Sample Collections and Poliovirus Containment: What's the Connection

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NAC
U.S. National Authority
for Containment of Poliovirus

What's in Your Institution's Freezers?

- Poliovirus that hasn't been declared?
- Human specimens or sewage samples that could be contaminated with poliovirus?
- Historical domestic or international human sample collections?

Agenda

1. Risks of continued work with poliovirus (PV)
2. Introduction to the US NAC
3. PV Infectious materials (IM) in the US
4. PV Potentially infectious materials (PIM) in the US
5. National surveys
6. Questions

Risks of continued work with poliovirus

Accidents happen

April 2017 WPV2 spill inside vaccine manufacturer [1]

- 2 vaccinated workers exposed
- 1 worker tested positive for PV on day 4, as did sewage
- Worker isolated at home with no additional transmission

Sept 2014 vaccine manufacturer released 45 L of concentrated WPV3 (10^{13}) [2]

- Facility to treatment plant and then into river
- River flowed into areas of lower vaccine coverage
- No PV detected in river

References provided at end of presentation

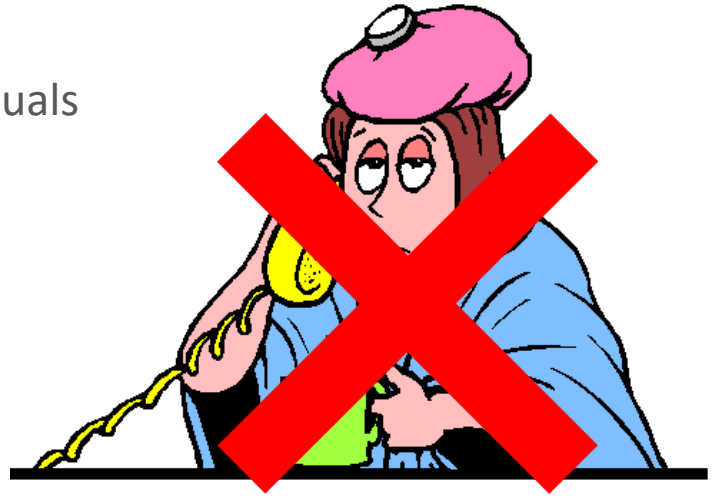
Silent outbreak of WPV1 in Israel [3]

- Israel polio free since 1988
- Inactivated polio vaccine (IPV) only used since 2005, > 95% coverage rate
- Environmental surveillance detected WPV1 in 2013 at multiple locations
- Reintroduction of virus and “silent” circulation w/o acute flaccid paralysis (AFP)
- Vaccination campaigns using oral polio vaccine (OPV), again certified free in April 2015

Asymptomatic Laboratory Acquired Infections (LAI) and Shedding

- Both vaccines protect against disease but not infection
- Vaccinated worker – no symptoms
- If worker was infected in the laboratory
  - Poliovirus shed in stool
  - Potential silent transmission in community
  - Possible polio disease in unvaccinated individuals

- If worker becomes infected, you won't know.



Secondary transmission from unidentified LAIs

- WPV1 (Mahoney) used in IPV production detected in 19 mo old during a WPV3 epidemic in the Netherlands (1992) [4]
  - Father worked at PV vaccine production facility and accidentally exposed to high amount of Mahoney
- WPV3 (Saukett) used in IPV production outside the Netherlands detected in 5 yo in the Netherlands (1993) [4]
  - Source not identified
- WPV2 (MEF-1) detected in 10 patients in India with paralytic polio (2000, 2002-2003) [5]
  - Source not identified, no evidence of extensive transmission

Additional risk mitigation is needed for PV2

- To protect eradication efforts
- Primary route of infection for immunized worker = ingestion
- Likely to occur via inadvertent touch of mouth with contaminated hands or gloves
- Recommend focus on:
  - hand hygiene
  - PPE use
  - training
  - adherence to protocols
  - non-punitive incident reporting

Introduction to the US National Authority for Containment (NAC) of Poliovirus

Getting started

- Poliovirus Containment Activity stood up Jan 2017
- Designated as NAC Jan 2018
- Located at CDC due to expertise in poliovirus, eradication, and laboratory containment
- No regulation in the US compelling facilities to adopt WHO GAP III containment measures

NAC
U.S. National Authority
for Containment of Poliovirus

U.S. National Authority for Containment of Polioviruses
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Responsibilities

- Implement the Containment Certification Scheme for GAP III = application and audit process to become a Poliovirus Essential Facility (PEF)
  - Assist US facilities working with PV materials in understanding containment needs
  - Where needed, develop policies that interpret WHO GAP III elements for US circumstances
  - Seek WHO endorsement for PEF applications
  - Conduct audits to assess implementation of GAP III containment elements
- Complete national inventory

Approach

- Collaborative approach to containment
  - Engage affected facilities
  - Seek input on NAC documents and policies
- Encourage a community of practice
  - NAC-PEF Webinars
  - Voluntary sharing of contact information

