Introduction to Poliovirus Potentially Infectious Materials

Background information

The Global Polio Eradication Initiative, launched in 1988, is the largest international public health effort ever. It has immunized billions of children and prevented millions of paralytic poliomyelitis cases through donations, government efforts, and volunteer work. The Global Commission for the Certification of the Eradication of Poliomyelitis certified the eradication of wild poliovirus type 2 in 2015 and type 3 in 2019. The eradication of type 1 and circulating vaccine-derived polioviruses is expected soon, along with the gradual disappearance of immunodeficiency-associated vaccine-derived poliovirus. The only remaining poliovirus reservoirs will be facilities with infectious or potentially infectious materials, which must ensure they do not pose a post-eradication risk.

Within Australia, the government periodically undertakes an audit of facilities currently holding poliovirus potentially infectious materials (PIMs). The University has an obligation to appropriately record the presence of such samples, and where applicable, to arrange appropriate containment or disposal.

What are Poliovirus Potentially Infectious Materials?

Poliovirus potentially infectious materials (PIMs) include fecal, respiratory, or concentrated sewage samples, and derivatives of such samples, collected in areas where wild poliovirus or vaccine-derived poliovirus (VDPV) were circulating, or where oral polio vaccine (OPV), novel oral polio vaccine (nOPV) or Sabin strain was in use. Full-length poliovirus nucleic acid is also considered potentially infectious material, as under certain conditions it may develop into infectious poliovirus particles.

Facilities handling clinical or environmental samples not related to polio work can still pose a poliovirus transmission risk if samples were collected where wild poliovirus (WPV), VDPV, or OPV/nOPV/Sabin were used. These facilities may not recognize the presence of infectious poliovirus or the necessary containment measures. At-risk facilities include those researching diarrhoeal and respiratory diseases, nutrition, and environmental studies involving faecal and respiratory samples or raw sewage. Specific risks involve work with enterovirus, rotavirus, norovirus, hepatitis A and E, other viral enteric agents, enteric bacteria like *E. coli* and *Shigella*, and respiratory agents such as influenza and measles.

The poliovirus transmission risk of PIMs collections is a product of multiple elements, including the nature of the sample collection (when, where and what was collected), the poliovirus that may be present (WPV/VDPV, OPV/nOPV/Sabin), the hazards related to the laboratory procedures being used, and worker/community susceptibility.

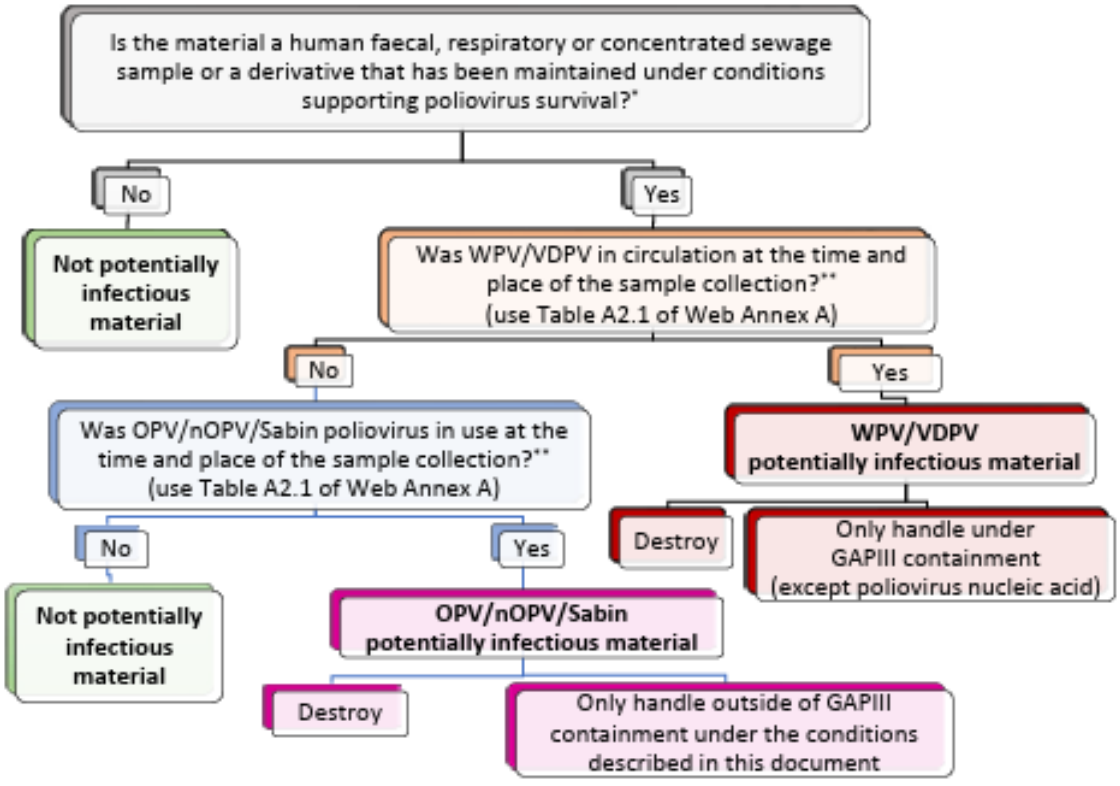
For samples that were collected in Australia, the critical dates are in or before December 1972 for wild poliovirus (since this was when the last locally acquired case of polio was reported), and between

