

Genomic surveillance in the EU/EEA, objectives, tools, examples

FWD AMR RefLabCap workshop, Copenhagen 29 October 2024

Drafted legal documents and discussions around WGS data reporting in this context

Drafted Implementing act WGS food isolates



- “To substantially facilitate food-borne outbreak investigations and the timely detection of the sources of those outbreaks, Member States should be required to collect *Salmonella enterica*, *Listeria monocytogenes*, *Escherichia coli*, *Campylobacter jejuni* and *Campylobacter coli* isolates derived from food, animal, feed and related environmental samples from food and feed business operators and during official controls, where those isolates are associated or suspected to be associated with a foodborne outbreak. Member States should also be required to carry out WGS on those isolates.”
- “The Member States should transmit the results from WGS on isolates of those pathogens [...] to the EFSA that developed a joint One Health system together with the ECDC.”

Regulations are legal acts defined by Article [288](#) of the Treaty on the Functioning of the European Union (TFEU). They have general application, are binding in their entirety and are **directly applicable** in EU [Member States](#).

**REGULATION (EU) 2022/2371 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 23 November 2022
on serious cross-border threats to health and repealing Decision No 1082/2013/EU
(Text with EEA relevance)**

Serious cross border threats to health regulation



Article 14

Digital platform for surveillance

7. The Commission shall adopt delegated acts in accordance with Article 31 to supplement this Regulation concerning:
 - (a) the cases where, and the conditions under which, the third countries and international organisations concerned may be granted partial access to the functionalities of the digital platform for surveillance and the practical arrangements for such access;
 - (b) the cases where, and the conditions under which, the data, information and documents referred to in Article 13 are to be transmitted using the digital platform for surveillance and the list of such data, information and documents; and
 - (d) molecular pathogen data, if required for detecting or investigating serious cross-border threats to health

Ongoing work for drafting Delegated act (EU legal document) regarding reporting requirements for communicable disease surveillance

- Reporting requirements in the Delegated act are to be complemented by more detailed surveillance standards that ECDC shall develop, maintain and monitor in collaboration with the networks
- These shall include for example specific surveillance objectives, surveillance methods, indicators to be monitored, mandatory key variables etc

Genomic data and surveillance standards



Whenever genomic data is relevant for the defined disease objectives, they will be included in the surveillance standards

The scope and timeliness of genomic data submission will be defined and agreed jointly with Member States

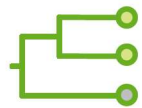


Reporting according to the standards will be mandatory



Level of reporting of genomic data will be evaluated on a yearly basis

Standards: implications for genomic surveillance for Member States



Enhanced possibilities to contextualise national WGS data

Member States need to set up systems that allows reporting of criteria described in the surveillance standards



New system for data submission (EpiPulse cases)

Standards: implications for genomic surveillance for ECDC



Maintain sufficient bioinformatics calculation capacity



Continuous work with the Member States to streamline the data submission process and eliminate any barriers for reporting



Further develop ECDC functionalities/capacities for analysing, visualising and presenting outputs from integrated data



