Polio in New York: How to Recognize and Report Polio, and Reinforce Routine Childhood Polio Vaccination

Clinician Outreach and Communication Activity (COCA) Call

Thursday, September 1, 2022

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- CDC did not accept financial or in-kind support from ineligible companies for this continuing education activity.

Objectives

At the conclusion of today's session, the participant will be able to accomplish the following:

1. Discuss the history of polio globally and in the United States.
2. Outline the current investigation and response to the case of paralytic polio in New York.
3. Describe how to recognize, diagnose, and report suspected paralytic polio cases in the United States.
4. Distinguish the differences between inactivated polio vaccine (IPV) and oral polio vaccine (OPV) and the importance of maintaining high polio vaccination coverage.

To Ask a Question

- Using the Zoom Webinar System
  - Click on the “Q&A” button
  - Type your question in the “Q&A” box
  - Submit your question

- If you are a patient, please refer your question to your healthcare provider.

- If you are a member of the media, please direct your questions to CDC Media Relations at 404-639-3286 or email media@cdc.gov

Today's Presenters

Farrell Tobolowsky, DO, MS
LCDR, U.S. Public Health Service
Clinical Task Force Lead
2022 NYS Polio Response
Centers for Disease Control and Prevention

Janell Routh, MD, MHS
CAPT, U.S. Public Health Service
Incident Manager
2022 NYS Polio Response
Centers for Disease Control and Prevention

Emily Lutterloh, MD, MPH
Director, Division of Epidemiology
New York State Department of Health

Georgina Peacock, MD, MPH
Director, Division of Immunization Services
National Center for Immunization and Respiratory Diseases
Centers for Disease Control and Prevention

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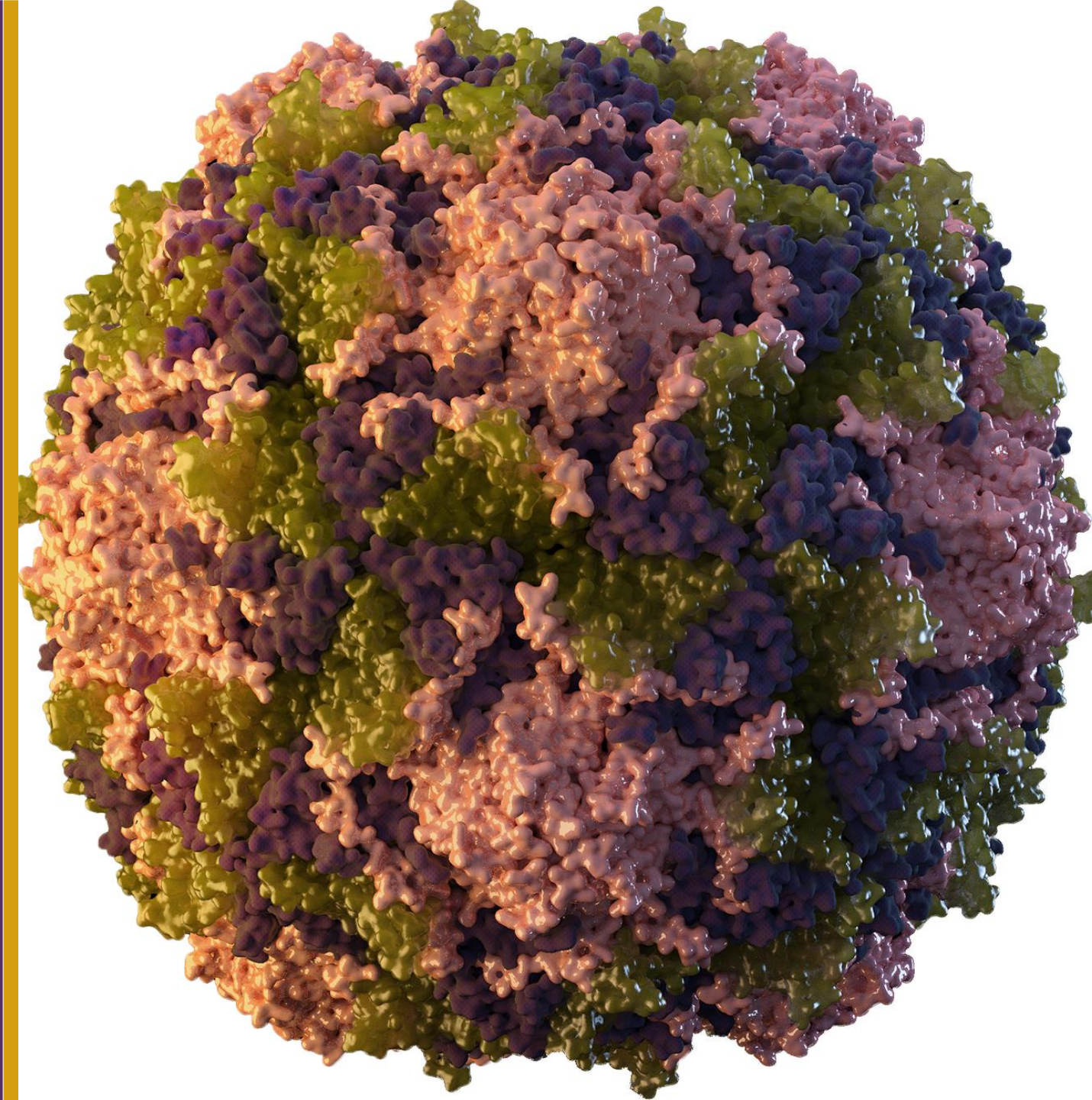
Poliovirus: Past and Present

COCA Call | September 1, 2022

Farrell Tobolowsky, DO, MS
LCDR, US Public Health Service
Clinical Task Force Lead
2022 NYS Polio Response
Centers for Disease Control and Prevention



Objectives

- Understand the history of polio in the US and globally
- Describe polioviruses
- Understand the incubation period and transmission of poliovirus
- Understand the impact of polio vaccination and the different types of vaccine

