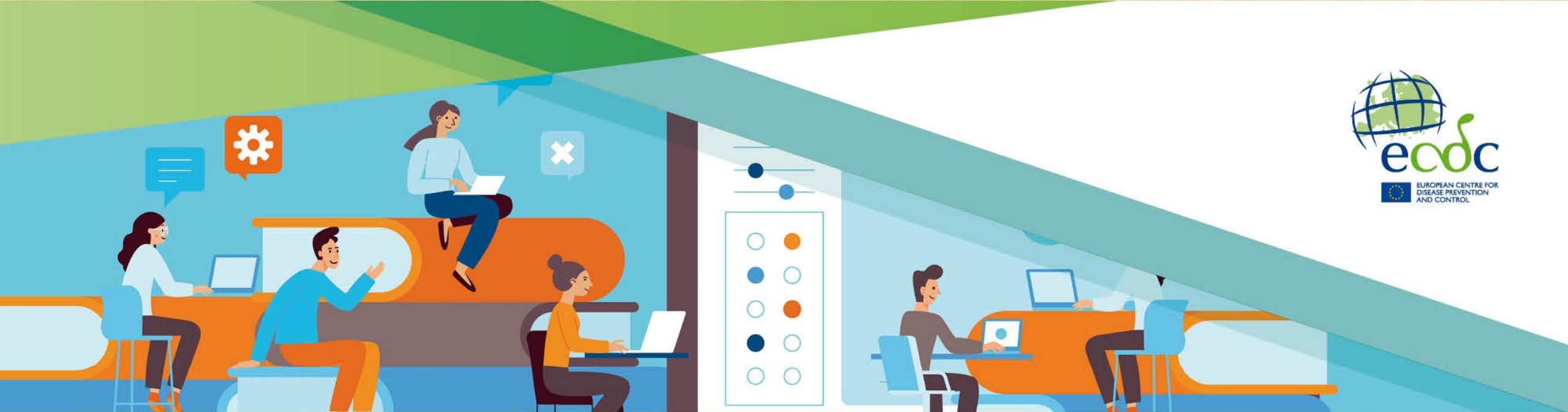
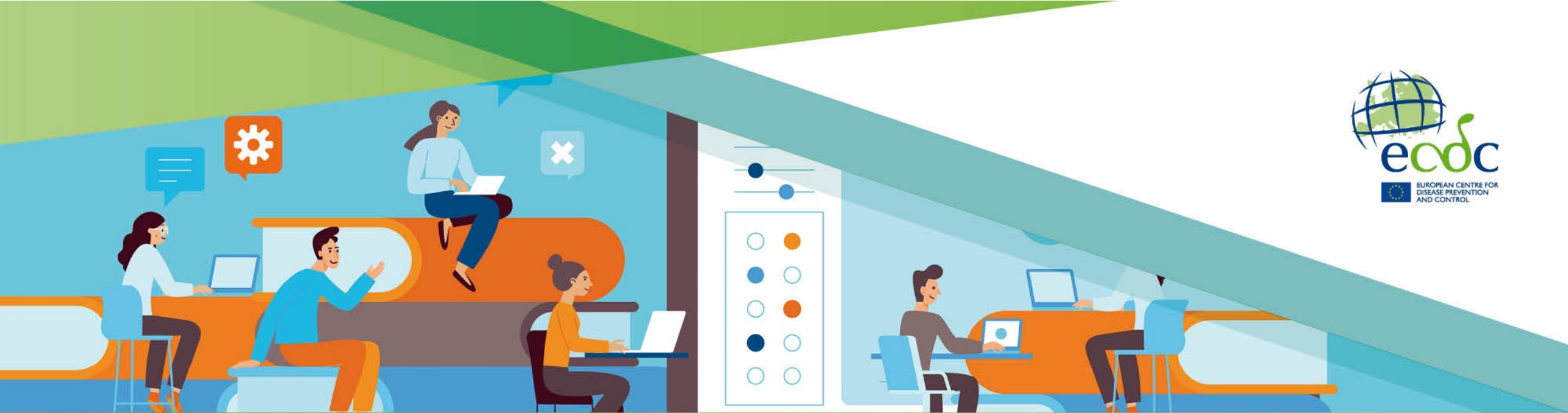




GenEpi-BioTrain - Virtual Training 28 - Genomics and epidemiology of polioviruses

Poliovirus surveillance in the EU/EEA

17 July 2026



GenEpi-BioTrain - Virtual Training 28 - Genomics and epidemiology of polioviruses

Poliovirus surveillance, vaccination and epidemiology

17 July 2026

Silvia Funke

Outline – Part 1

This session consists of the following elements

- Polio surveillance
- Poliovirus types & Vaccination
- Epidemiology
- Risk assessment & recommendations

Polio surveillance in the EU/EEA

How ECDC monitors polio



Indicator based surveillance

- The European Surveillance Portal → EU/EEA
- Global Polio Eradication Initiative (GPEI) → Global level



Event based surveillance

- Screening and early detection activities through Epidemic Intelligence (24/7)
- Assessment and discussion at the daily Round Table meetings