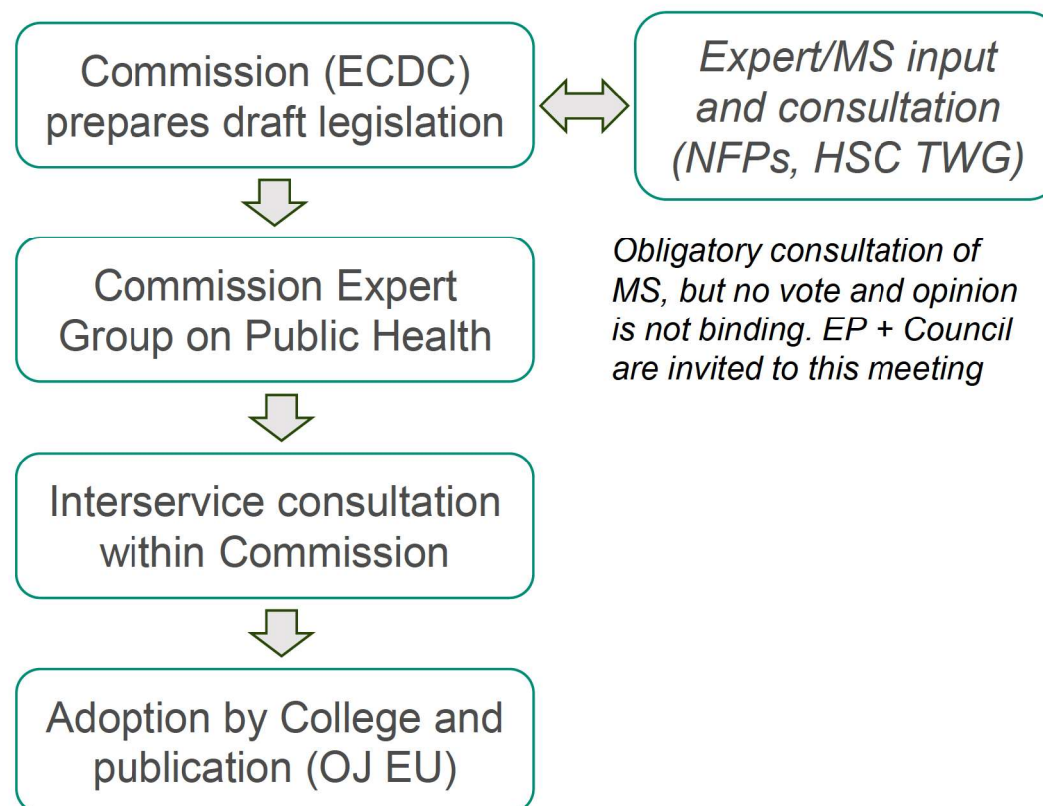
Ensure capacity to react on signals and use integrated data for public health actions

Delegated act regarding reporting requirements for communicable disease surveillance



- Balance between what detailed level would go into a legal document which can take time to update, and the surveillance standards.
- Possibility to add that "isolates from a proportion of samples to be sequenced for xyz purposes" ?

Process for a Delegated act



How does data sharing, comparing work in practice

ECDC EFSA One health system - overview

ECDC cluster analysis →
→ Identified clusters

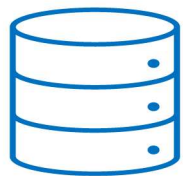


EpiPulse db

Query to EFSA
(EFSA + EFSA public)

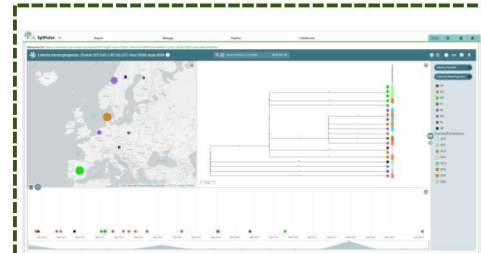
All Clusters

EFSA hits



EFSA WGS system

DATA ANALYSIS



EpiPulse Molecular
Typing Visualization

Human and
Non-human isolates

**DATA VISUALIZATION
FOR PUBLIC HEALTH
USER**

Cluster detection



Species specific cluster criteria for automatic cluster detection

- Core cluster: Single-linkage cluster of more than two sequences within 5 allele difference (AD) threshold (only Human isolates define the core clusters)
- Extended cluster: Slightly broader cut-off, within 10 allele difference (AD,) than core cluster includes the Food isolates
- Clusters include both single country clusters as well as multi-country clusters

ECDC data visibility criteria for PH users



- RecordId can only be seen by ECDC and the submitting country
- Clusters and Signals can only be seen by involved countries (involved countries are currently those with human cases in the cluster), unless upgraded to an Event or Threat (it is however possible for countries to see other nearby clusters if they use the more exploratory features in EpiPulse)

ECDC data visibility criteria for PH users regarding non-human isolates



- For EFSA data, country of origin can only be seen by ECDC and the same country, and further restrictions on data visibility can be applied by the EFSA providers
- For EFSA Public data, no visibility restrictions on country of origin