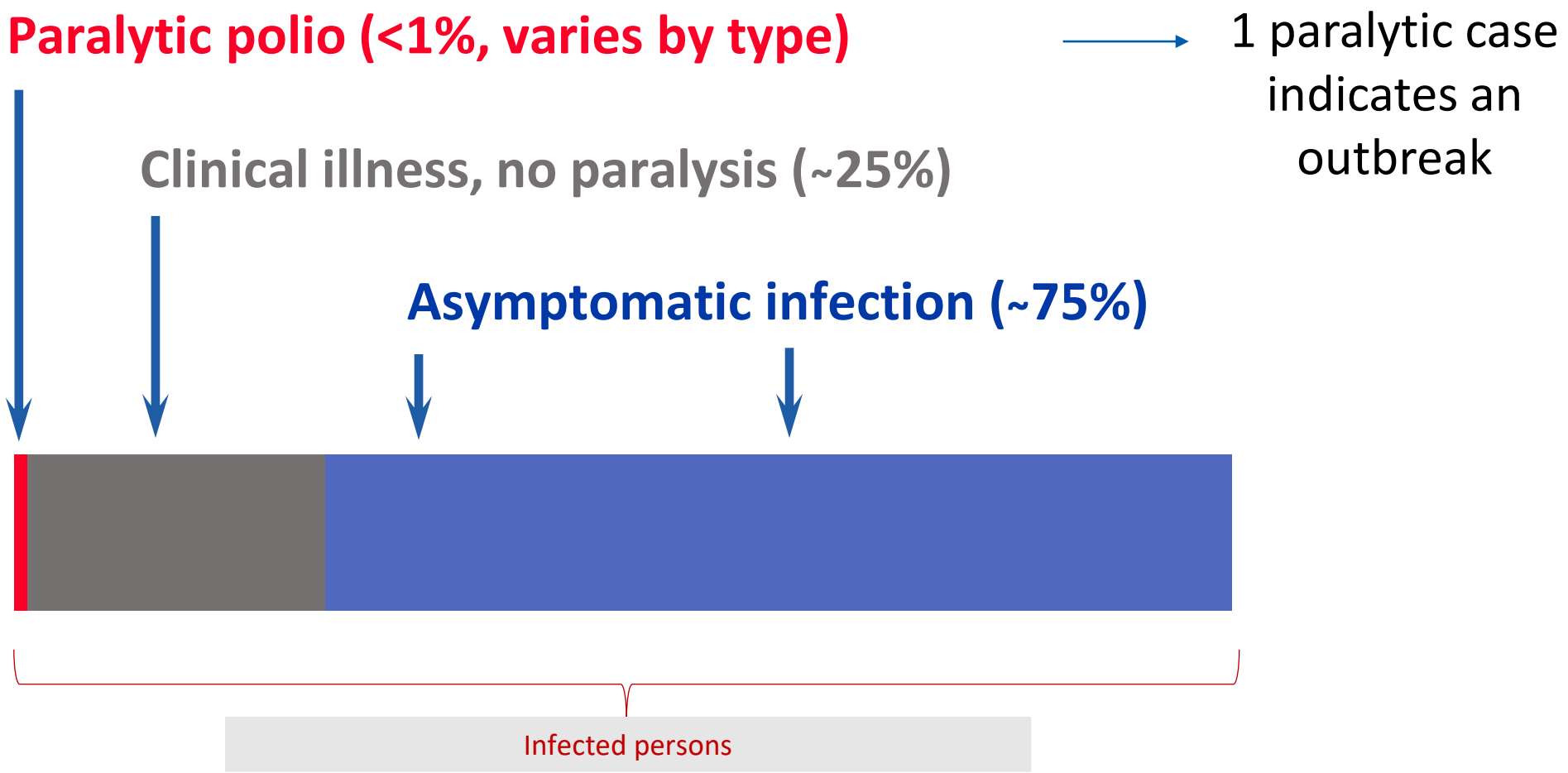
Poliovirus

Poliovirus serotypes

- Poliovirus consists of an RNA genome enclosed in a capsid
- The slightly different capsids are the three serotypes: type 1, type 2, and type 3
- Immunity to one serotype does not produce significant immunity to the other serotypes

Source: CDC Pink Book, GPEI

Paralytic polio occurs in <1% of infections



Sources: CDC, Sutter, Kew, Cochi, and Aylward. Poliovirus vaccine-live. Vaccines, 6th Edition, 2013. NB: Other sources cite different percentages.

Following poliovirus exposure, it can take up to 21 days for paralytic polio to present.

- Incubation period
  - 3 to 6 days for **nonparalytic** polio
  - 7 to 21 days for onset of paralysis in **paralytic** polio
- Virus mainly replicates in the gastrointestinal system and oropharynx
  - Invades local lymphoid tissue and may enter the bloodstream, and then infect cells of the central nervous system
  - Destruction of motor neurons result in **distinctive paralysis**

Source: CDC Pinkbook, PHIL

Poliovirus is highly infectious.

- Highly infectious
- Person-to-person spread of poliovirus occurs via the **fecal-oral** or oral-oral routes
  - Fecal-oral is the most important transmission pathway in settings with suboptimal hygiene and sanitation
- Patients are most infectious during days immediately before and after onset of symptoms, but virus is **excreted and may remain present in stool for up to 6 weeks**, sometimes longer
  - Can be shed in individuals with minor symptoms or no illness

Source: CDC Pinkbook, PHIL

There are 2 types of polio vaccines: IPV and OPV

Inactivated polio vaccine (IPV)

Oral polio vaccine (OPV)

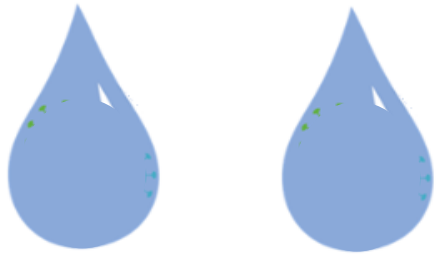
Inactivated polio vaccine (IPV)

Inactivated polio vaccine (IPV)

- IPV contains types 1, 2, and 3 polioviruses that have been chemically killed
  - Viruses cannot replicate, infect, or cause disease
- IPV induces effective humoral (blood) immunity but limited intestinal mucosal (gut) immunity → prevents paralysis
- Vaccine of choice for non-outbreak countries
- Only vaccine currently used in the United States since 2000

Oral polio vaccine (OPV)

