

Polio (Poliomyelitis)



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# Considerations For Wastewater Testing for Poliovirus in the United States



If you are considering wastewater testing for poliovirus, call your state and/or local health department. Work with them to consider whether to initiate this type of testing.

[List of state public health departments](#)

Poliovirus detections in wastewater should be a rare event; the considerations of site selection are different from testing for a more common virus like SARS-CoV-2.

## Uses of Wastewater Testing for Poliovirus

Wastewater testing for poliovirus is a well-established tool for poliovirus surveillance and outbreak response as part of the [Global Polio Eradication Initiative](#).

**Routine wastewater testing for poliovirus is not recommended for countries such as the United States that have eliminated polio and have high overall polio vaccination coverage and improved sanitation.**

In the setting of a poliovirus outbreak, wastewater testing can be used to:

- Define the geographic size and extent of the outbreak
- Determine where public health interventions should be focused
- Describe the frequency of poliovirus importations and circulation of poliovirus.

### The detection of poliovirus in wastewater:

| CAN                                                                                                                                                                                                                                                                                                                        | CANNOT                                                                                                                                                                                                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>• indicate importation and, when persistently detected, person-to-person transmission of poliovirus</li><li>• inform the targeted implementation of prevention measures such as <a href="#">vaccination campaigns</a> and other actions for disease control and prevention</li></ul> | <ul style="list-style-type: none"><li>• be used to determine the total number of infected persons in a community or the portion of the population that is infected; the minimum number of infected individuals that can be reliably detected through wastewater testing is not known.</li></ul> |

Targeted wastewater testing may be considered in non-outbreak situations to understand the potential for importation, poliovirus transmission, and risk of paralytic polio in certain communities. Such communities include those with:

- Low polio vaccination coverage (<80% 3-dose vaccination coverage in children < 18 years of age)
- Travel to and from areas with ongoing poliovirus outbreaks

Before undertaking wastewater testing, assessments of baseline vaccination coverage and the likelihood of travel-related poliovirus exposures can inform public health decisions.

## Selecting wastewater testing sites for poliovirus: sewershed size

Knowing the size of the sewershed is important for considering poliovirus wastewater testing and for interpreting results.

- For global poliovirus surveillance, sewersheds with a catchment of approximately 100,000–300,000 individuals are recommended.
- In the United States considering wastewater testing, selected sewersheds are recommended to have a catchment of no more than 400,000 individuals. Since the detection of poliovirus is expected to be a rare event, larger catchment areas might result in missed detections of poliovirus (that is, lower testing sensitivity).
- In some locations, sewersheds with < 400,000 individuals might not be possible (e.g., large metropolitan areas). In consultation with CDC and NWSS, jurisdictions can consider testing larger sewersheds noting the limitations of detection.
- If poliovirus is detected in a larger sewershed (>400K individuals), it is useful to consider the feasibility of establishing upstream wastewater sampling sites to narrow the population at risk. Upstream sampling might help guide strategies for public health action, such as [vaccination campaigns](#) in communities, if poliovirus is detected subsequently in a smaller catchment area.

## Laboratory testing for poliovirus in wastewater specimens

Wastewater specimens are tested for poliovirus using a pan-polio PCR assay, which detects all types of polioviruses. Detections following the pan-polio PCR assay require confirmation and sequencing. RNA extracts from wastewater specimens that are positive for poliovirus via the pan-poliovirus assay should be sent to CDC for confirmation and sequencing. Results are reported back to the submitting laboratory. The state public health laboratory is then responsible for providing results to public health department(s) and utilities, as appropriate. Additional questions can be referred to [poliolabusa@cdc.gov](mailto:poliolabusa@cdc.gov).

## Public health response to detections of poliovirus in wastewater specimens

Results of wastewater testing will inform whether public health action in a community is needed. If polioviruses are repeatedly detected in wastewater, public health departments should consider actions based on the strain of poliovirus detected. The following public health actions have been identified as important to prevention of further poliovirus transmission or breach of containment for polioviruses that have been eradicated (Types 2 and 3). These actions fall into five categories as described below:

- [Surveillance](#) [e.g., for polio and [acute flaccid myelitis \(AFM\)](#)]
- [Vaccination](#)
- [Containment](#)
- [Communications](#)
- [Reporting a detection](#)

Surveillance

A key component of response to a detection of poliovirus in wastewater is timely surveillance for cases of paralytic poliomyelitis. In the United States, surveillance for poliomyelitis is captured by national [acute flaccid myelitis \(AFM\)](#) surveillance activities. These include:

- Enhancing surveillance for [acute flaccid myelitis \(AFM\)](#) using syndromic surveillance queries in conjunction with the [National Syndromic Surveillance Program \(NSSP\)](#). In October of 2021, a new ICD-10 code, G04.82, was added to specify the diagnosis of AFM and can assist with syndromic surveillance queries.
- Alerting clinicians in community and tertiary care hospitals in the areas through a Health Alert Notification about enhanced case finding for acute flaccid weakness and spinal cord grey matter lesions on magnetic resonance imaging (MRI). Clinicians who recognize a suspected case of AFM (sudden onset of acute flaccid weakness) should report the case to the state or local health department if there is any grey matter involvement on spinal cord MRI.