PV Infectious Materials (IM) in the US

PV2 Infectious Materials

- Starting here – PV2 eradicated, IM highest risk
- NAC engagement began in Jan 2018 with introductory visits
- 12 facilities intend to retain PV2 IM
- NAC currently receiving Certificate of Participation (CP) applications from facilities with PV2 IM
  - 1st step in Containment Certification Scheme
  - Formal engagement in the process

Risk Mitigation Strategies for Work with PV2 During the Transition Period

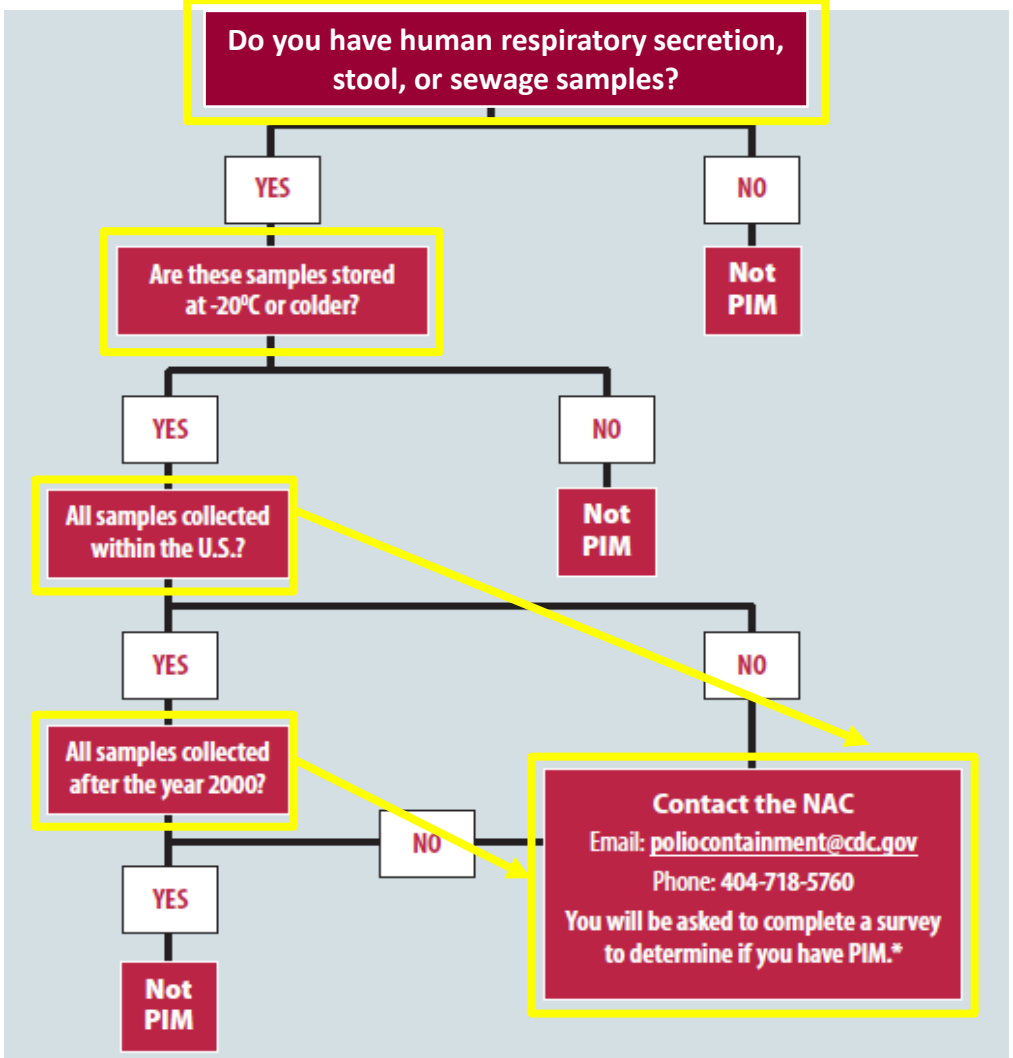
- Now and while working under a CP
- Addition of BSL3 practices in BSL2 laboratory, such as work in primary containment and PPE to protect worker
- Minimum mitigation measures for work with PV2 IM
- Not a substitute for WHO GAP III
- Starting point for enhanced practices

PV1 and 3 Infectious Materials

- Containment not required until final eradication
- At least 3 years away
- No lead-in period for implementation as with PV2
- All GAP III elements implemented at time of final eradication
- Initial outreach now to keep PV1 and 3 IM facilities informed and help them prepare

PV Potentially Infectious Materials (PIM) in the US

Are sample collections at your institution potentially contaminated with poliovirus?