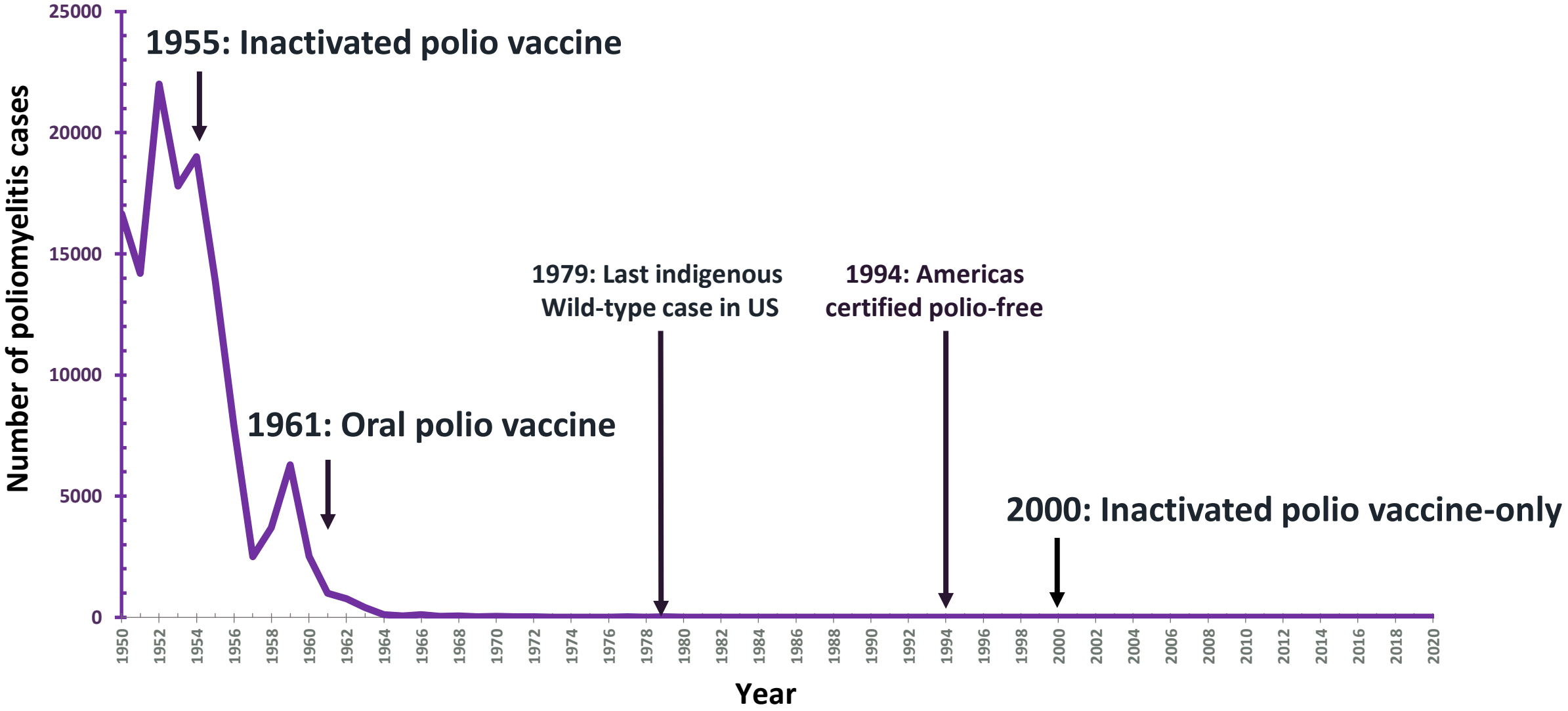
- Live attenuated vaccine (contains live, weakened polioviruses)
  - Replicates in gut, is shed in stool
- Prevents paralysis and transmission of polio
- Given orally (two drops)
- Vaccine of choice for developing countries or countries experiencing polio outbreaks
- If allowed to circulate in under-immunized populations for long enough, can revert to a form that causes paralysis.



Oral polio vaccine

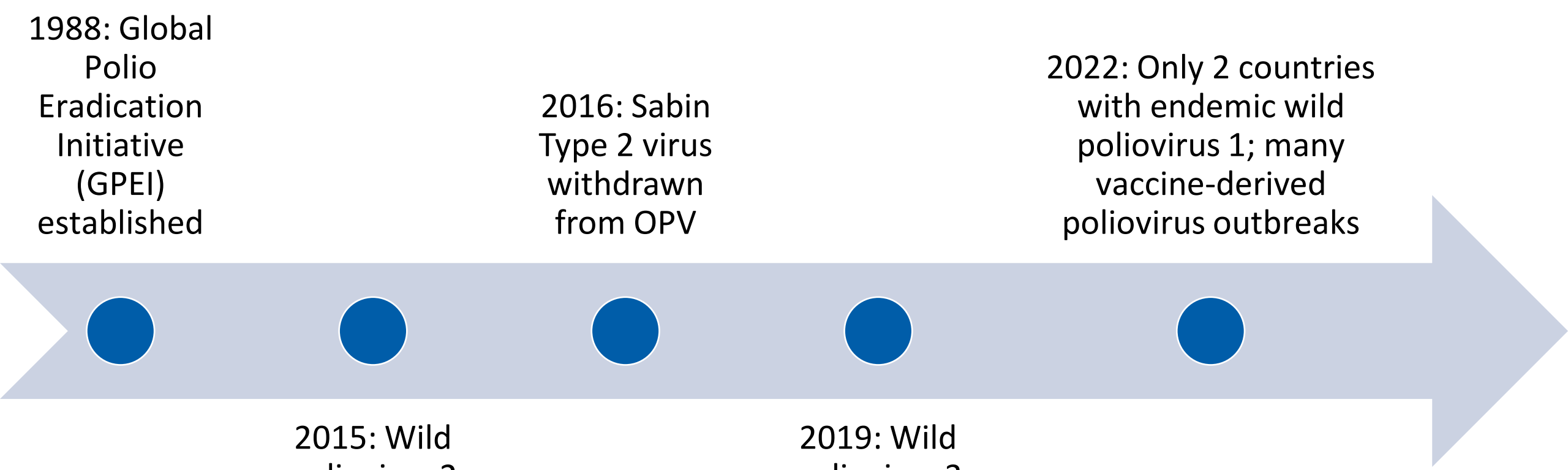
Polio in the United States

Paralytic polio in the U.S. decreased rapidly after introduction of vaccine



Global Polio Eradication Progress

Wild poliovirus type 1 remains endemic in just 2 countries.