Early Warning is also ensured through

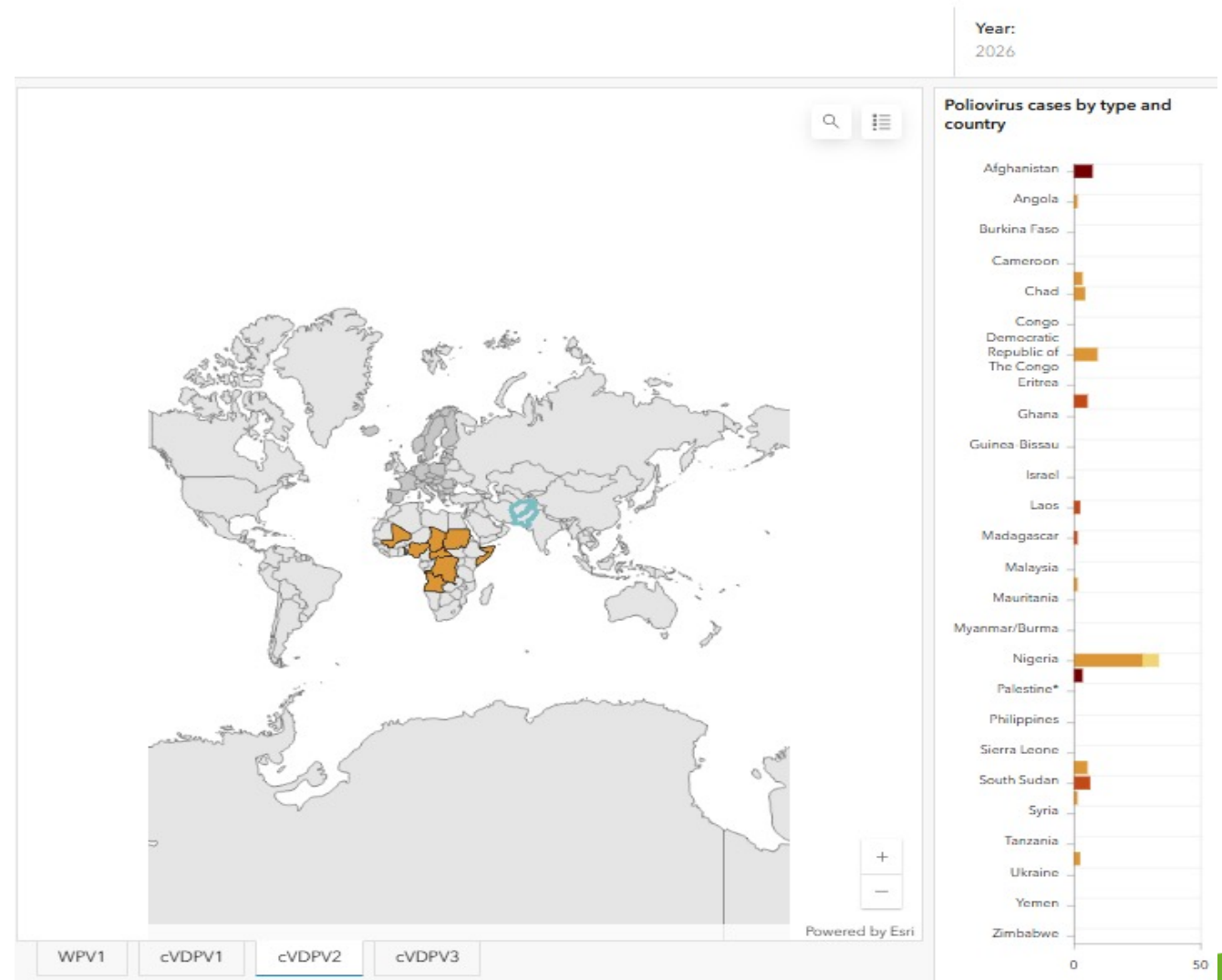
- EWRS → EU/EEA
- WHO IHR notifications → Global level



ECDC Polio related outputs

**To internal stakeholders
and/or to the public**

- EpiPulse (RT, [CDTR](#))
- [RRA](#)
- [Technical Report](#)
- [News Item](#)
- [Polio dashboard](#)



Poliovirus types & Vaccination

Poliovirus types

Wild polio virus (WPV):

WPV1, WPV2, WPV3

Vaccine-derived polio virus (VDPV):

VDPV1, VDPV2, VDPV3



Circulating Vaccine-derived polio virus (cVDPV):

cVDPV1, cVDPV2, cVDPV3

Oral polio vaccination (OPV)

- + Virus replicates in the intestine, is excreted and spread → passive immunization of others
- + Easy to administer (mass vaccination)
- + Cheap
- + Offers long-lasting immunity
- + Used to interrupt person-to-person transmission in outbreaks
- **Can circulate and mutate (cVDPV) and cause outbreaks in populations with low vaccination coverage (VC)**