Vaccination

Follow-up actions in response to a poliovirus detection of concern in wastewater include:

- Assessing and improving vaccination coverage in zip codes with <80% polio vaccination coverage for 3 or more valid doses of inactivated poliovirus vaccine (IPV) among children aged <18 years.
- Administering inactivated polio vaccine to complete the primary series of adults who are unvaccinated or incompletely vaccinated and live or work in areas where poliovirus is circulating.

Additional guidance on polio vaccine recommendations can be found at: [www.cdc.gov/vaccines/vpd/polio/public/index.html](http://www.cdc.gov/vaccines/vpd/polio/public/index.html)

Containment of Poliovirus Infectious and Potentially Infectious Material

The WHO declared eradication of wild poliovirus (WPV) types 2 and 3 in 2015 and 2019, respectively. With global eradication, laboratory containment of specimens containing these viruses is critical to prevent reintroduction of these viruses into the environment. Read more information about the [strategies for global poliovirus containment](#) [↗](#).

The U.S. National Authority on Containment of Poliovirus (NAC) provides policies for implementing poliovirus containment in the United States. All specimens known to contain poliovirus, or that could potentially contain poliovirus [designated potentially infectious material (PIM)] fall under these policies to prevent exposure or release back into the environment. Vaccine-derived poliovirus (VDPV) PIM includes materials and samples collected at a time and place where VDPV is known or suspected to be circulating.

Containment of poliovirus is a critical component of any wastewater testing plan. Laboratories, wastewater treatment plants, and other facilities that collect and handle poliovirus PIM should adhere to U.S. NAC interim guidance to mitigate the risks to personnel, environment, public health, and the global eradication of poliovirus.

Depending on the type and duration of poliovirus detections found in wastewater:

- Containment requirements will apply to all facilities (e.g., wastewater treatment plants, laboratories, hospitals, academic research centers) in sewersheds where the detections occurred.
- Requirements apply to all PIM in those facilities, including specimens not collected for polio wastewater testing purposes (e.g., upper respiratory and stool clinical specimens and other wastewater specimens).
- Identification of any poliovirus positive samples must be reported to U.S. NAC as “infectious materials” and depending on the type will have specific containment requirements.

The NAC is available to work with facilities to ensure awareness of these requirements at [poliocontainment@cdc.gov](mailto:poliocontainment@cdc.gov).

Communications

A coordinated and pre-planned communications approach to a detection of poliovirus should be developed prior to the initiation of wastewater testing. If poliovirus is detected, results must be carefully communicated by state and local health departments to (at a minimum) persons living in zip codes served by that sewershed, along with clear recommendations that are feasible to convey and implement. State and local health departments are the first line and most appropriate channel of public facing health communications and it is critical to partner with them for awareness and understanding before implementing wastewater testing.

Communication of wastewater testing results:

- Address where and when poliovirus in wastewater has been detected, whether there have been multiple or persistent detections, or whether detections were isolated or sporadic
- Should make clear detections are in wastewater and not persons infected with poliovirus
- Should only be released after wastewater specimens are confirmed and sequenced

Follow-up actions in response to a confirmed poliovirus detection in wastewater generally include:

- Advise residents of clear actions to take, such as if and where to receive inactivated polio vaccine at specific vaccination clinics or through local healthcare providers.
- Consider planning to leverage existing [educational materials](#) and resources.
- Ensure that local healthcare providers are knowledgeable about recommendations for vaccination and how to order additional vaccine doses.
- Depending on the type of poliovirus detected, jurisdictions can consider issuing a notification to healthcare providers and other stakeholders via the [Health Alert Network \(HAN\)](#) if there is concern for potential infection and transmission within the community.

When communicating about a positive wastewater result, information that gives context for the general public about the low risk of paralytic polio is important. Most of the U.S. population have protection against paralytic polio because they were vaccinated during childhood. It is also important to describe the safety, effectiveness, and accessibility of inactivated poliovirus vaccine. Focused communications with communities of concern are strengthened through addressing any vaccine hesitancy factors, being culturally relevant, and if needed, engaging with community leaders regarding any community outreach efforts. CDC has additional resources for clinicians and health departments: [Vaccines and Immunizations: For Healthcare Professionals](#)

Reporting a detection of poliovirus in wastewater

If wastewater testing detects poliovirus, it is important that any facility report that detection to the state or local health department. They will then work together with CDC to confirm and sequence the detection.

Depending on the type of poliovirus detected, CDC is obligated to inform the World Health Organization (WHO) through an [International Health Regulation \(IHR\)](#) [↗](#) notification. CDC will work with the jurisdiction, laboratory staff and both CDC and jurisdictional communication teams to ensure transparency about the timing and information contained in the notification.

| Additional Resources                                                                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">National Wastewater Surveillance System (NWSS) – a new public health tool to understand COVID-19 spread in a community</a> |
| <a href="#">Reporting Suspected Cases of Polio</a>                                                                                     |
| <a href="#">Poliovirus Containment</a>                                                                                                 |