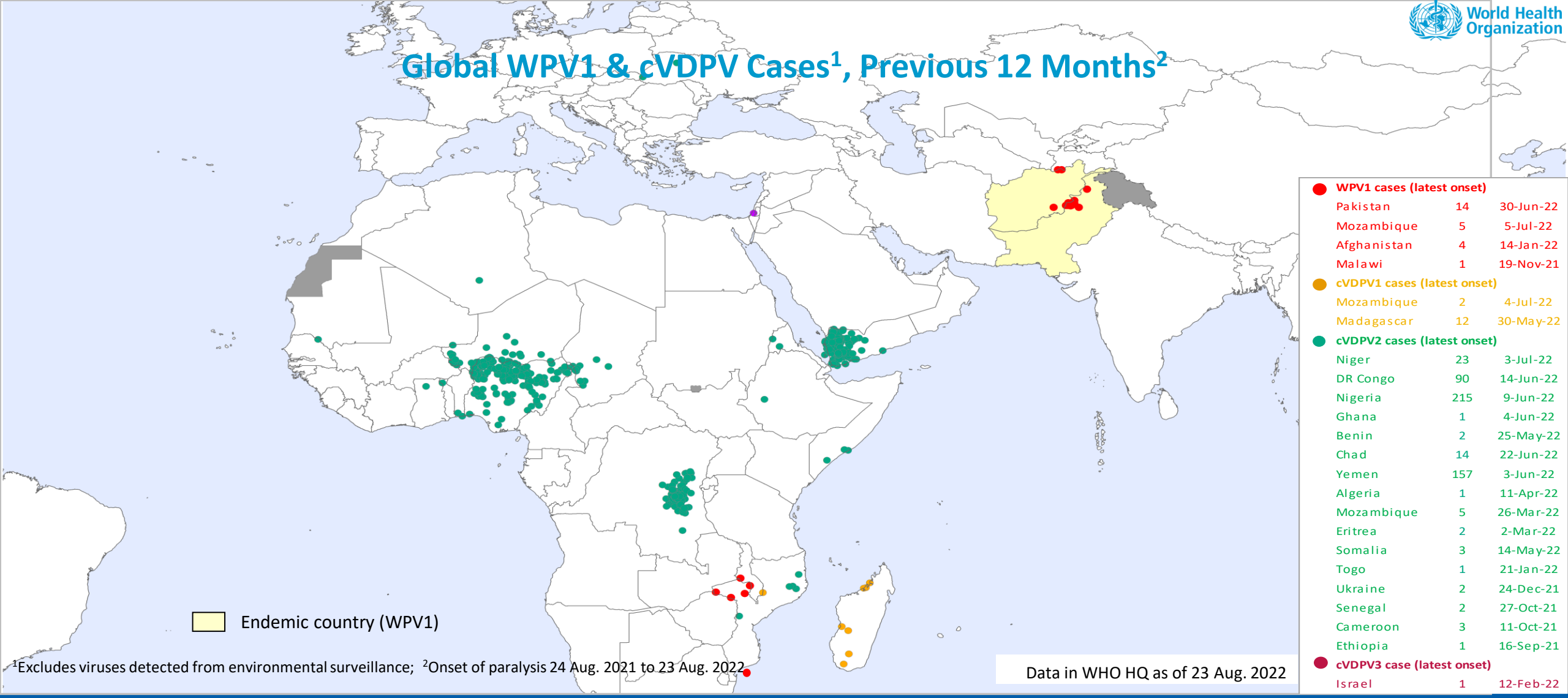


Definitions

- WPV: wild poliovirus
- VDPV: vaccine-derived poliovirus
  - strain related to the weakened live poliovirus contained in oral polio vaccine (OPV)
  - If allowed to circulate in under-immunized populations for long enough, the weakened virus can revert to a form that causes illness and paralysis.
  - Outbreaks most commonly caused by type 2

Source: CDC, GPEI

Global WPV1 & cVDPV Cases[1], Previous 12 Months[2]

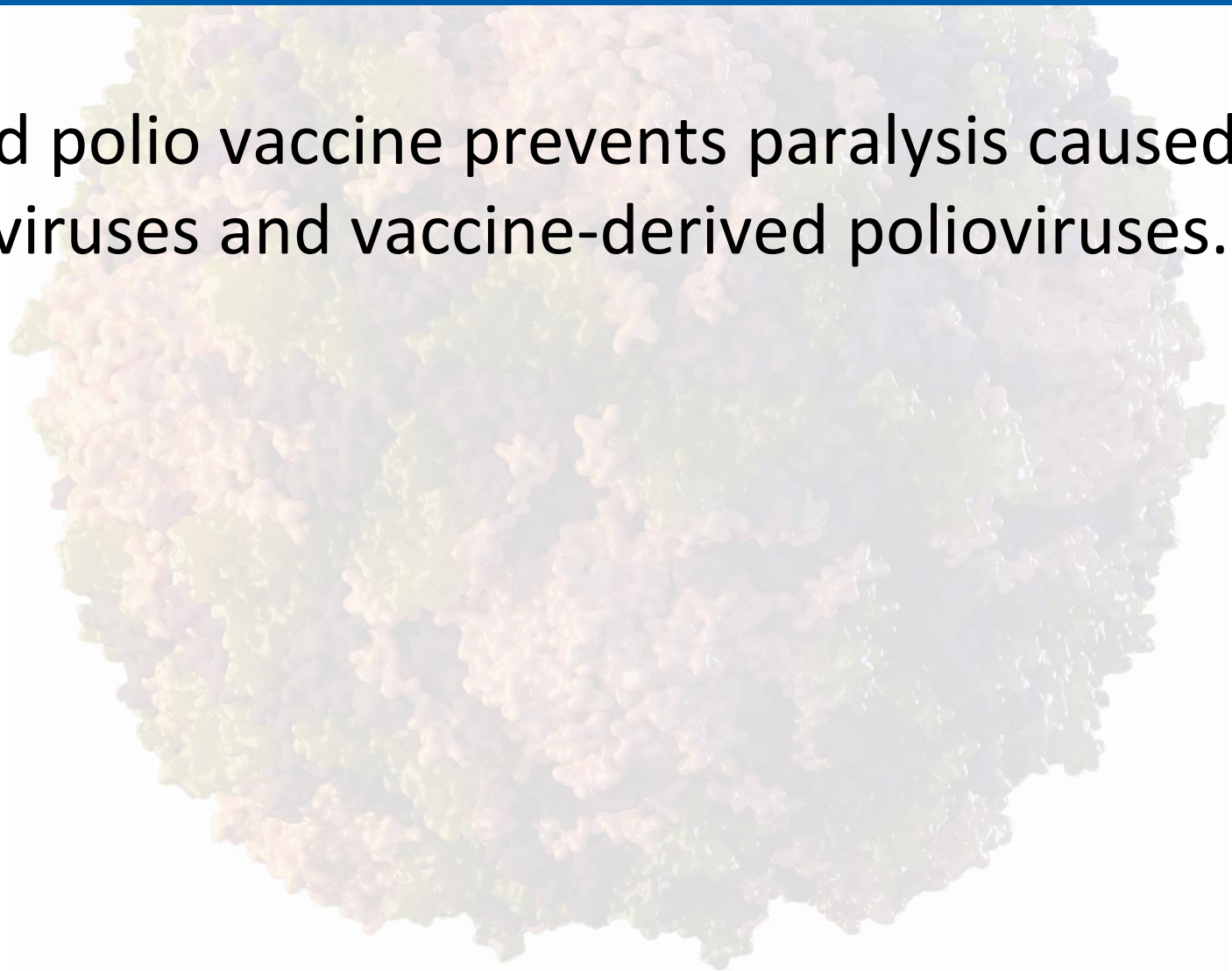


[1]Excludes viruses detected from environmental surveillance; [2]Onset of paralysis 24 Aug. 2021 to 23 Aug. 2022

Data in WHO HQ as of 23 Aug. 2022

Polio outbreaks continue to be identified globally with 249 laboratory-confirmed cases this year.

Knowledge check



Inactivated polio vaccine prevents paralysis caused by both wild polioviruses and vaccine-derived polioviruses.

