018 on the communicable diseases and related special health issues to be covered by epidemiological surveillance, as well as relevant case definitions.[4]

EARS-Net is based on a network of representatives from European Union/European Economic Area (EU/EEA) countries collecting routine clinical antimicrobial susceptibility data from national AMR surveillance initiatives. Scientific guidance and support to the network is provided by the EARS-Net Coordination Committee. This group is composed of individual experts selected from among the nominated disease-specific contact points and experts from other organisations that are involved in surveillance of antimicrobial resistance.

The objective of EARS-Net is to collect, analyse and report data on AMR across EU/EEA countries and as defined in the EARS-Net protocol, to enable action to address AMR. In 2026, EARS-Net will collect and analyse 2025 data from the EU/EEA countries.

Preparing national AMR datasets

The data collection at laboratory level can be performed both electronically and manually by filling out the corresponding Isolate Records Forms for each pathogen (see Isolate Record forms). If the data collection at laboratory level has been performed manually by filling out the Isolate Records, the Country Data Manager should create the fields 'Age' and 'PatientId', based on the information available in the paper forms.

The data collection for EARS-Net is supported by WHONET (Microbiology Laboratory Database Software) which is a useful tool for processing and analysing antimicrobial resistance data. It provides a routine procedure to perform data entry and export data in EARS-Net exchange format and can be used locally by participating laboratories and centrally by country data managers. The software and manual can be downloaded from http://www.whonet.org/.

If a new laboratory joins the surveillance network the country disease-specific contact point must communicate the new code of the new laboratory to the Helpdesk at EpiPulseCases@ecdc.europa.eu by e-mail before uploading data; otherwise, the system will not recognise the new code and will reject the entire file.

Checking for duplicate records

Before uploading a file to EpiPulse Cases, the country data manager should revise the laboratory data and check for duplicates (records with the same NationalRecordId). If there are duplicates, EpiPulse Cases will reject the upload. Duplicates should be eliminated by merging/selecting records.

Recommendations for selecting records:

[4] Commission Implementing Decision (EU) 2018/945 of 22 June 2018 on the communicable diseases and related special health issues to be covered by epidemiological surveillance, as well as relevant case definitions. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018D0945&from=EN

- In the EpiPulse Cases metadata, the recommended format of the NationalRecordId is a combination of the following fields: ReportingCountry; LaboratoryCode; PatientId; Pathogen; Specimen; AntimicrobialAgent and DateUsedForStatistics.
- According to the metadata set specifications, two or more records with the same NationalRecordId are considered as **duplicates and will generate an error** in the uploading process to EpiPulse Cases, with the subsequent rejection of the entire batch of records.
- To avoid rejection of the batch, it is important to identify multiple isolates within the same day (DateUsedForStatistics) and select one of them according to the following priority:
  - If there are duplicates with the same 'Pathogen' and 'AntimicrobialAgent' combination but different microbiological tests, select the proper one according to EUCAST guidelines.
  - If there are duplicates with the same 'Pathogen', 'AntimicrobialAgent', and microbiological test, but different SIR, select the first in this order R→I→S (thereby selecting the most resistant).
  - If there are duplicates with the same 'Pathogen', 'AntimicrobialAgent', microbiological test, and SIR (true duplicates), just select one of them, taking into account the completeness of the other variables.

Data management and analysis

EpiPulse Cases filter 1 (case definition) and validation report

EpiPulse Cases filters the uploaded records according to the list of microorganism/antimicrobial agent combinations included in the AMR surveillance (the EARS-Net case definition for EpiPulse Cases is described in more detail in 'Implementation of AMR case definitions for EpiPulse Cases'). Records referring to additional microorganism/antimicrobial agent combinations are ignored during the analysis.

Shortly after the data are uploaded, EpiPulse Cases provides a validation report which should be assessed by the country user. The report shows summary statistics of the validated data from the uploaded batch.

EpiPulse Cases filter 2 (preparing dataset for analysis)

This filter aims to obtain one record per patient/microorganism/specimen/antimicrobial agent combination and year.