EpiPulse Molecular Typing Tool – visualisation and cluster detection of reported WGS data



ecdc EpiPulse ☰

- Report**
 - TESSy Cases
 - Events, Forum & News
 - Surveillance system descriptors
 - EpiPulse Cases
- Manage**
 - TESSy - review uploads
 - Atlas ▶
 - TALD cases
 - TALD sites
- Explore**
 - Public Atlas
 - Surveillance Dashboards/Reports ▶
 - Events, Forum & News
 - Download data
 - Signal detection tool
 - Molecular typing tool
 - Outputs Overview
 - EQA Lab Reports
- Collaborate**
 - CCB contacts
 - Domain Contacts ▶
 - Extranets
 - Duty Schedule
 - TESSy Help & Docs
 - Request EU Health Task
 - Force support

☰ (4) 🔒 📧

🏠 > Explore > Molecular typing tool

Please treat the data in the platform as sensitive non-classified unless specifically indicated as public.

Please, select a Pathogen to review and analyse its data.

Campylobacter

▼ Search & Refine Selection

Sequence Type

Please, select one Sequence Type x ▼

Countries

Countries x ▼

If empty, all the countries will be selected.

Match Distance

Match Distance

Cluster

Cluster Code x ▼

If empty, all the clusters will be selected.

Date used for statistics

dd/mm/yyyy 📅 dd/mm/yyyy 📅

Cluster Method

Default ▼

Events

Events

Submission Date

dd/mm/yyyy 📅 dd/mm/yyyy 📅

Epidemiological Data

Please, select one or more epidemiological data x ▼

Isolates

Isolates

Distance metric to match

Default ▼

ST572

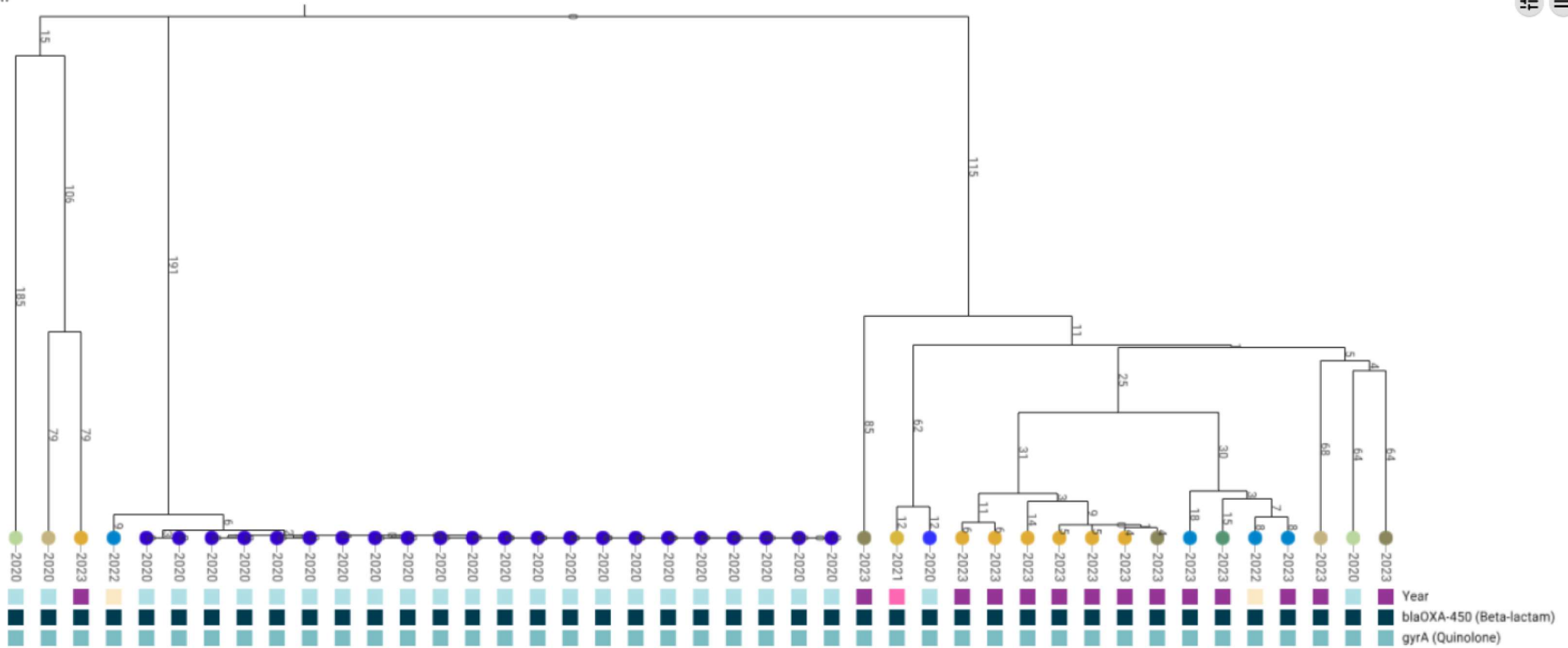
ST 572 isolates (cgMLST, Single Linkage tree)