nOPV: more genetically stable, reduced risk of cVDPV



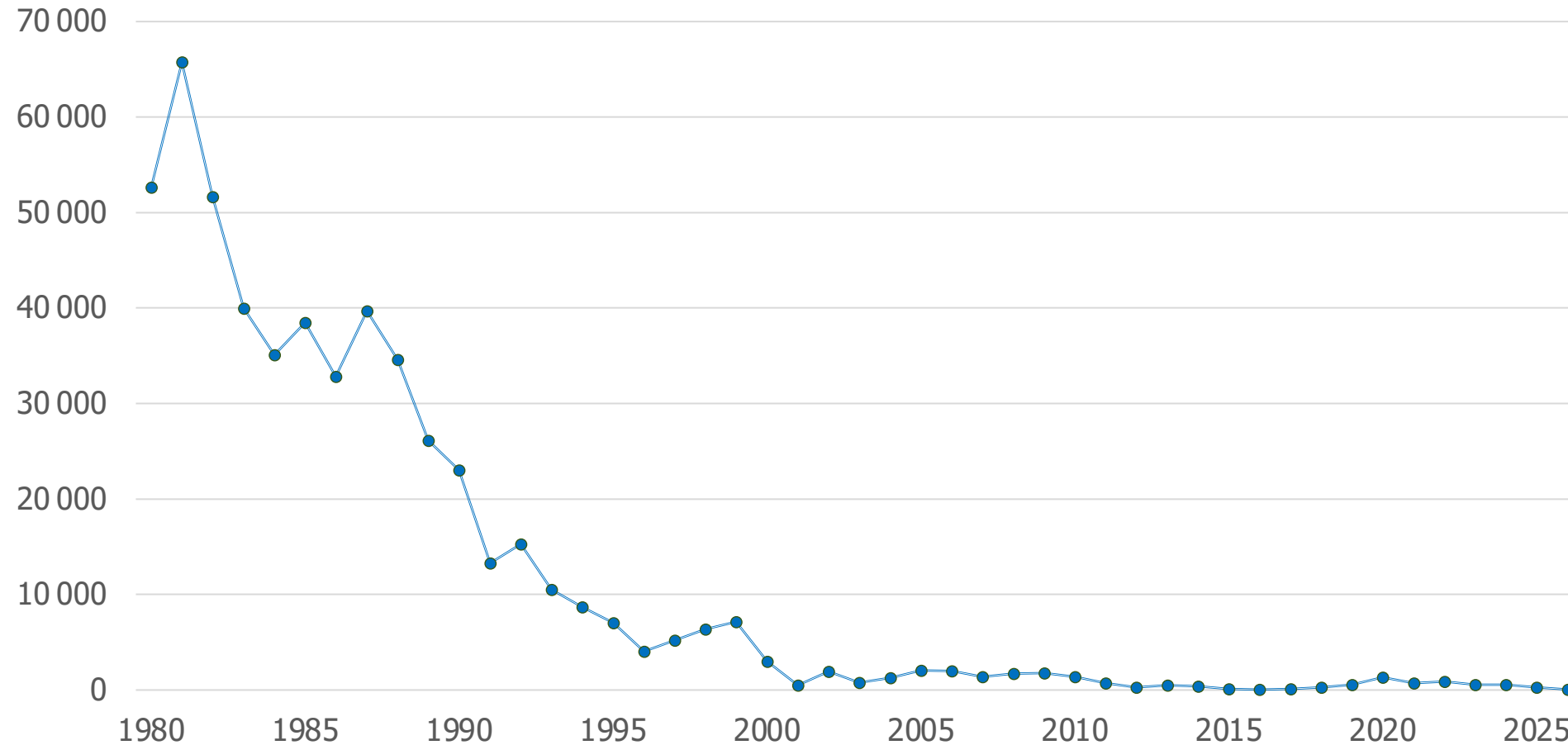
Inactivated polio vaccine (IPV)



- + Inactivated → no risk of paralysis
 - + Triggers excellent immune response in most people
 - Needs to be administered by trained HCW
 - Expensive
 - Does not stop transmission of the virus
- only polio vaccine used in the EU/EEA**

Epidemiology

Reported polio cases by year, 1980-2026

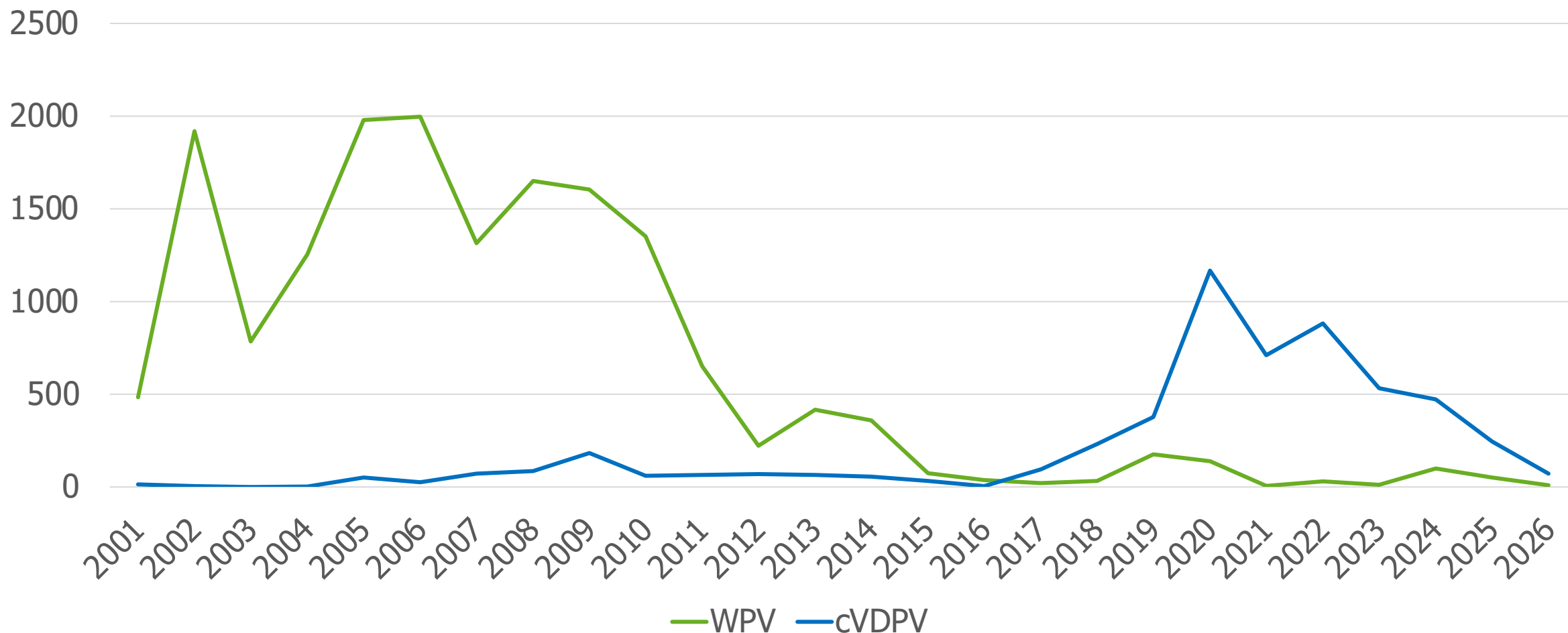


Source:

<https://immunizationdata.who.int/global/wiise-detail-page/poliomyelitis-reported-cases-and-incidence>