STEP 1	Select all records that belong to the **first date** within the considered YEAR for each patient/microorganism combination.	Fields to identify the date: • DateUsedForStatistics Fields to identify the patient/microorganism combination: • ReportingCountry • LaboratoryCode • PatientId • Pathogen
STEP 2	If more than **one source** (BLOOD, CSF) is reported within the first date, select only one, giving priority to the CSF.	Field to identify the **source**: • Specimen
STEP 3	If the same antimicrobial is still reported in more than one record, make a selection according to the **final interpretation of the susceptibility test** (priority sequence R→I→S).	Field to identify the **final interpretation of the susceptibility test**: • SIR
STEP 4	If the same antimicrobial is still reported in more than one record, select the first one.	

Data analysis and presentation

For the analysis, an isolate is considered resistant to an antimicrobial agent when tested and interpreted as resistant (R) according to the EUCAST clinical breakpoint. An isolate of *Streptococcus pneumoniae* is considered penicillin non-wild-type when testing results show oxacillin inhibition zone < 20 mm or benzylpenicillin MIC > 0.06 mg/L. Since 2020 (2019 AMR data), results based on interpretive criteria other than EUCAST criteria have not been accepted in EARS-Net.

As a general rule, data are expressed as a resistance percentage (i.e. the percentage of R isolates of all isolates with antimicrobial susceptibility testing (AST) information on that specific microorganism–antimicrobial agent combination), or as an estimated incidence of resistance (i.e. the number of cases with R isolates from the population covered.)

In most cases, the percentage resistance or estimated incidence of resistance is calculated considering an antimicrobial group (instead of a single antimicrobial agent), which means that other specifications are needed to perform the analysis. Often, but not always, the group represents an antimicrobial class. An example of an antimicrobial group is the aminopenicillins for *E. coli*. This group contains two antimicrobial agents: ampicillin (AMP) and amoxicillin (AMX). If two or more antimicrobials (records) are reported for the same 'microorganism/antimicrobial group' combination, count only one of them; the choice has to be made in accordance with the final interpretations of the susceptibility test (field=SIR; priority sequence R→I→S).

Specific rule for *Streptococcus pneumoniae* and penicillin non-wild-type

The antimicrobials considered for this phenotype are penicillin (PEN) and oxacillin (OXA). If both are reported, give priority to penicillin.

Specific rule for *Streptococcus pneumoniae* and fluoroquinolones

The antimicrobials considered for this resistance are norfloxacin (NOR), levofloxacin (LVX) and moxifloxacin (MFX). Priority is given to levofloxacin and moxifloxacin AST results over norfloxacin results.

Specific rule to define Meticillin-resistant *Staphylococcus aureus* (MRSA)

The antimicrobials considered for this resistance are cefoxitin (FOX) and oxacillin (OXA), with priority given to cefoxitin (FOX). AST results for meticillin (MET), flucloxacillin (FLC), cloxacillin (CLO) or dicloxacillin (DIC) are accepted as a marker for oxacillin (OXA) resistance if oxacillin is not reported. Other tests are also considered: PCR *mecA* or PBP2a detection.

Hierarchical levels to assess the MRSA:

- SIR result of FOX
- SIR result of OXA
- SIR result of MET, FLC, CLO, DIC
- Other test (PCR *mecA* and PBP2a).

When SIR results for FOX, OXA or markers of OXA are not reported, the definition of MRSA is based on the following criteria:

- if at least one from ResultPCRmec and ResultPbp2aAggl is positive, then MRSA;
- if at least one from ResultPCRmec and ResultPbp2aAggl is negative, and the other is not positive then MSSA (meticillin-sensitive *Staphylococcus aureus*).

Specific rule for *Staphylococcus aureus* and fluoroquinolones

The antimicrobials considered for this resistance are norfloxacin (NOR), ciprofloxacin (CIP) and levofloxacin (LVX). Priority is given to ciprofloxacin, and/or levofloxacin AST results over norfloxacin results.

Presentation

The full set of microorganism/antimicrobial group combinations under regular surveillance by EARS-Net (routinely presented in an annual report or the ECDC Surveillance Atlas of Infectious Diseases) is displayed in Table 9. Additional analysis of other single or groups of antimicrobial agents will be performed on an ad hoc basis.

If fewer than 20 isolates are reported for a specific organism–antimicrobial agent combination in a country, the results for this country are not displayed on the maps presented in the Annual Report and the interactive database.