☰ Campylobacter. Sequence Type: 572 ⓘ

🔍 SEARCH IN ALL COLUMNS

43 of 43

Tree



40.565

PhyloCanvas

Have you access to EpiPulse events?

YES

NO

I DON'T KNOW

https://epipulse.ecdc.europa.eu/eps/#/

Report Manage Explore Collaborate

Please treat the data in the platform as sensitive non-classified unless specifically indicated as public.

All ARHAI EI LEGI EVD FWD HEP HIV IRV PREP SoHO SRV STI TB VPD Resp. duty Molec. typing TALD Daily CDTR Weekly CDTR

Search by text in Please select [v] [q] Announcement Event Forum Long-Term Monitoring News Signal Threat Closed Discarded Open

Advanced search criteria

Create item Create output Edit flags [bell] Column visibility Show 25 rows [upload] [print]

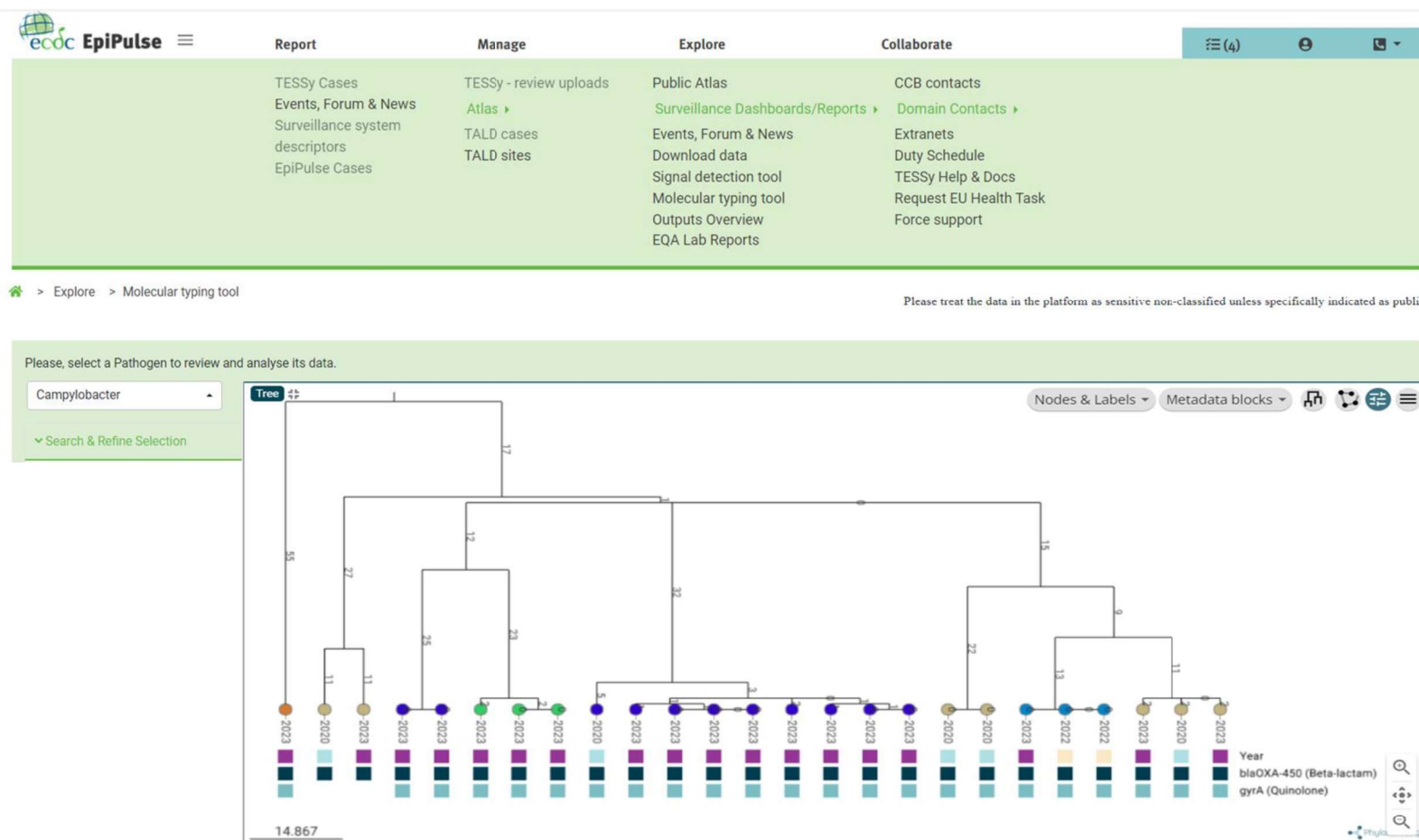
ID	Participating domain	Type	Title	Created by	Pathogens	Diseases	Modified time	Flags
2024-FWD-00097	FWD, EI, PREP	Event	Cluster of Salmonella Worthington	Czechia/Public Health	Salmonella subspecies I (enterica)	Salmonellosis	2024-10-28 12:15	
2024-FWD-00095	FWD, EI, PREP	Event	Cluster of S. Typhimurium CT18908 in Berlin	Germany/Public Health	Salmonella Typhimurium	Salmonellosis	2024-10-28 12:09	
2024-FWD-00104 (new)	FWD, EI, PREP	Event	Two new clusters of S. Typhimurium ST36 in Sweden	Sweden/Public Health	Salmonella Typhimurium	Salmonellosis	2024-10-28 12:07	
2024-FWD-00087	FWD, EI, PREP	Event	Two clusters of Salmonella Enteritidis ST11, Sweden	Sweden/Public Health	Salmonella Enteritidis	Salmonellosis	2024-10-28 12:06	
2024-IRV-00003	IRV, EI, FWD, PREP	Signal	Avian influenza A(H5N1) human cases – United States – 2024	ECDC/Public Health	Avian influenza virus	Influenza, avian	2024-10-28 11:10	[lock] [info]