<https://polioeradication.org>

Reported polio cases by type, 2001-2026



Source:

<https://immunizationdata.who.int/global/wiise-detail-page/poliomyelitis-reported-cases-and-incidence>

<https://polioeradication.org>

Global epidemiological situation in 2024-2026

WPV1

Afghanistan

- 2026 – 7 cases
- 2025 – 21 cases
- 2024 – 25 cases

Pakistan

- 2026 – 3 cases
- 2025 – 31 cases
- 2024 – 74 cases

cVDPV

cVDPV1

- 2026 – 14 cases (4 countries in AFRO, WPRO)
- 2025 – 3 cases (3 countries in AFRO, EMRO, WPRO)
- 2024 – 21 cases (3 countries in AFRO)

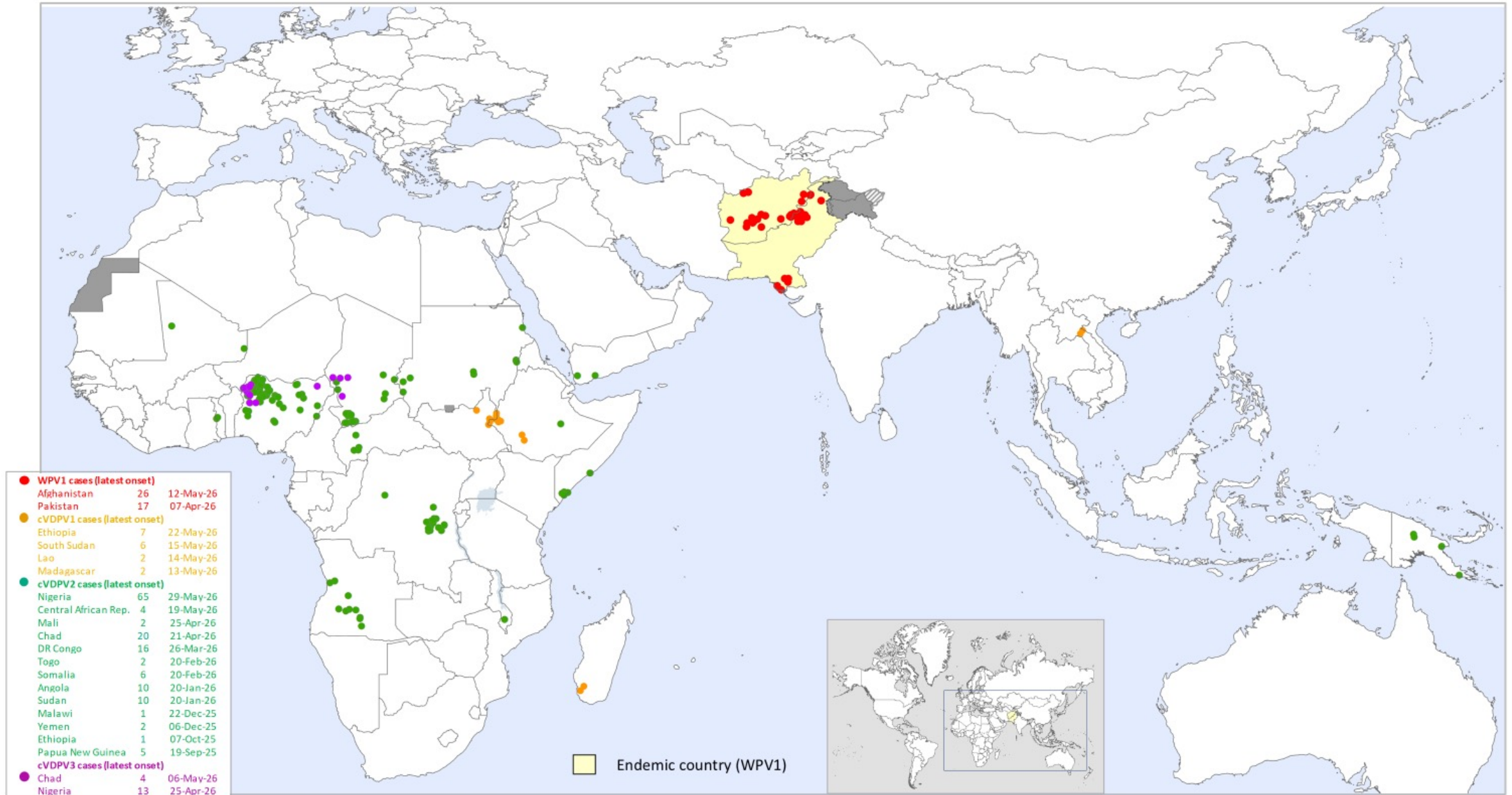
cVDPV2

- 2026 – 53 cases (9 countries in AFRO, EMRO)
- 2025 – 228 cases (16 countries in AFRO, EMRO, WPRO)
- 2024 – 448 cases (20 countries in AFRO, EMRO, SEARO)

cVDPV3

- 2026 - 6 cases (1 country in AFRO)
- 2025 – 15 cases (4 countries in AFRO)
- 2024 – 4 cases (1 country in AFRO)

Global WPV1 & cVDPV Cases¹, Previous 12 Months²



¹Excludes viruses detected from environmental surveillance; ²Onset of paralysis: 08 Jul. 2025 to 07 Jul. 2026

Epidemiological situation in the EU/EEA

- Last WPV cases were reported in 2001
- EURO certified polio-free in 2002
- No polio cases due to cVDPV have ever been reported

But repeated detections of VDPVs and cVDPVs (and WPV) in wastewater samples in different EU countries in the recent years

RRA 2025: Assessing the risk to public health of multiple detections of poliovirus in wastewater in the EU/EEA