Estimation of EU/EEA incidence of invasive isolates

Invasive isolates refer to isolates from blood or cerebrospinal fluid samples. For each year and bacterial species, the total number of invasive isolates is estimated by dividing the number of isolates for the bacterial species reported by a country to EARS-Net by the reported population coverage of the country. The resulting numbers from the participating countries are then added together to get the EU/EEA total for the year. This sum is then divided by the EU/EEA population to arrive at the estimated EU/EEA incidence of invasive isolates for the specific pathogen.
The most recently reported coverage for the respective year is used, as reported to TESSy/EpiPulse Cases for 2018 and onward. If possible, the coverage reported for the year (Y) is used. If the coverage for year Y is not available, the coverage in the preceding year (Y-1) is used. If neither are available, the coverage for the following year (Y+1) is used. If the coverage is still missing, the process is repeated in the same order, but a year further from the intended year (Y). This process is repeated for as long as possible within the reported data, covering the years 2018 and onward.

Estimation of incidence and total number of cases

The methodology to estimate incidence (cases per 100 000 population) at country level:

$$\frac{Cases}{National\ population * Coverage} * 100\ 000 = estimated\ incidence$$

Cases – cases reported as R.
Coverage – estimated national population coverage. Using the same method as described under 'Estimation of EU/EEA incidence of invasive isolates'.
National population – as reported to Eurostat.

at EU and or EU/EEA level:
the sum of all the estimated cases for the reporting EU/EEA countries included is calculated and divided by the total EU/EEA population.

Estimated cases – cases reported as R by a country, divided by the coverage.

The statistical significance of temporal trends in antimicrobial resistance is calculated based on data from the last five years, or, for target calculations the number of years since the baseline year. For antimicrobial resistance percentages by country, countries reporting fewer than 20 isolates per year, where a significant change in data source occurred during the period, or countries that did not provide data for all years within the considered period, are not included in the analysis. The statistical significance of trends in resistance percentages is assessed by a chi-square test for trend. For the percentage resistance, an additional sensitivity analysis is performed by repeating the test including only laboratories which consistently reported for the full five-year period, in order to exclude selection bias when assessing the significance of the trends. For estimated incidence of resistance by country, countries that did not provide data for all years within the considered period are not included in the analysis, nor is it possible to calculate the trend if the estimated incidence of resistance is 0 for most years. Statistical significance of trends in estimated incidence is assessed with negative binomial regression.

Table 9. Microorganism and antimicrobial group combinations under regular EARS-Net surveillance, routinely presented in an annual report or the ECDC Surveillance Atlas of Infectious Diseases 2026

Microorganism	Antimicrobial group	Antimicrobial agents
Streptococcus pneumoniae **(STRPNE)**	Penicillins	PEN, OXA*
	Macrolides	ERY, CLR, AZM
	Fluoroquinolones	NOR, LVX, MFX**
	Third-generation cephalosporins	CTX, CRO
Staphylococcus aureus **(STAAUR)**	MRSA	FOX, OXA***
	Rifampicin	RIF
	Fluoroquinolones	NOR, CIP, LVX****
Enterococcus faecalis **(ENCFAE)**	High-level aminoglycoside resistance	GEH
	Aminopenicillins	AMX, AMP
	Vancomycin	VAN
Enterococcus faecium **(ENCFAI)**	Aminopenicillins	AMX, AMP
	High-level aminoglycoside resistance	GEH
	Vancomycin	VAN
Escherichia coli **(ESCCOL)**	Aminopenicillins	AMX, AMP
	Fluoroquinolones	CIP, OFX, LVX
	Third-generation cephalosporins	CTX, CRO, CAZ
	Aminoglycosides	GEN, TOB
	Carbapenems	IPM, MEM
	(New antibiotics and combinations)	(FDC, CZA, IMR, MEV, AZA)
Klebsiella pneumoniae **(KLEPNE)**	Fluoroquinolones	CIP, OFX, LVX
	Third-generation cephalosporins	CTX, CRO, CAZ
	Aminoglycosides	GEN, TOB
	Carbapenems	IPM, MEM
	(New antibiotics and combinations)	(FDC, CZA, IMR, MEV, AZA)