Domestic samples

Date collected, within the US	Sample potentially contains	Indicate on survey	Subject to containment now?
Before 1966	WPV1,2,3; OPV	WPV2 PIM	Yes– GAP III
1966 – 1968	WPV1,3; OPV	WPV3 PIM	No[2]
1969-1972,1979[1]	WPV1; OPV	WPV1 PIM	No[2]
1973 – 1978 and 1980 – March 2000	OPV	OPVunknown PIM	Yes– PIM Guidance
April 2000 - present	N/A	N/A	No

1 = WPV1 outbreak in1979

2 = subject to GAP III at time of final eradication

International samples

- WHO table with dates for each country
  - WPV last present (by type)
  - OPV use ceased

Table A2.1. Country- and territory-specific poliovirus data

No.	Country or territory	Province, district, local area	Poliovirus potentially infectious materials		
			WPV2	VDPV2	OPV2/Sabin2
1.	Afghanistan[1]	Helmand	Until 31 Dec 1997	Between 10 Jun 2010 and 20 Feb 2013	• Between 1 Jan 1998 and 9 Jun 2010 • Between 21 Feb 2013 and 31 Jul 2016
		Kandahar	Until 31 Dec 1997	Between 30 Oct 2012 and 13 Mar 2013	• Between 1 Jan 1998 and 29 Oct 2012 • Between 14 Mar 2013 and 31 Jul 2016
		Rest of the country	Until 31 Dec 1997	–	Between 1 Jan 1998 and 31 Jul 2016

Samples potentially contaminated with wild poliovirus
WPV PIM

- Subject to GAP III containment
- Current US recommendations for these materials
  - Storage: secure samples in locked freezer or laboratory, limit access
  - Work: contact the US NAC

Samples potentially contaminated w/ oral polio vaccine
OPV PIM

- Not subject to GAP III containment
- Subject to WHO *Guidance to minimize risk for facilities collecting, handling or storing materials potentially infectious for poliovirus* (PIM Guidance)
  - Risk classification based on material type (stool/sewage, respiratory, nucleic acid) and work (use with PV permissive cells)
  - Storage: secure samples in locked freezer or laboratory, limit access
  - Work: mitigations include risk assessment, good laboratory practices, validation of methods, and immunization of staff

US National Surveys

2015 Survey

- Conducted 2015-2017
- All 3 types
- Asked about IM and PIM
- Targeted PV and enterovirus laboratories (n > 250)
- National inventory not complete
  - outreach needed to labs that may have PIM

2018 Survey

- To be released in 2018
- Will target laboratories with PIM, especially respiratory laboratories
- Will be available on NAC website and direct email
- Advertise
  - NAC website
  - Distribution through professional societies
  - Conference talks and expos
  - Future MMWR, Applied Biosafety articles

Actions Needed by Laboratories

- ALL
  - Assess historical domestic and international sample collections for PIM
  - Destroy all non-essential PV materials, IM and PIM
  - Ensure all retained materials are declared in the national survey
- PV2 IM
  - Implement additional containment measures for PV2 IM and PIM now
  - Submit CP application
- PV1 and PV3 IM
  - Determine whether crucial work with PV1 and PV3 will need to continue after eradication/ability to meet GAP III
  - Participate in conference call with NAC

Key Messages for Biosafety

- Asking for your help to
  - Share information with your PIs
  - Identify PV materials at your institution
  - Encourage destruction of non-essential PV materials
  - Contact NAC to declare/complete survey
  - Foster good material accountability/inventory practices

Resources

- US NAC website
  - www.cdc.gov/phpr/polioviruscontainment
  - poliocontainment@cdc.gov

- Global Poliovirus Eradication Initiative website
  - polioeradication.org/polio-today/preparing-for-a-polio-free-world/containment/containment-resources/
    - Global Action Plan III (GAP III)
    - *Guidance to minimize risk for facilities collecting, handling or storing materials potentially infectious for poliovirus* (PIM Guidance)
    - Country table for identifying PIM

References

1 Duizer E, Ruijs WL, van der Weijden CP, Timen A. Response to a wild poliovirus type 2 (WPV2)-shedding event following accidental exposure to WPV2, the Netherlands, April 2017. Euro Surveill. 2017;22(21)

2 Duizer E, Rutjes S, Husman A, Schijven J. Risk assessment, risk management and risk-based monitoring following a reported accidental release of poliovirus in Belgium, September to November 2014. Euro Surveill. 2016;21(11)

3 Kaliner E, Kopel E, Anis E, Mendelson E, Moran-Gilad J, Shulman LM, Singer SR, Manor Y, Somekh E, Rishpon S, Leventhal A, Rubin L, Tasher D, Honovich M, Moerman L, Shohat T, Bassal R, Sofer D, Gdalevich M, Lev B, Gamzu R, Grotto I. The Israeli public health response to wild poliovirus importation. Lancet Infect Dis. 2015 Oct;15(10):1236-1242

4 Mulders MN, Reimerink JH, Koopmans MP, van Loon AM, van der Avoort HS. Genetic analysis of wild-type poliovirus importation into The Netherlands (1979-1995). J Infect Dis. 1997 Sep;176(3):617-24.

5 Deshpande JM, Nadkarni SS, Siddiqui ZA. Detection of MEF-1 laboratory reference strain of poliovirus type 2 in children with poliomyelitis in India in 2002 & 2003. Indian J Med Res. 2003 Dec;118:217-23.

Questions?

For more information, contact the US NAC at

404-718-5160
poliocontainment@cdc.gov
www.cdc.gov/phpr/polioviruscontainment