Risk assessment & recommendations

Assessment of wastewater detections in the EU/EEA



- Some self-limited local circulation is expected due to lack of mucosal immunity in countries using inactivated polio vaccine (IPV) only
- Not all signals warrant an emergency response, but all detections are a reminder of the constant pressure of poliovirus importation and the importance of filling known immunity gaps.
- There is a potential of international spread and a risk of poliovirus importation into the EU/EEA due to WPV1 circulation and emerging cVDPV outbreaks caused by a lack of polio immunity

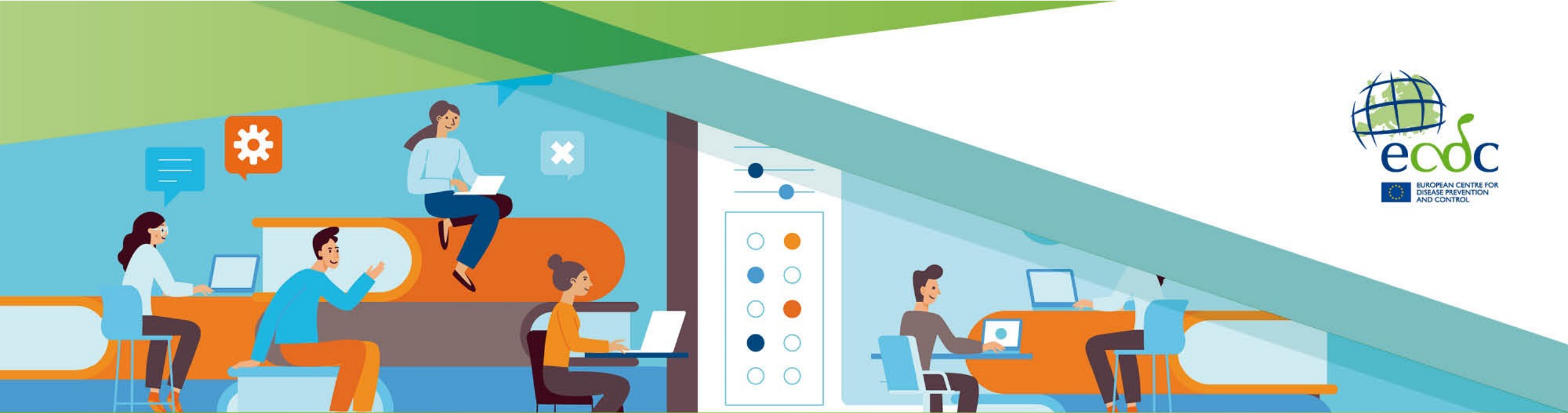
A population with high VC is not at risk of being infected by imported WPV or cVDPV

Recommendations and actions suggested to EU/EEA countries



To limit the risk of reintroduction and sustained transmission of WPV and cVDPV in the EU/EEA, it is crucial

- to maintain high vaccine coverage in the general population through routine immunisation programmes
- to increase vaccination uptake in pockets of underimmunised populations
- to strengthen immunisation information systems
- to conduct high quality and timely surveillance, including environmental surveillance as per guidelines
- to adhere to the Global Containment Strategy



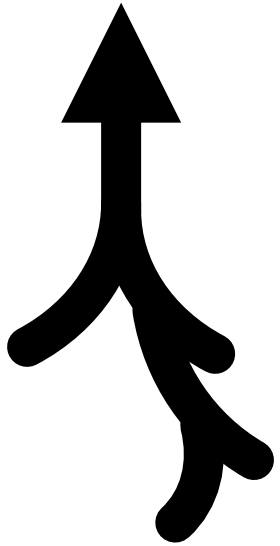
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Luca Freschi

A new paradigm: integrated surveillance



It **is a coordinated approach** to disease monitoring that combines multiple sources of data, laboratory methods, and disciplines to provide a **comprehensive** picture of public health threats.

- *bioinformatics, data science, **microbiology**, epidemiology, epidemic intelligence, health economics, behavioural science*

Clinical and environmental surveillance



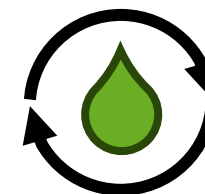
Purpose: detect symptomatic cases; trigger rapid response

Added Value:

- Direct evidence of transmission & disease
- Epidemiological linkage (cases → contacts)
- Confirms eradication progress

Limitations:

- Relies on symptomatic cases only
- Late signal (chains already established)
- ↑ costs



Purpose: detect circulating virus before cases appear

Added Value:

- Early warning system (early detection)
- Captures asymptomatic transmission
- Population-level coverage
- Cost-effective (one sample = thousands of people)
- Detects vaccine-derived poliovirus (VDPV)

Limitations:

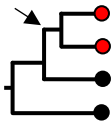
- Cannot link virus to individual cases
- Presence ≠ necessarily ongoing transmission
- Requires interpretation