Microorganism	Antimicrobial group	Antimicrobial agents
Pseudomonas aeruginosa **(PSEAER)**	Piperacillin-tazobactam	TZP
	Ceftazidime	CAZ
	Fluoroquinolones	CIP, LVX
	Aminoglycosides	TOB
	Carbapenems	IPM, MEM
	(New antibiotics and combinations)	(FDC, CZA, CZT, IMR, MEV)
Acinetobacter **species (ACISPP)**	Fluoroquinolones	CIP, LVX
	Aminoglycosides	GEN, TOB
	Carbapenems	IPM, MEM
	(New antibiotics and combinations)	(FDC)

** Priority is given to penicillin susceptibility test over oxacillin results.*
*** Priority is given to levofloxacin and moxifloxacin susceptibility results over norfloxacin results.*
**** Meticillin (MET), flucloxacillin (FLC), cloxacillin (CLO) or dicloxacillin (DIC) susceptibility results are accepted as markers for oxacillin (OXA) resistance if oxacillin is not reported.*
***** Priority is given to ciprofloxacin and levofloxacin susceptibility results over norfloxacin results.*

Parentheses indicate antibiotics and combinations recently introduced to EARS-Net and that additional considerations are necessary when analysing and reporting on AST results.

Isolate record forms

These isolate record forms should be filled in by laboratories without electronic systems.

The following isolate record forms are included:

- Isolate Record Form *Streptococcus pneumoniae*
- Isolate Record Form *Staphylococcus aureus*
- Isolate Record Form *Enterococcus faecium*/ *Enterococcus faecalis*
- Isolate Record Form *Escherichia coli*
- Isolate Record Form *Klebsiella pneumoniae*
- Isolate Record Form *Pseudomonas aeruginosa*
- Isolate Record Form *Acinetobacter* spp.

Isolate Record Form *Streptococcus pneumoniae*

Instructions: Please send data for the first blood and/or cerebrospinal fluid isolate of every patient with an invasive *S. pneumoniae* infection. Send data on resistant and susceptible isolates; use one form per isolate. [n] Indicates variable number in reporting protocol.

[8] Laboratory Code		
[13] Isolate Id	**[9] Specimen** ☐ Blood ☐ CSF	**[6] Date of sample collection** (yyyy-mm-dd)
[10] Patient Id	**[11] Gender** ☐ Male ☐ Female ☐ Other	**[12] Age** (years)
[14] Hospital Id	**[15] Patient type** ☐ Inpatient ☐ Outpatient ☐ Other	**[18] Date of hospitalisation** (yyyy-mm-dd)
[16] Hospital Unit Type ☐ Internal medicine ☐ Paediatrics/neonatal ☐ Paediatrics/neonatal ICU ☐ Surgery ☐ Haematology/Oncology ☐ Obstetrics/Gynaecology ☐ Intensive care unit ☐ Emergency department ☐ Urology ward ☐ Infectious disease ward ☐ Other		

Antibiotic susceptibility testing (S/I/R, zone and/or MIC)

[24] Antimicrobial agent	**[25] SIR** (final interpretation result of all different susceptibility tests performed)	**Zone diameter**			**MIC**		**Gradient strip results**		**[35] Reference guidelines**
		[26] Result (mm)	**[27] Interpretation** (SIR)	**[34] Disk load** (specify unit)	**[29] Result** (mg/L)	**[30] Interpretation** (SIR)	**[32] Result** (mg/L)	**[33] Interpretation** (SIR)	Only EUCAST breakpoints accepted
Oxacillin									
Penicillin									
Erythromycin									
Clarithromycin									
Azithromycin									
Cefotaxime									
Ceftriaxone									
Norfloxacin									
Levofloxacin									
Moxifloxacin									
[21] Serotype:									

Send this form to: [Name/Institute/Contact details].

Isolate Record Form *Staphylococcus aureus*

Instructions: Please send data for the first blood and/or cerebrospinal fluid isolate of every patient with an invasive *S. aureus* infection. Send data on resistant and susceptible isolates; use one form per isolate.
[n] Indicates variable number in reporting protocol.