A. True

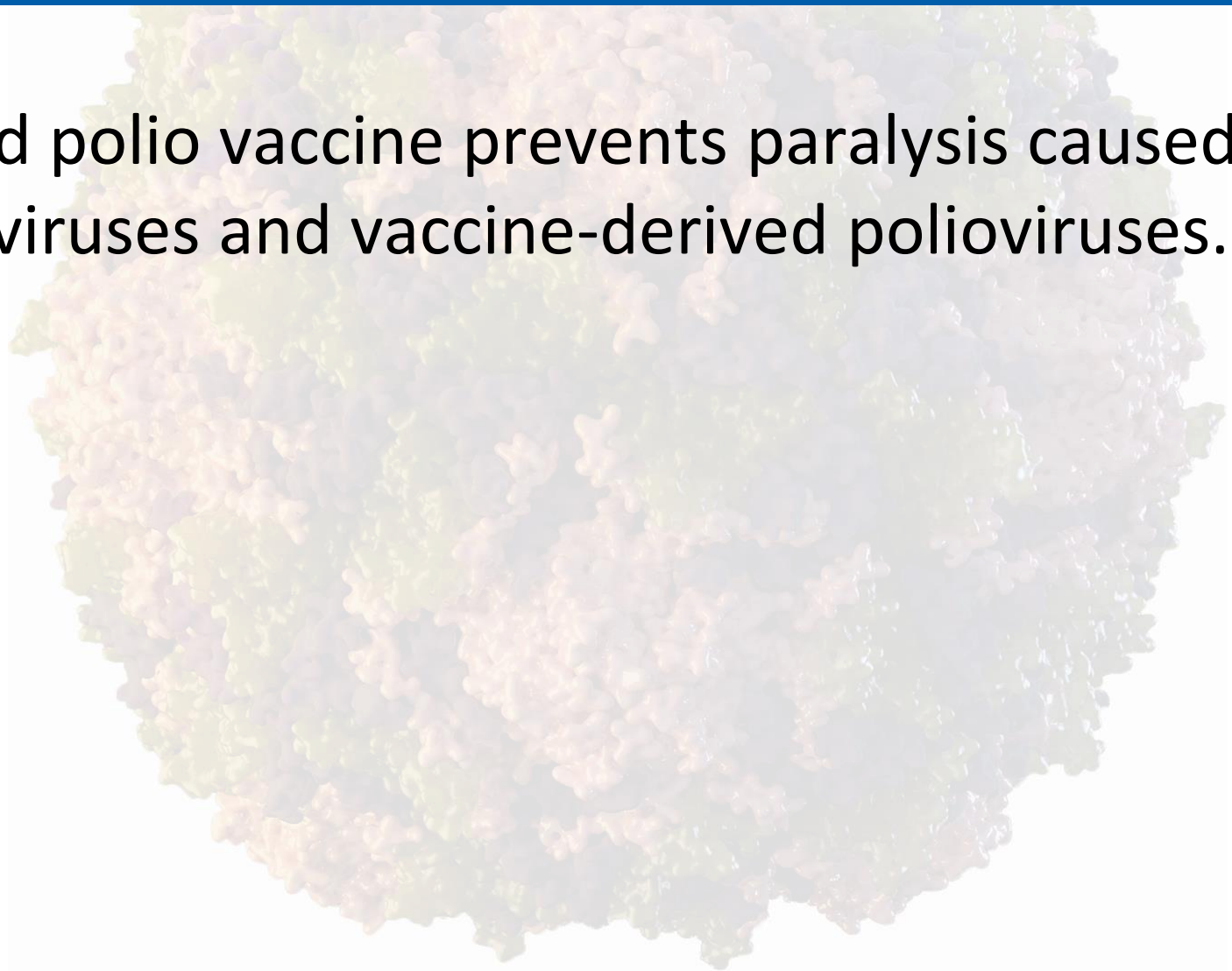
B. False

Knowledge check Answer

Inactivated polio vaccine prevents paralysis caused by both wild polioviruses and vaccine-derived polioviruses.

A. True

B. False



Summary

- Polio is caused by 3 serotypes of enteroviruses: 1, 2, and 3.
- There are 2 types of polio vaccines: inactivated polio vaccine and oral polio vaccine; however, inactivated polio vaccine is the only vaccine currently given in the United States.
- Wild poliovirus is currently only endemic in 2 countries.
- Vaccine-derived poliovirus cases continue to increase globally.
- As the risk of importations of wild poliovirus and vaccine-derived poliovirus from other countries continues, it is critical to maintain high vaccination coverage worldwide, including in the United States.

Thank you

A CASE OF

PARALYTIC POLIO

IN NEW YORK STATE, 2022

09.01.2022

BY DR. EMILY LUTTERLOH
NYSDOH, DIRECTOR OF THE DIVISION OF EPIDEMIOLOGY

NEW YORK STATE | Department of Health

CASE IDENTIFICATION

- Call from Wadsworth Center, the New York State public health laboratory
- Detection of poliovirus in a specimen submitted as part of our routine acute flaccid myelitis (AFM) surveillance

CASE IDENTIFICATION

- Received stool, NP swab, OP swab, CSF
- Stool specimens positive by enterovirus PCR
  (other specimens negative)
- Subsequent sequencing identified vaccine-derived poliovirus, type 2 (VDPV2)
  - Confirmed by CDC
  - 10 nucleotide changes in region encoding viral capsid protein (VP1) compared to Sabin 2 strain

CASE IDENTIFICATION

- Unimmunized, immunocompetent young adult
- Developed fever, neck stiffness, back pain, abdominal pain, constipation
- 3 days later developed lower extremity weakness
- 2 days after weakness began, presented to an ED and admitted to the hospital with flaccid weakness
- Patient discharged to a rehabilitation facility

CASE IDENTIFICATION

- Clinicians aware of an advisory disseminated by NYSDOH in late June reminding healthcare providers to submit specimens in cases of AFM
- Led to the submission of specimens in this case and the detection of poliovirus

EPIDEMIOLOGIC INVESTIGATION AND RESPONSE

- No international travel during the 21 days before onset of paralysis
- Attended a large gathering 8 days before onset of first symptoms

EPIDEMIOLOGIC INVESTIGATION AND RESPONSE

- **Education and Outreach:** In partnership with local county health departments, healthcare providers and health centers, community-based organizations and trusted community leaders, ongoing awareness, education, and outreach efforts

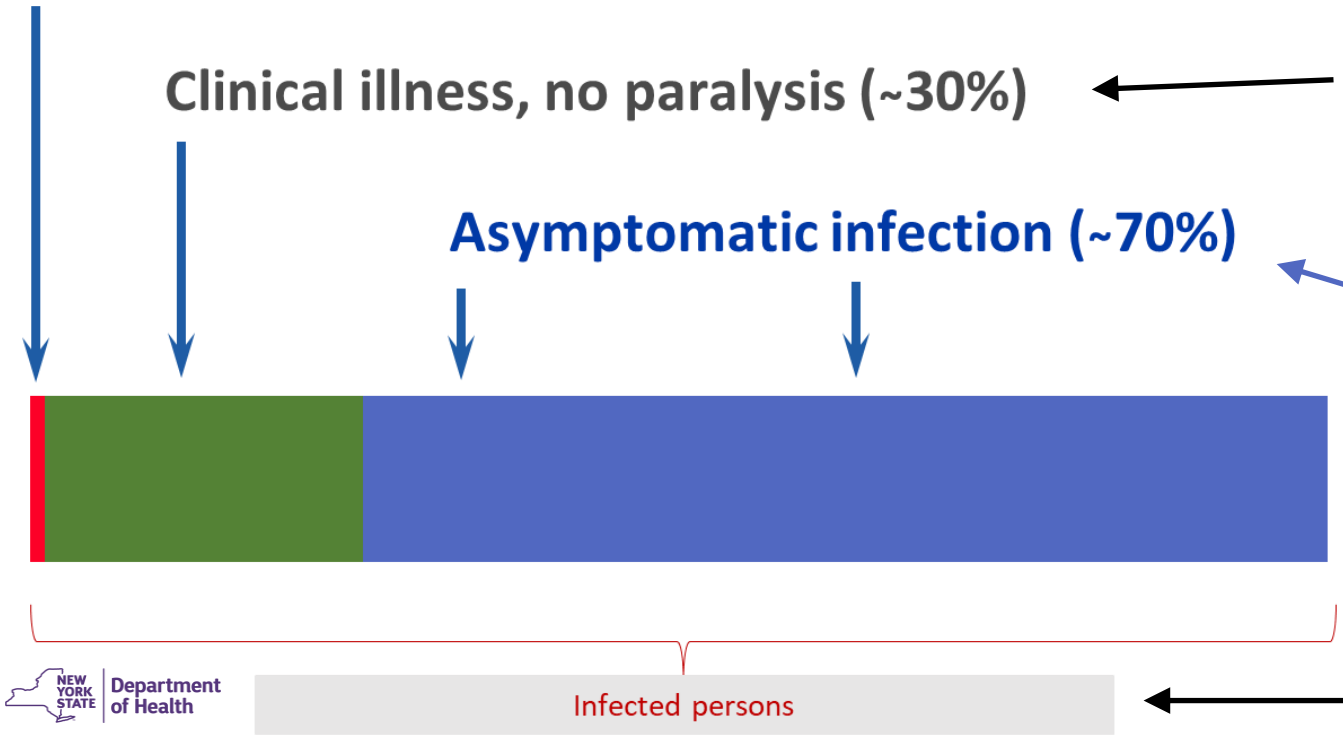
- **Engaging Healthcare Providers:** Notifications to providers to increase awareness, conduct surveillance, and proactively support the on-time administration of polio immunizations among patients