Added value of genomic surveillance

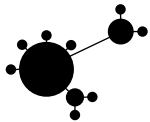
VDPV1



Classification beyond serotype



Emergence dating and circulation timeline



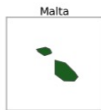
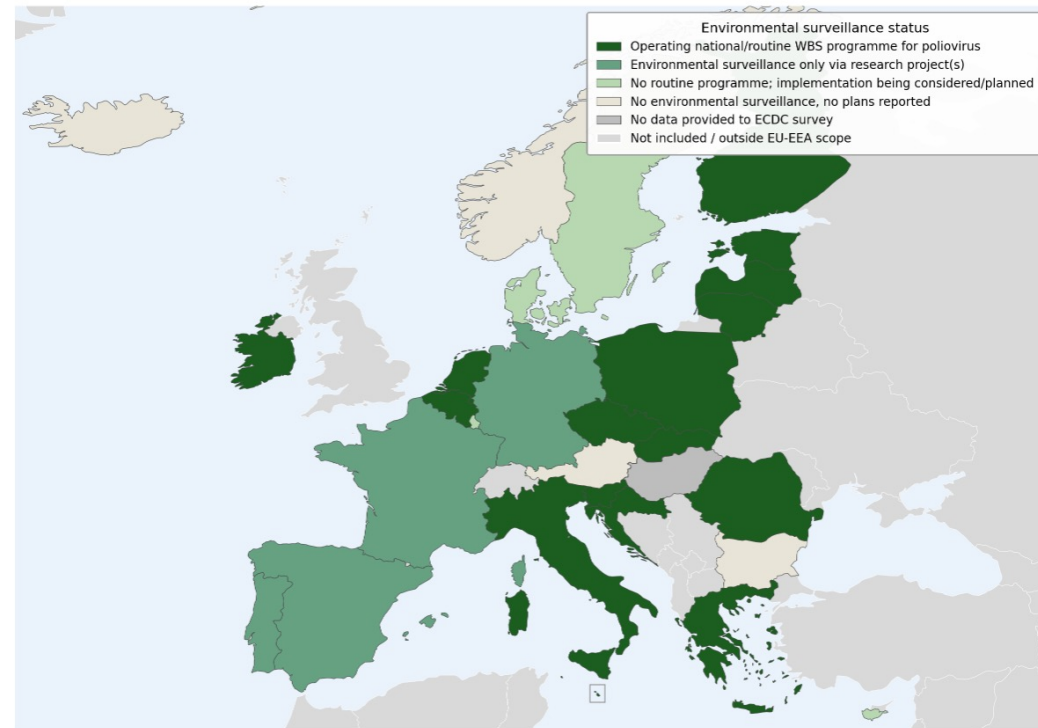
Genetic linkage / transmission chain reconstruction



Epidemiological context (importation, local transmission)

Status of environmental surveillance

Status of environmental (wastewater-based) surveillance
for poliovirus, EU/EEA, January 2025



Source: ECDC survey among EU/EEA Member States, 9–17 January 2025.
Data: Assessing the risk to public health of multiple detections of poliovirus in wastewater
in the EU/EEA. ECDC: Stockholm, 2025 (Annex 1, Table 2).

Administrative boundaries: © EuroGeographics © UN-FAO © Turkstat. The boundaries and names shown on this map do not imply official
endorsement or acceptance by the European Union.

- ECDC relies on national initiatives for environmental surveillance
- The majority of the EU/EEA countries are currently running environmental surveillance for polio
- Open questions: sustainability, standards

Polio genomic surveillance on EpiPulse: rationale



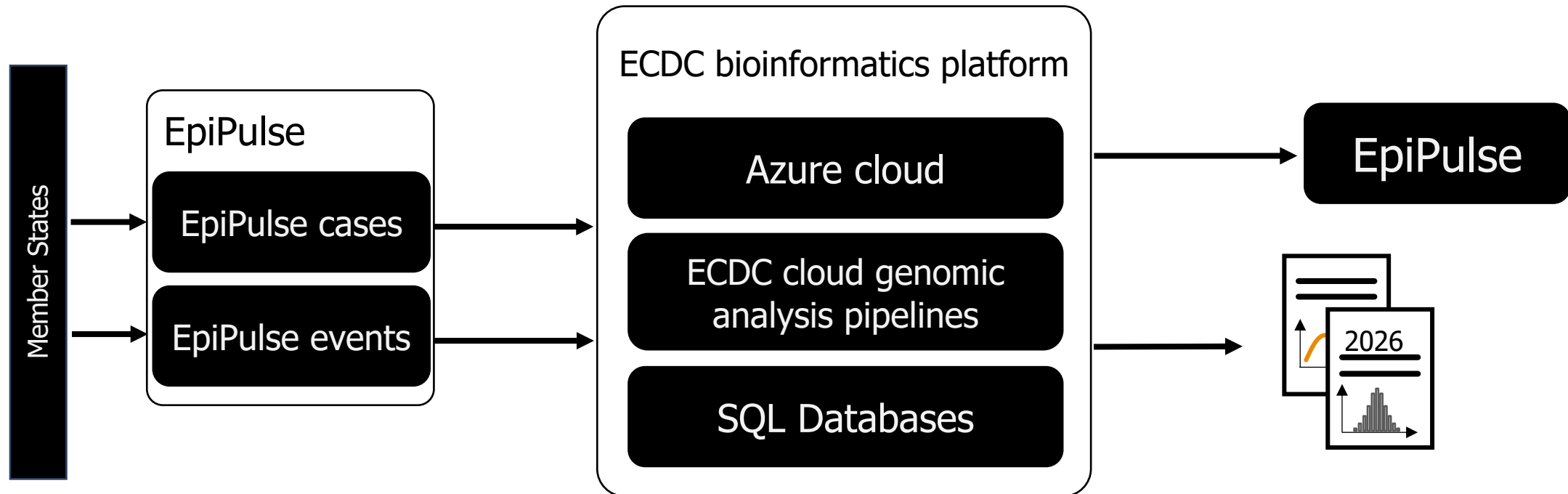
Situation **[EU/EEA]**

No polio cases reported since 2001, but repeated detections of VDPVs and cVDPVs (and WPV) in wastewater samples in different EU countries in the recent years