[8] Laboratory Code		
[13] Isolate Id	**[9] Specimen** ☐ Blood ☐ CSF	**[6] Date of sample collection** (yyyy-mm-dd)
[10] Patient Id	**[11] Gender** ☐ Male ☐ Female ☐ Other	**[12] Age** (years)
[14] Hospital Id	**[15] Patient type** ☐ Inpatient ☐ Outpatient ☐ Other	**[18] Date of hospitalisation** (yyyy-mm-dd)
[16] Hospital Unit Type ☐ Internal medicine ☐ Paediatrics/neonatal ☐ Paediatrics/neonatal ICU ☐ Surgery ☐ Haematology/Oncology ☐ Obstetrics/Gynaecology ☐ Intensive care unit ☐ Emergency department ☐ Urology ward ☐ Infectious disease ward ☐ Other		

MRSA confirmation tests

[19] PCR mec	☐ **Positive** ☐ **Negative**
[20] Pbp2a agglutination	☐ **Positive** ☐ **Negative**

Antibiotic susceptibility testing (S/I/R, zone and/or MIC)

[24] Antimicrobial agent	**[25] SIR** (final interpretation result of all different susceptibility tests performed)	**Zone diameter**			**MIC**		**Gradient strip results**		**[35] Reference guidelines**
		[26] Result (mm)	**[27] Interpretation** (SIR)	**[34] Disk load** (specify unit)	**[29] Result** (mg/L)	**[30] Interpretation** (SIR)	**[32] Result** (mg/L)	**[33] Interpretation** (SIR)	Only EUCAST breakpoints accepted
Cefoxitin									
Oxacillin									
Ciprofloxacin									
Levofloxacin									
Norfloxacin									
Rifampicin									
Linezolid									
Vancomycin									
Daptomycin									

Send this form to: [Name/Institute/Contact details].

Isolate Record Form

□ *Enterococcus faecium*

□ *Enterococcus faecalis*

Instructions: Please send data for the first blood and/or cerebrospinal fluid isolate of every patient with an invasive *E. faecium/E. faecalis* infection. Send data on resistant and susceptible isolates; use one form per isolate. [n] Indicates variable number in reporting protocol.

[8] Laboratory Code		
[13] Isolate Id	**[9] Specimen** ☐ Blood ☐ CSF	**[6] Date of sample collection** (yyyy-mm-dd)
[10] Patient Id	**[11] Gender** ☐ Male ☐ Female ☐ Other	**[12] Age** (years)
[14] Hospital Id	**[15] Patient type** ☐ Inpatient ☐ Outpatient ☐ Other	**[18] Date of hospitalisation** (yyyy-mm-dd)
[16] Hospital Unit Type ☐ Internal medicine ☐ Paediatrics/neonatal ☐ Paediatrics/neonatal ICU ☐ Surgery ☐ Haematology/Oncology ☐ Obstetrics/Gynaecology ☐ Intensive care unit ☐ Emergency department ☐ Urology ward ☐ Infectious disease ward ☐ Other		

Antibiotic susceptibility testing (S/I/R, zone and/or MIC)

[24] Antimicrobial agent	**[25] SIR** (final interpretation result of all different susceptibility tests performed)	**Zone diameter**			**MIC**		**Gradient strip results**		**[35] Reference guidelines**
		[26] Result (mm)	**[27] Interpretation** (SIR)	**[34] Disk load** (specify unit)	**[29] Result** (mg/L)	**[30] Interpretation** (SIR)	**[32] Result** (mg/L)	**[33] Interpretation** (SIR)	Only EUCAST breakpoints accepted
Amoxicillin									
Ampicillin									
Gentamicin - High									
Vancomycin									
Teicoplanin									
Linezolid									

Send this form to: [Name/Institute/Contact details].

Isolate Record Form *Escherichia coli*

Instructions: Please send data for the first blood and/or cerebrospinal fluid isolate of every patient with an invasive *E. coli* infection. Send data on resistant and susceptible isolates; use one form per isolate.
[n] Indicates variable number in reporting protocol.