January 1973 to June 2006 (which was when the oral polio vaccine was being administered). There are still cases of wild poliovirus and/or active use of oral polio vaccines worldwide, and for this reason any samples that have been bought into Australia from overseas are potentially infectious, independent of when they were collected.

The conditions under which the samples are stored is also important. For the polio virus to survive, the samples need to have been stored at -20ºC or lower.

The classification of samples as PIMs is based on the publication: "Guidance to minimize risks for facilities collecting, handling or storing materials potentially infectious for polioviruses", published by the World Health Organization; 2018. https://polioeradication.org/wp-content/uploads/2018/06/polio-containment-guidance-for-non-poliovirus-facilities-20180614-en.pdf

World Health Organisation decision tree on determining whether material is a poliovirus potentially infectious material, and how the sample should be handled:



* Conditions supporting poliovirus survival include long-term storage at temperatures below -20 °C.
** If a sample has a missing or damaged label or the type, country of origin or date of collection is unknown, the sample should be destroyed or inactivated using a method known to inactivate poliovirus.

Table A2.1 of Web Annex A can be accessed here: https://polioeradication.org/wp-content/uploads/2024/09/PIM-Guidance-Web-Annex-A-June-2024.pdf

GAPIII conditions are described in this document: https://polioeradication.org/wp-content/uploads/2016/12/GAPIII_2014.pdf - note that the University does not maintain facilities registered for poliovirus essential activities required for GAPIII.

What Do I Need to Do?

1. **Determine if you have any PIMs in your lab.** Undertake an assessment of any human faecal, respiratory or concentrated sewage samples or any specimens from animals used in polio research that have been stored at temperatures below -20℃ to determine if they were collected from a place or at a time when wild or vaccine-derived poliovirus was circulating, or where poliovirus vaccines were in use. Refer to Table A2.1 of Web Annex A for the list of affected places and dates.
2. **Notify the IBC** of any PIMs or any full-length poliovirus nucleic acid samples that you hold in your lab. Notification can be via email, or by submission of a non-GM biological risk form in the ACES compliance system.
3. The IBC will make necessary notifications to the Department of Health and the National Enterovirus Reference Laboratory (NERL).
4. **Follow directions issued by the regulatory agencies.** In most cases, the best option is for PIMs to be destroyed, and the Department of Health or NERL will be able to advise how to do this safely.
5. If samples need to be retained for ethical or other reasons, they should be transferred to the NERL for long-term storage

Where Can I Get Further Information?

- **Australian initiative to eradicate PIMs**: https://research.csiro.au/2021poliosurvey/pims/
- **Poliovirus Eradication Initiative**:
    - FAQs: https://polioeradication.org/wp-content/uploads/2018/11/PIM-guidance-frequently-asked-questions-July-18.pdf
    - Containment information: https://polioeradication.org/what-we-do-2/containment/
- **World Health Organisation**:
    - PIMS Guidance: https://iris.who.int/bitstream/handle/10665/341367/9789240021204-eng.pdf