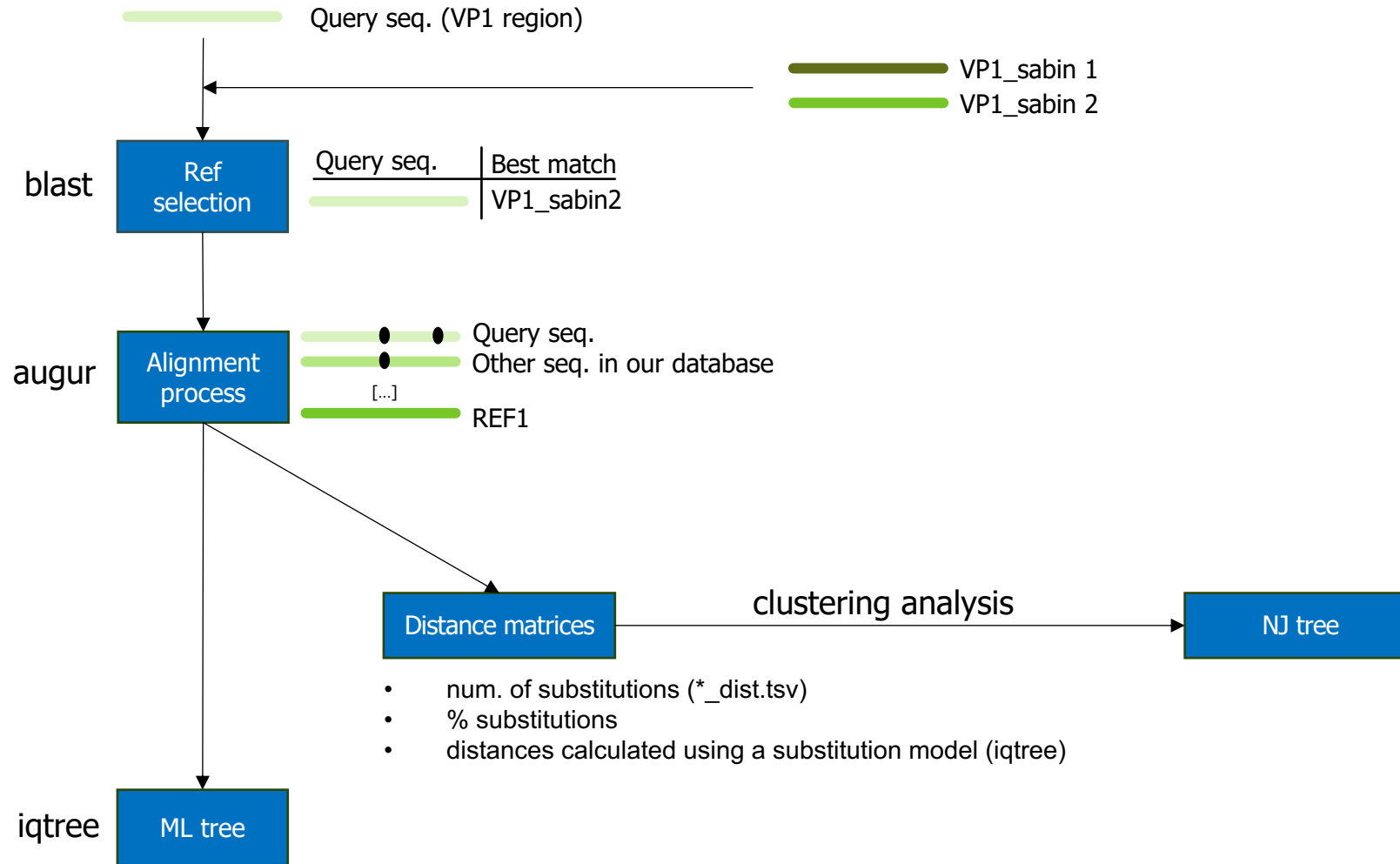
Objectives

- Use environmental surveillance data [wastewater surveillance]
- Early warning [EU perspective: detect cross-border events]
- Risk assessment