- **Driving Immunizations:** Vaccination campaign
  - Deploying vaccine to the affected areas
  - Initiation or completion of primary series
  - Urging the on-time administration of childhood vaccine series, combating delays, and catching children up
  - Boosters for individuals at high risk of exposure (e.g., individuals in contact with the case, some healthcare workers)

EPIDEMIOLOGIC INVESTIGATION AND RESPONSE

- Surveillance

Active case finding
(e.g., via syndromic surveillance)
Continued AFM/paralytic disease surveillance



Enhanced surveillance for enterovirus-positive illness, particularly in unimmunized individuals in affected counties

Prevalence of asymptomatic infection in affected areas
(e.g., stool samples from diapers at pediatrician offices)

Wastewater surveillance in Rockland County and the surrounding areas

SELF-KNOWLEDGE CHECK:

Which of the following is true about vaccine-derived poliovirus (VDPV), type 2?

a) It can cause paralytic illness similar to wild poliovirus.

b) Its detection in the US implies that the affected individual either recently received oral poliovirus vaccine (OPV) outside the US or had close contact with someone who did.

c) It can spread widely and can cause mild illness, but it does not cause paralysis.

d) A and B only.

e) All of the above.

SELF-KNOWLEDGE CHECK ANSWER

Which of the following is true about vaccine-derived poliovirus (VDPV), type 2?

a) **It can cause paralytic illness similar to wild poliovirus.**

True. VDPV can cause paralytic illness.

b) Its detection in the US implies that the affected individual either recently received oral poliovirus vaccine (OPV) outside the US or had close contact with someone who did.

False. Poliovirus, including VDPV, spreads easily. There might be a lengthy transmission chain with many unaffected people between someone who received OPV containing a Sabin 2 strain (typically given only in outbreak situations) and an individual who develops paralysis.

c) It can spread widely and can cause mild illness, but it does not cause paralysis.

False. VDPV can cause paralysis.

THANK YOU.

NEW YORK STATE | Department of Health

Clinical Overview of Paralytic Poliomyelitis and Reporting to Public Health

Janell Routh, MD MHS

Incident Manager, NYS Polio Response

Team Lead, Acute Flaccid Myelitis and Domestic Polio

September 1, 2022

COCA Call

Objectives

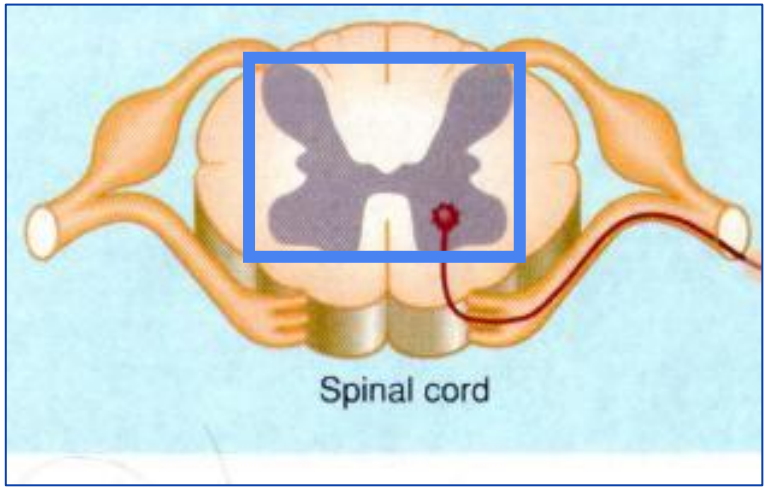
To provide an overview of:

- Clinical presentation of patients with paralytic poliomyelitis
- Initial evaluation and clinical management
- How to report suspected poliomyelitis (polio) cases to public health

Clinical characteristics of paralytic polio

Poliomyelitis (paralytic polio)

- After infection, virus is carried by retrograde axonal transport to the spinal cord
- Gray matter of the spinal cord (blue box) is affected, specifically the anterior horn cells of the motor neurons
- Motor neuron damage and paralysis is usually permanent, although improvement with rehabilitation is possible
- Most cases are in children, but adult infections are more likely to result in paralysis



Caption: Cross-section of the spinal cord showing the gray matter and lower motor neurons affected in AFM.

Characteristic MRI findings in poliomyelitis

- Sagittal image demonstrating T2 weighted hyperintensity of the entire central gray matter of the cervical spinal cord
- Multiple levels of the spinal cord are often involved
- In patients with bulbar involvement, brain MRI should be considered as there is often enhancement of the cranial nerves