[8] Laboratory Code		
[13] Isolate Id	**[9] Specimen** ☐ Blood ☐ CSF	**[6] Date of sample collection** (yyyy-mm-dd)
[10] Patient Id	**[11] Gender** ☐ Male ☐ Female ☐ Other	**[12] Age** (years)
[14] Hospital Id	**[15] Patient type** ☐ Inpatient ☐ Outpatient ☐ Other	**[18] Date of hospitalisation** (yyyy-mm-dd)
[16] Hospital Unit Type ☐ Internal medicine ☐ Paediatrics/neonatal ☐ Paediatrics/neonatal ICU ☐ Surgery ☐ Haematology/Oncology ☐ Obstetrics/Gynaecology ☐ Intensive care unit ☐ Emergency department ☐ Urology ward ☐ Infectious disease ward ☐ Other		

Phenotypic detection of resistance

[22] ESBL	☐ **Positive** ☐ **Negative**
[23] Carbapenemase	☐ **Positive** ☐ **Negative**

Antibiotic susceptibility testing (S/I/R, zone and/or MIC)

[24] Antimicrobial agent	**[25] SIR** (final interpretation result of all different susceptibility tests performed)	**Zone diameter**			**MIC**		**Gradient strip results**		**[35] Reference guidelines**
		[26] Result (mm)	**[27] Interpretation** (SIR)	**[34] Disk load** (specify unit)	**[29] Result** (mg/L)	**[30] Interpretation** (SIR)	**[32] Result** (mg/L)	**[33] Interpretation** (SIR)	Only EUCAST breakpoints accepted
Amoxicillin									
Ampicillin									
Amoxicillin-clavulanic acid									
Piperacillin – tazobactam									
Gentamicin									
Tobramycin									
Amikacin									
Ciprofloxacin									
Ofloxacin									
Levofloxacin									
Moxifloxacin									
Cefotaxime									
Ceftriaxone									
Ceftazidime									
Ceftazidime-avibactam									
Cefepime									
Cefiderocol									
Imipenem									
Imipenem-relebactam									
Meropenem									
Meropenem-vaborbactam									
Ertapenem									
Colistin									
Tigecycline									
Aztreonam-avibactam									

Send this form to: [Name/Institute/Contact details].

Isolate Record Form *Klebsiella pneumoniae*

Instructions: Please send data for the first blood and/or cerebrospinal fluid isolate of every patient with an invasive *K. pneumoniae* infection. Send data on resistant and susceptible isolates; use one form per isolate. [n] Indicates variable number in reporting protocol.

[8] Laboratory Code		
[13] Isolate Id	**[9] Specimen** ☐ Blood ☐ CSF	**[6] Date of sample collection** (yyyy-mm-dd)
[10] Patient Id	**[11] Gender** ☐ Male ☐ Female ☐ Other	**[12] Age** (years)
[14] Hospital Id	**[15] Patient type** ☐ Inpatient ☐ Outpatient ☐ Other	**[18] Date of hospitalisation** (yyyy-mm-dd)
[16] Hospital Unit Type ☐ Internal medicine ☐ Paediatrics/neonatal ☐ Paediatrics/neonatal ICU ☐ Surgery ☐ Haematology/Oncology ☐ Obstetrics/Gynaecology ☐ Intensive care unit ☐ Emergency department ☐ Urology ward ☐ Infectious disease ward ☐ Other		

Phenotypic detection of resistance

[22] ESBL	☐ Positive ☐ Negative
[23] Carbapenemase	☐ Positive ☐ Negative

Antibiotic susceptibility testing (S/I/R, zone and/or MIC)

[24] Antimicrobial agent	**[25] SIR** (final interpretation result of all different susceptibility tests performed)	**Zone diameter**			**MIC**		**Gradient strip results**		**[35] Reference guidelines**
		[26] Result (mm)	**[27] Interpretation** (SIR)	**[34] Disk load** (specify unit)	**[29] Result** (mg/L)	**[30] Interpretation** (SIR)	**[32] Result** (mg/L)	**[33] Interpretation** (SIR)	Only EUCAST breakpoints accepted
Amoxicillin clavulanic acid									
Piperacillin – tazobactam									
Gentamicin									
Tobramycin									
Amikacin									
Ciprofloxacin									
Ofloxacin									
Levofloxacin									
Moxifloxacin									
Cefotaxime									
Ceftriaxone									
Ceftazidime									
Ceftazidime-avibactam									
Cefepime									
Cefiderocol									
Imipenem									
Imipenem-relebactam									
Meropenem									
Meropenem-vaborbactam									
Ertapenem									
Aztreonam-avibactam									
Colistin									

Send this form to: [Name/Institute/Contact details].