2023-FWD-00090	FWD, EI, PREP	Event	Multistate outbreak with Salmonella Strathcona in Germany	Germany/Public Health	Salmonella (non-typhoidal) species, not specified	Salmonellosis	2024-10-28 10:36	

Have you access to EpiPulse Molecular Typing Tool?

YES

NO

I DON'T KNOW



The screenshot displays the EpiPulse Molecular Typing Tool interface. At the top, there is a navigation menu with four main sections: Report, Manage, Explore, and Collaborate. The 'Explore' section is currently active, showing a list of tools including 'Molecular typing tool'. Below the navigation menu, there is a breadcrumb trail: 'Home > Explore > Molecular typing tool'. A disclaimer states: 'Please treat the data in the platform as sensitive non-classified unless specifically indicated as public.'

The main content area shows a selection prompt: 'Please, select a Pathogen to review and analyse its data.' A dropdown menu is set to 'Campylobacter'. Below this, there is a search and refine selection area. The central part of the interface is a phylogenetic tree visualization. The tree shows a hierarchical structure of Campylobacter strains, with nodes labeled with numbers representing the number of samples. The tree is rooted on the left and branches out to the right. The nodes are color-coded by year: 2020 (orange), 2022 (yellow), 2023 (purple), and 2024 (green). A legend at the bottom right indicates the color coding for 'Year', 'blaOXA-450 (Beta-lactam)', and 'gyrA (Quinolone)'. The tree is titled 'Tree' and has a zoom level of 14.867. There are also controls for 'Nodes & Labels' and 'Metadata blocks'.

