Poliovirus Containment for Non-Polio Facilities

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Topics

● 3 Types of Polio Virus
● Polio eradication effort
● Infectious materials versus potentially infectious materials (PIMs)
● Risk associated with PIMs
● GAP III -Global Plan of Action for Poliovirus Containment
● PIM Guidance including risk mitigation strategies
Polio once paralyzed >1000 children/day

- Endemic in certain parts of Pakistan, Afghanistan and Nigeria

WILD POLIO TYPE 1

- October 1999: India reported the last indigenous case globally.

WILD POLIO TYPE 2

- September 2015: Declared eradicated by the GCC*

WILD POLIO TYPE 3

- November 2012: Nigeria reported the (hopefully) last case globally.
- Has not been declared eradicated by the GCC

*GCC – Global Certification Commission for the Eradication of Poliomyelitis.
Children paralyzed by polio
(all serotypes)

Global synchronized switch from trivalent (types 1, 2 and 3) to bivalent (types 1 and 3) OPV

Last case of indigenous wild poliovirus type 2 reported

GCC declares WPV2 eradicated

Cases (‘000)

- 0
- 100
- 200
- 300
- 400

Global Polio Eradication Initiative

World Health Assembly

- Expert Committee on Biological Standardization (ECBS)
- Global Commission for the Certification of the Eradication of Poliomyelitis (GCC)
- Containment Advisory Group (CAG)²
- Strategic Advisory Group of Experts (SAGE) on Immunization
- CAG Secretariat
- CWG Secretariat

- Policy development for polio vaccines
- Inventory, destruction and preparation for poliovirus type 2 containment (Phase I of GAPIII) and later PV1 and PV3 (Phase I of GAPIII activities)
- Poliovirus type 2 containment period (Phase II of GAPIII) and Containment of all PV (Phase III of GAPIII)
- Advice on technical issues on GAPIII implementation; handling of poliovirus-related materials; identification of poliovirus potentially infectious materials and acceptable alternative in the interim before full eradication.
- Principal advisory group to WHO for vaccines and immunization policies and strategies

2 Terms of References of the GCC-CWG. Available at: http://polioeradication.org/wp-content/uploads/2016/10/TOR_GCC-CWG.pdf
3 Past submissions included those from NACs, MOH, NCC, other government institutions, potential poliovirus-essential facilities (PEF) (vaccine producers and laboratories), poliovirus-non-essential facilities (polio and non-polio laboratories), containment-related working groups and polio-related international and national-level advisory groups, etc.
What is poliovirus containment?

A system for confining polioviruses within a defined space

Global agreement:

WHA resolution 68.3:
- The May 2015 resolution urges countries to implement GAPIII

Global Plan of Action for Poliovirus Containment (GAPIII)

- Based around a ‘modern’ biorisk management philosophy
- Annex requirements are generic and apply regardless of:
  - Type
  - Size
- Risk-based approach and is not focused upon biological agent risk groups or containment levels
- If exclusions proposed, claims of conformity are not acceptable unless detailed and shown to be justified
- Compliance with national and local requirements of primary importance
WHA resolution 71-16

Urges all MS:
- to intensify efforts to accelerate the progress of poliovirus containment certification
- to complete inventories for type 2 polioviruses, destroy unneeded type 2 materials and to begin inventories and destruction of unneeded type 1 and 3 materials in accordance with the latest available published WHO guidance;
- to ensure that any confirmed event associated with a breach in poliovirus containment is immediately reported to the National IHR Focal Point

URGES all Member States retaining polioviruses:
- to reduce to a minimum the number of facilities designated for the retention of polioviruses, prioritizing facilities performing critical national or international functions
- to appoint, as soon as possible and no later than the end of 2018, a competent National Authority for Containment
- to request facilities designated to retain poliovirus type 2 to formally engage in the Containment Certification Scheme by submitting to their NAC their applications for participation, which is the first step of the global certification process, as soon as possible and no later than 31 December 2019

29 countries plan to retain poliovirus type 2 materials* in 81 designated PEFs

*Includes WPV/cvDPV and OPV/Sabin type 2
Data reported by WHO Regional Offices as of 3 September 2018 and subject to change