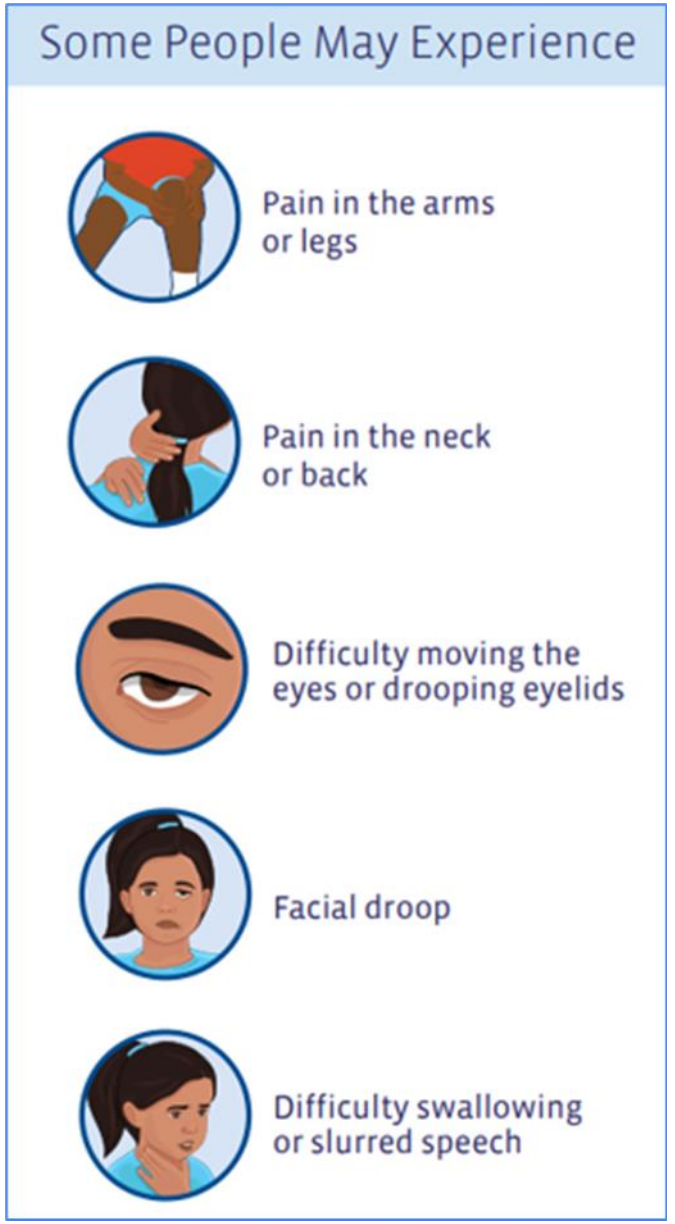
Symptoms and signs of poliomyelitis

- Most patients have preceding illness before **onset of acute flaccid limb weakness**
  - Frequently gastrointestinal illness (GI) with symptoms of fever, sore throat, abdominal pain, muscle aches, malaise
- Illness might occur 1-3 weeks before the development of weakness
- Weakness onset is often accompanied by recurring fever and neck or back pain, and pain in the affected limb(s)

https://www.cdc.gov/acute-flaccid-myelitis/symptoms.html; Credit: Prostock-studio - stock.adobe.com

Symptoms and signs of poliomyelitis

- **Onset of weakness is rapid**
  - Within hours to a few days
- Loss of muscle tone (floppy) and reflexes
- Weakness is usually in lower extremities and often asymmetric
- Bulbar poliomyelitis presents with cranial nerve findings and can lead to respiratory impairment; might present with a weak or hoarse cry in infants



https://www.cdc.gov/acute-flaccid-myelitis/symptoms.html

Medical history should include critical questions on travel and vaccination

- **Red Flags:**
  - Recent international travel to areas where poliovirus is circulating (within 30 days), OR exposure to a person infected with poliovirus AND
  - Unvaccinated, under vaccinated, or unsure of vaccination status

- Note any GI symptoms, with or without fever before **acute onset of weakness**
- Ask about difficulty breathing or shortness of breath
- Young children or their parents might not describe limb impairment as “weakness”; important to ask questions about limb function
  - Loss of ability to feed themselves, dress, throw a ball, walk or squat

https://www.cdc.gov/acute-flaccid-myelitis/hcp/clinicians-health-departments/evaluation.html

It is important to conduct a thorough, age-appropriate neurologic examination

- Decreased muscle tone in affected muscles
- Diminished or absent reflexes
- Muscle weakness
  - Usually asymmetric
  - Usually more proximal than distal
- Sensory and bowel/bladder function usually spared
- Less common, bulbar paralysis can result in respiratory failure
  - Assess the patient's ability to protect their airway
  - Document respiratory sufficiency

Examining proximal muscle weakness in children

- When examining patients with sudden limb, neck, or trunk weakness, **remember to check both proximal and distal muscle strength**, as impairment in proximal strength can be easily missed during exams.

https://www.cdc.gov/acute-flaccid-myelitis/downloads/examining-proximal-muscle-weakness-508.pdf

Differential diagnosis of acute flaccid paralysis (AFP)

Paralytic polio may resemble:

- Acute Flaccid Myelitis
- Acute Cord Compression
- Transverse Myelitis
- Spinal Stroke
- Guillain Barre syndrome
- Other

Careful medical history, neurological examination, laboratory testing, and MRI of the spine and brain can help guide diagnosis, which should be made together with specialists in infectious diseases and neurology

Diagnostic studies

Diagnostic studies

- **Neuroimaging**
  - MRI with and without contrast of the entire spine and brain
  - Use the highest tesla scanner available (ideally 3T)
  - Axial and sagittal images are most helpful in identifying lesions

- **Laboratory Testing**
  - Collection of CSF, serum, stool, and NP/OP swab and other pathogen-specific tests should be done as soon as possible for best chance of pathogen yield; in-house enterovirus (EV) testing is an important first step but will not pick up stool EV, the gold standard for polio
  - **For poliovirus, collect two whole stool and two oropharyngeal (OP) swabs**
    - Taken at least 24 hours apart during the first 14 days after onset of limb weakness
  - All specimens should be routed through state/local health departments for initial EV testing and then to CDC for confirmation of poliovirus

Initial management of polio

Initial acute management of polio

- Monitor respiratory status as progression of weakness can be rapid
- Neurology and infectious disease specialists should be consulted
- Rehabilitation therapy such as PT/OT/speech/swallowing should initiated as soon as possible
- No FDA-approved antivirals or medications/biologics for poliomyelitis

Reporting polio to public health

Report suspected polio to public health

- Reporting of cases should not delay a patient's diagnosis and/or treatment and management plan
- Contact state/local health department on any suspected polio case
  - ***Paralytic polio*** has been classified as "Immediately notifiable, Extremely Urgent," which requires that local and state health departments contact CDC within 4 hours.
  - ***Non-paralytic polio*** has been classified as "Immediately notifiable, Urgent," which requires that local and state health departments contact CDC within 24 hours.
- Health departments will complete a patient summary form and request MRI report and images, and neurology consult notes from the hospital
- Information will be sent to CDC's expert neurology panel for review; this should be done while laboratory testing is underway; a classification of polio does not depend on lab results

Considerations for HCP and lab workers

Considerations for Health Care Providers (HCP)

- Isolate the patient in a room with a private bathroom, if possible, while undergoing diagnostic evaluation

- HCP should use standard and contact precautions during interactions with suspected case-patients
  - If patient develops respiratory distress, consider droplet precautions

- Only HCP and lab personnel with evidence of complete polio vaccination should work with patients with polio

- CDC recommends a single lifetime booster for:
  - Laboratory and HCP who handle specimens that might contain polioviruses
  - HCP who are treating patients who could have polio

HCP should discuss polio prevention methods with family members of the case-patient

- Ensure household contacts are up to date on polio vaccination
- Hand hygiene: wash with soap and water before eating/assisting with feeding and after toileting/changing diaper/assisting with toileting
- Monitor household contacts for infection and shedding in stool, regardless of vaccination status

Knowledge check

Which specimen type has the highest yield for detecting poliovirus in infected patients?

A. Cerebrospinal fluid

B. Serum

C. Stool

D. Oropharyngeal swab

Knowledge check Answer

Which specimen type has the highest yield for detecting poliovirus in infected patients?