Isolate Record Form *Pseudomonas aeruginosa*

Instructions: Please send data for the first blood and/or cerebrospinal fluid isolate of every patient with an invasive *P. aeruginosa* infection. Send data on resistant and susceptible isolates; use one form per isolate.
[n] Indicates variable number in reporting protocol.

[8] Laboratory Code		
[13] Isolate Id	**[10] Specimen** ☐ Blood ☐ CSF	**[6] Date of sample collection** (yyyy-mm-dd)
[10] Patient Id	**[11] Gender** ☐ Male ☐ Female ☐ Other	**[12] Age** (years)
[14] Hospital Id	**[15] Patient type** ☐ Inpatient ☐ Outpatient ☐ Other	**[18] Date of hospitalisation** (yyyy-mm-dd)
[16] Hospital Unit Type ☐ Internal medicine ☐ Paediatrics/neonatal ☐ Paediatrics/neonatal ICU ☐ Surgery ☐ Haematology/Oncology ☐ Obstetrics/Gynaecology ☐ Intensive care unit ☐ Emergency department ☐ Urology ward ☐ Infectious disease ward ☐ Other		

Phenotypic detection of resistance

[23] Carbapenemase	☐ **Positive** ☐ **Negative**

Antibiotic susceptibility testing (S/I/R, zone and/or MIC)

[24] Antimicrobial agent	**[25] SIR** (final interpretation result of all different susceptibility tests performed)	**Zone diameter**			**MIC**		**Gradient strip results**		**[35] Reference guidelines**
		[26] Result (mm)	**[27] Interpretation** (SIR)	**[34] Disk load** (specify unit)	**[29] Result** (mg/L)	**[30] Interpretation** (SIR)	**[32] Result** (mg/L)	**[33] Interpretation** (SIR)	Only EUCAST breakpoints accepted
Piperacillin									
Piperacillin-tazobactam									
Tobramycin									
Amikacin									
Ciprofloxacin									
Levofloxacin									
Ceftazidime									
Ceftazidime-avibactam									
Cefepime									
Cefiderocol									
Ceftolozane-tazobactam									
Imipenem									
Imipenem-relebactam									
Meropenem									
Meropenem-vaborbactam									
Colistin									

Send this form to: [Name/Institute/Contact details].

Isolate Record Form *Acinetobacter* species

Instructions: Please send data for the first blood and/or cerebrospinal fluid isolate of every patient with an invasive *Acinetobacter* spp. infection. Send data on resistant and susceptible isolates; use one form per isolate. [n] Indicates variable number in reporting protocol.

[8] Laboratory Code		
[13] Isolate Id	**[9] Specimen** ☐ Blood ☐ CSF	**[6] Date of sample collection** (yyyy-mm-dd)
[10] Patient Id	**[11] Gender** ☐ Male ☐ Female ☐ Other	**[12] Age** (years)
[14] Hospital Id	**[15] Patient type** ☐ Inpatient ☐ Outpatient ☐ Other	**[18] Date of hospitalisation** (yyyy-mm-dd)
[16] Hospital Unit Type ☐ Internal medicine ☐ Paediatrics/neonatal ☐ Paediatrics/neonatal ICU ☐ Surgery ☐ Haematology/Oncology ☐ Obstetrics/Gynaecology ☐ Intensive care unit ☐ Emergency department ☐ Urology ward ☐ Infectious disease ward ☐ Other		

Phenotypic detection of resistance

[23] Carbapenemase	☐ **Positive** ☐ **Negative**

Antibiotic susceptibility testing (S/I/R, zone and/or MIC)

[24] Antimicrobial agent	**[25] SIR** (final interpretation result of all different susceptibility tests performed)	**Zone diameter**			**MIC**		**Gradient strip results**		**[35] Reference guidelines**
		[26] Result (mm)	**[27] Interpretation** (SIR)	**[34] Disk load** (specify unit)	**[29] Result** (mg/L)	**[30] Interpretation** (SIR)	**[32] Result** (mg/L)	**[33] Interpretation** (SIR)	Only EUCAST breakpoints accepted
Cefiderocol									
Ciprofloxacin									
Levofloxacin									
Gentamicin									
Tobramycin									
Amikacin									
Imipenem									
Meropenem									
Colistin									

Send this form to: [Name/Institute/Contact details].