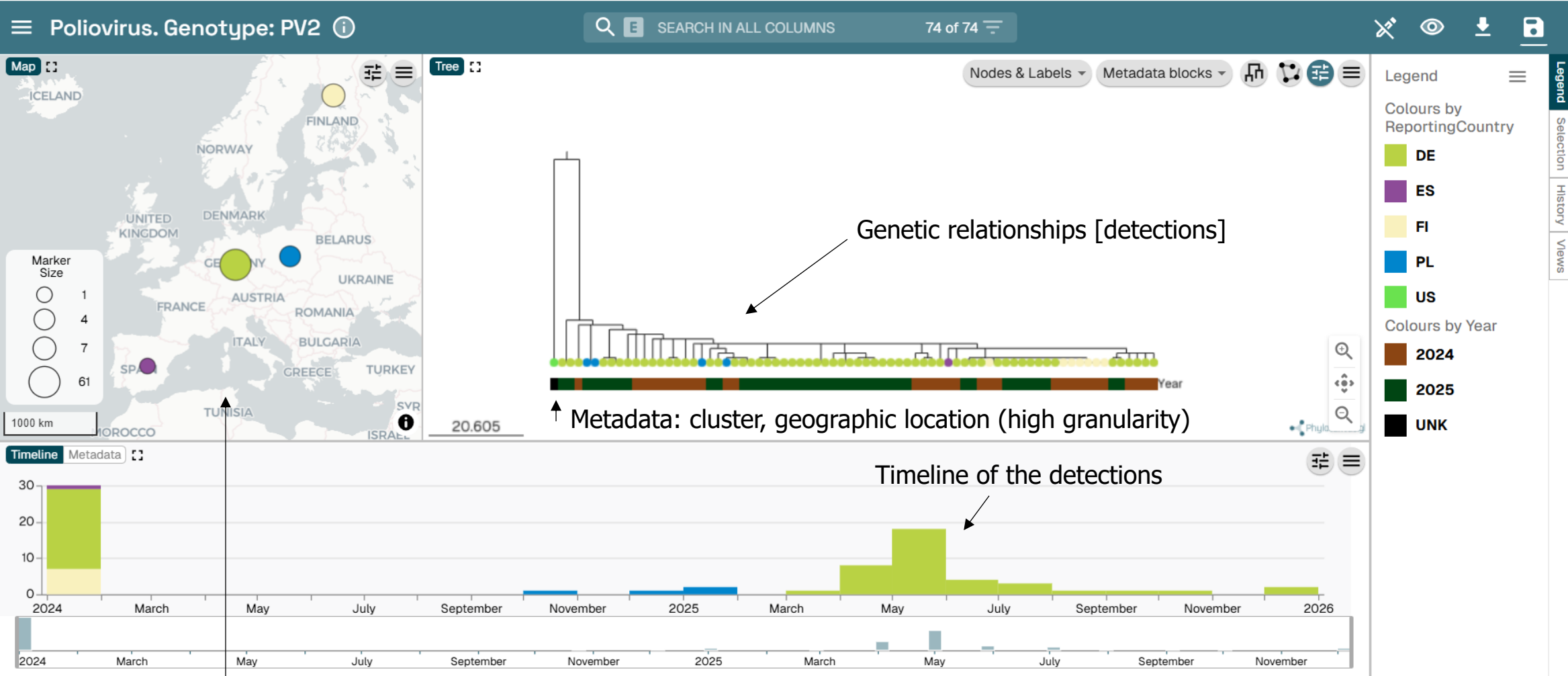
ECDC data ecosystem



Polio genomic surveillance on EpiPulse: data analysis



Polio genomic surveillance on EpiPulse: data visualisation

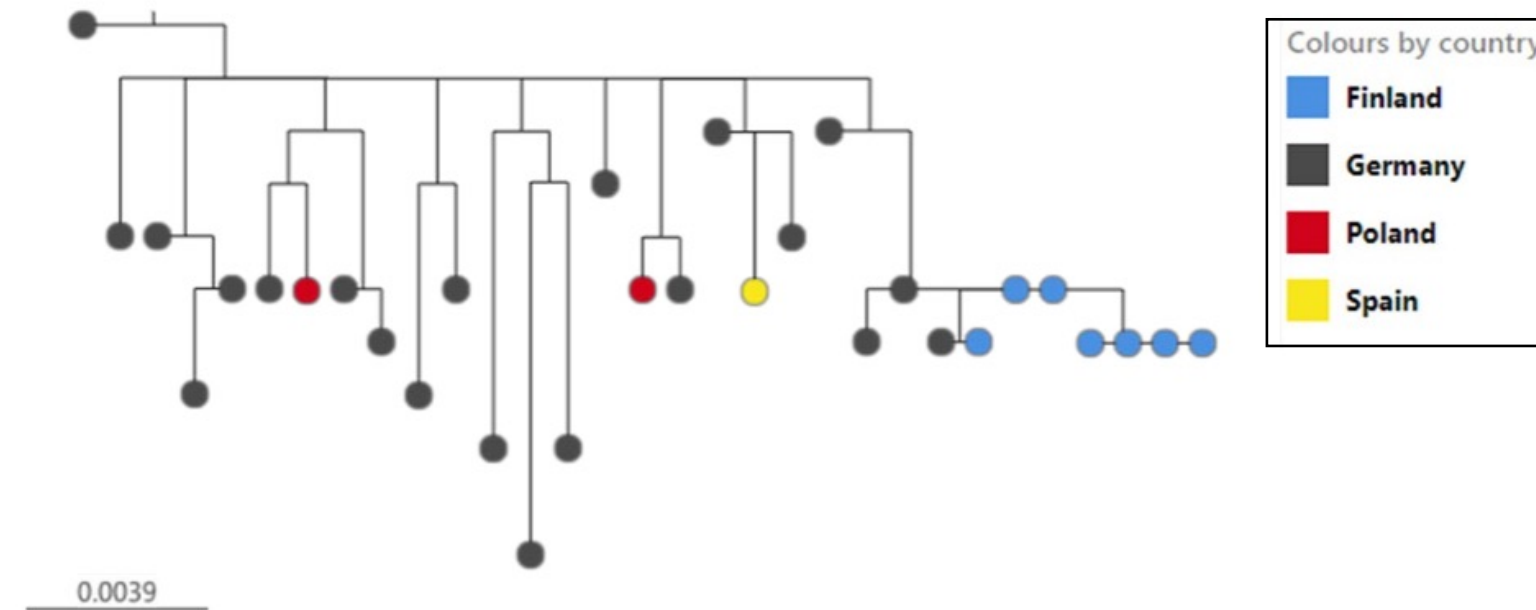


Use cases and current added value of the system

- Search for signals of possible cross-border transmission
- Risk assessment [→ [Assessing the risk to public health of multiple detections of poliovirus in wastewater in the EU/EEA](#)]
- Background data for future detections

An example of a use case: a Rapid Risk Assessment

Figure 1. Phylogenetic tree of 31 VP1 sequences collected from EU/EEA Member States between September and December 2024



The sequences from Finland are replicate isolations from a single sample.

The most likely explanation for the observations in Figure 1 is repeated virus introductions from a region with ongoing circulation of this variant of cVDPV2. It is also possible, albeit less likely, that they reflect virus circulation in EU/EEA that went undetected by environmental surveillance until recently.

Polio genomic surveillance on EpiPulse: current limitations



- The current reference set mostly uses vaccine strains [need a mechanism for WPV]
- Currently using only data from EU/EEA member states [missing background data to characterise introductions]
- Access to the system is currently restricted to ECDC staff [results and assessments have been promptly shared with Member States]
 - This access policy reflects the fact that the system is still at the early stages of development. The mid-term plan is to open it to nominated users

Conclusions

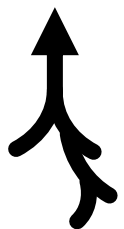


ECDC started to use environmental surveillance data from EU/EEA Member States as an early warning system for polio.

- The system has been already used for risk assessment, to search for potential cross-border transmission patterns and it is constantly being improved
- Other EU agencies and entities (notably HERA and the JRC) have also played a key role in promoting the development and use of environmental surveillance for preparedness and research



The same system can be used for other pathogens



The goal is to use all available data sources for disease surveillance [integrated surveillance approach] to support EU/EEA member states in their efforts of disease prevention and control.