Who can access and visualise data in the Molecular typing Tool (MTT)



- To **visualise** clusters/results for the relevant diseases/pathogens for example: SALM and SALMISO (salmonellosis/ salmonella isolates i. e. Epi/Lab), **TESSy download rights is needed**
- To **upload** WGS and meta data to TESSy and **visualise** the results for example: SALM and SALMISO (salmonellosis/ salmonella isolates, i. e. Epi/Lab): **TESSy upload, download and approve rights are needed**

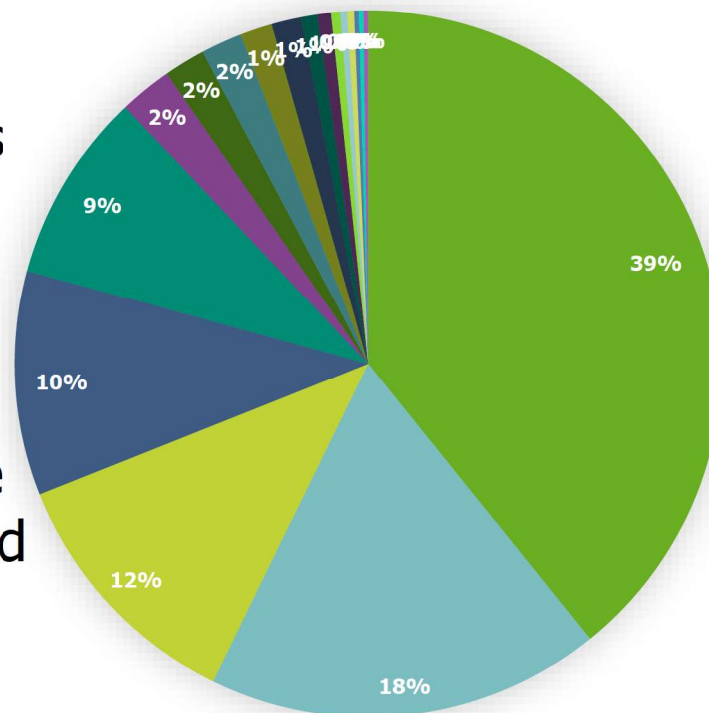
Can you access this link? <https://epipulse.ecdc.europa.eu/typing/explore>
If not, you do not have the right TESSy access rights to access EpiPulse MTT.

Country distribution of all isolates entered into the ECDC system since June 2023

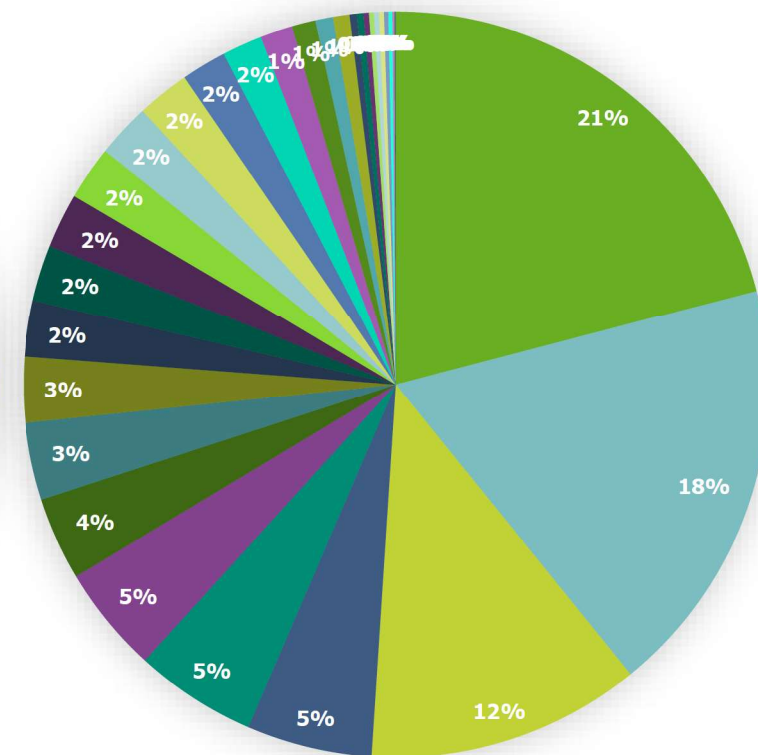


- For Listeria 5 countries represent 88% of isolates
- For Salmonella the contributions are more even
- Salmonella data are more dominated by event-based data and data for yearly AMR analysis
- This shows that the uptake of continuous prospective surveillance is still low