A. Cerebrospinal fluid

B. Serum

C. Stool

D. Oropharyngeal swab

Summary

- Polio is characterized by lesions in the gray matter of the spinal cord, visible on MRI
- Consider polio and ask about vaccination status and travel history in patients with acute flaccid limb weakness
- Obtain stool specimens to test for poliovirus infection
- Report suspected cases to public health – do not need to wait for laboratory confirmation

Thank You

For questions, contact AFMInfo@cdc.gov

If urgent, contact CDC EOC at **770-488-7100** (domestic polio team is on call 24/7)

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

Immunization Services Division

"Protecting individuals and communities from vaccine preventable diseases across the lifespan"

Polio Vaccine

Clinician Outreach and Communication Activity (COCA) Call
Thursday, September 1, 2022

Georgina Peacock, MD, MPH, FAAP
ISD Director

Poliovirus Vaccines

- 1955–Inactivated vaccine
- Early 1960s–Live, attenuated vaccine (OPV)
- 1987–Enhanced-potency, inactivated vaccine (IPV)

Polio-Containing Vaccine Products

Vaccine name	Vaccine components	Age indication	Dose in polio series	Injection route
Ipol (SP)	IPV	6 weeks and older, any dose in the series	Any	IM or SC
Pentacel (SP)	DTaP-IPV/Hib	6–4 yrs	1, 2, 3, 4	IM
Kinrix (GSK),	DTaP-IPV	4–6 yrs	4	IM
Quadracel (SP)	DTaP-IPV	4–6 yrs	4, 5	IM
Vaxelis (Merck)	Dtap-IPV-Hib-HepB	6 wks–4 years	1, 2, 3	IM
Pediarix (GSK)	DTaP-HepB-IPV	6 wks–6 yrs	1, 2, 3	IM

IM = Intramuscular; SC = Subcutaneous; All vaccines in the table above are non-live

Enhanced Inactivated Polio Vaccine

- **IPV highly effective in producing immunity to poliovirus**
  - 90% of recipients are immune after 2 doses
  - 99% of recipients are immune after 3 doses
- **Duration of immunity not known with certainty**

Clinical Considerations

ACIP Polio Immunization Recommendations
Routine Childhood Schedule

IPV Dose	Routinely Recommended Age
1	2 months
2	4 months
3	6–18 months
4	4–6 years

Polio Schedule and Combination Vaccines

- Children get four doses of IPV, with one dose at each of these ages:

1st Dose: 2 months	2nd Dose: 4 months	3rd Dose: 6 – 18 months	4th Dose: 4 – 6 years

- Additional Vaccine Resources:
  - Vaccine Schedule for Parents: https://www.cdc.gov/vaccines/parents/schedules/index.html
  - Routine Polio Vaccination: https://www.cdc.gov/vaccines/vpd/polio/hcp/routine-polio-vaccination.html
  - Patients can download “CDC Vaccine Schedules” free for iOS and Android devices:

ACIP Polio Immunization Recommendations
Catch-Up Schedule

- Infants ages 6 months and younger, follow the recommended schedule
- If accelerated protection is needed (e.g., travel to polio-endemic area), minimum age and intervals may be followed

Dose	Minimum Age	Minimum Interval to the Next Dose
Dose 1	6 weeks	4 weeks
Dose 2	10 weeks	4 weeks
Dose 3	14 weeks	6 months
Dose 4	4 years	----------

ACIP Polio Immunization Recommendations: At Least 1 Dose Needed After Age 4

- A 4th dose is not necessary if the 3rd dose was administered:
  - At age 4 years or older AND
  - At least 6 months after the previous dose

- Children who have received 4 doses (or more) before 4 years of age need an additional dose
  - There should be at least 6 months between last and next-to-last dose

OPV Administered Outside the United States

- Use the date of administration to make a presumptive determination of what type of OPV was received
- Trivalent OPV was used throughout the world prior to April 1, 2016
- Persons 18 years of age and younger with doses of OPV that do not count towards the U.S. vaccination requirements should receive IPV according to the ACIP immunization catch up schedule

ACIP Polio Immunization Recommendations
Adolescents and Adults

- Adults who are unvaccinated or have incomplete vaccination for poliovirus should receive catch up immunization

- Adults at increased risk of exposure
  - Laboratory workers handling specimens that may contain polioviruses
  - Healthcare personnel treating patients who could have polio or have close contact with a person who could be infected with poliovirus
  - Travelers to areas where poliomyelitis is endemic or epidemic.

ACIP Polio Immunization Recommendations
Unvaccinated Adults

- Use routine IPV schedule if possible
  - 0, 1 through 2 months, 6 through 12 months intervals
- If accelerated protection is needed (e.g., travel to polio-endemic area), use the minimum intervals.

Dose	Minimum Intervals to the Next Dose
Dose 1	4 weeks
Dose 2	6 months
Dose 3	----------

Self-Knowledge Check

What is the recommended interval between the first 3 doses of the polio vaccine for children?

A. 3 months

B. 2 months

C. 6 months

D. 1 year

Self-Knowledge Check

The correct answer is:

B. 2 months

Safety

Safety

Contraindications

- Severe allergic reaction (e.g., anaphylaxis) after a previous dose or to a vaccine component

Precautions

- Pregnancy
- Moderate or severe acute illness with or without fever

IPV Adverse Reactions

- Local reactions (pain, redness, swelling) - 3.2-18%
- Severe reactions - rare

ACIP Polio Immunization Recommendations
Previously Vaccinated Adults

- Previously completed series
  - Administer 1 dose of IPV to those at increased risk

- Incomplete series
  - Administer remaining doses in series based on immunization history
  - No need to restart a valid, documented series
    - Valid = minimum intervals met

Thank You!

For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

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- If you are a member of the media, please direct your questions to CDC Media Relations at 404-639-3286 or email media@cdc.gov

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- All continuing education for COCA Calls is issued online through the CDC Training & Continuing Education Online system at https://tceols.cdc.gov/.

- Those who participate in today's COCA Call and wish to receive continuing education please complete the online evaluation by **October 3, 2022,** with the course code **WC4520-090122**. The access code is **COCA090122.**

- Those who will participate in the on-demand activity and wish to receive continuing education should complete the online evaluation between **October 4, 2022,** and **October 4, 2024,** and use course code **WD4520-090122.** The access code is **COCA090122.**

- Continuing education certificates can be printed immediately upon completion of your online evaluation. A cumulative transcript of all CDC/ATSDR CEs obtained through the CDC Training & Continuing Education Online System will be maintained for each user.

Today's COCA Call Will Be Available to View On-Demand

- **When:** A few hours after the live call ends*
- **What:** Video recording
- **Where:** On the COCA Call webpage https://emergency.cdc.gov/coca/calls/2022/callinfo_090122.asp

**A transcript and closed-captioned video will be available shortly after the original video recording posts on the COCA Call webpage.*

Upcoming COCA Calls & Additional Resources

- Next COCA Call: Thursday, September 8, 2022, 2:00 – 3:00 PM ET
  - Topic: 2022-2023 Influenza Vaccination Recommendations and Guidance on Coadministration with COVID-19 Vaccines

- Continue to visit https://emergency.cdc.gov/coca/ to get more details about upcoming COCA Calls.

- Subscribe to receive notifications about upcoming COCA calls and other COCA products and services at emergency.cdc.gov/coca/subscribe.asp.

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