Listeria



Salmonella

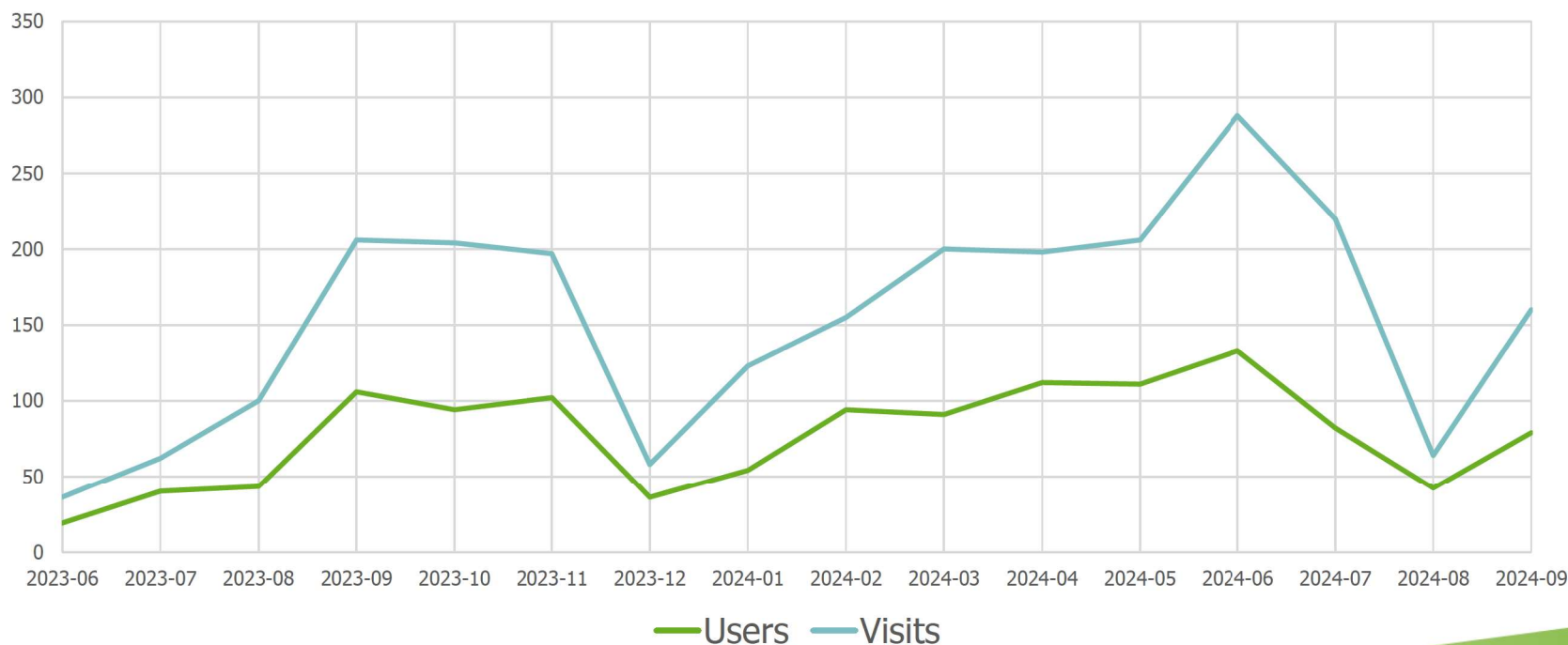


Colours by country,
As of 26 Sep 2024

Use of EpiPulse molecular typing webpage

The number of monthly external users is around 50-100

Monthly external users and visits to the ECDC molecular typing tool



Show case the MTT, country user!

Questions