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

NACs: 22 of 30 NACs ‘nominated’
PEFs: Applications submitted to GCC 3; CPs delivered: 1
Annexes – Facility (primary) safeguards

- Annex 2 – Poliovirus-essential facilities holding wild polioviruses
- Annex 3 – Poliovirus-essential facilities holding only OPV/Sabin
- Annex 2 – is identical to Annex 3 except for certain facility containment-specific areas applying in Phase III for containment of all wild poliovirus
- Annex 6 – Poliovirus-non-essential facilities if they suspect they will handle new poliovirus samples

Population immunity (secondary) safeguards

Revised population immunity (secondary safeguards) to reduce the consequences of a poliovirus release from a facility based on current recommendations by SAGE for countries hosting PEFs (to align GAPIII and SAGE recommendations on IPV immunization schedules):

<table>
<thead>
<tr>
<th>2° safeguards: Population immunity in country hosting the facility</th>
<th>Poliovirus type 2 containment period</th>
<th>Final poliovirus containment period</th>
</tr>
</thead>
<tbody>
<tr>
<td>All type 2 polioviruses</td>
<td>≥ 2</td>
<td>≥ 2</td>
</tr>
<tr>
<td>All OPV/Sabin polioviruses</td>
<td>≥ 2</td>
<td>≥ 2</td>
</tr>
<tr>
<td>All wild polioviruses</td>
<td>≥ 2</td>
<td>≥ 90%*</td>
</tr>
</tbody>
</table>

*≥90% of IPV2 coverage in infants within a 100 km of the PEF

Environment & location (tertiary safeguards) reduce the consequences of a poliovirus release from a facility

<table>
<thead>
<tr>
<th>3rd safeguards: Environment &amp; location</th>
<th>Poliovirus type 2 containment period</th>
<th>Final poliovirus containment period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All type 2 polioviruses</td>
<td>All OPV/Sabin polioviruses</td>
</tr>
<tr>
<td>Siting of facilities in areas with low transmission potential ($R_0$) for wild polioviruses</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

Global Polio Eradication Initiative

Primary Safeguard of Facility Containment

Secondary Safeguard of Population Immunity

Tertiary Safeguard of Facility Location

- In line with GAP III
- Not in line with GAP III

- Closed Sewage System
- Open Sewage System
- Dedicated Effluent Treatment Plant
- Failure in primary safeguards resulting in infected worker or release of untreated effluents
3. Completion of Phase I (Preparation for containment of poliovirus type 2) of GAPIII

GCC conclusions:

• GCC noted the lack of consistent, standardized and harmonized data collection mechanisms to finalize preparations for PV containment phase in the six regions.

• GCC recognized the need for CAG to endorse the *Guidance for non-poliovirus facilities to minimize risk of sample collections potentially infectious for PV in order to support the completion of inventories for PV materials in polio and non-polio facilities.*
3 ISSUES, CONCLUSIONS AND RECOMMENDATIONS

Completion of Phase I (Preparation for containment of poliovirus type 2) of GAPIII

GCC recommendations:

• GCC encourages the establishment of a standardized data collection and verification mechanism.

• NCC/RCC reports need to clearly indicate where and when activities in Phase I have been completed, based on a standardized data collection and verification mechanism, so that, on the basis of equivalent data quality between regions, the GCC can declare global completion of Phase I.

• The deadline for completion of Phase I for all PV2 is set at one year after the publication of the Guidance for non-poliovirus facilities to minimize risk of sample collections potentially infectious for polioviruses.

3 ISSUES, CONCLUSIONS AND RECOMMENDATIONS

Completion of Phase I (Preparation for containment of poliovirus type 2) of GAPIII

GCC recommendations:

• GCC urges countries affected by ongoing transmission of cVDPV2 to repeat their inventories and destroy, transfer or contain PV2 materials after the outbreak is declared closed.

• GCC requests RCCs to urge countries to complete the identification, destruction, transfer or containment (Phase I) of WPV1 and WPV3 materials by the end of Phase II.

• GCC urges countries planning to designate facilities for the retention of WPV1 and WPV3 materials to weigh the risks and benefits of having such facilities and the commitments that will be required to comply with the primary (facility), secondary (population immunity) and tertiary (sanitation and hygiene) safeguards.

• GCC requests a letter be prepared and distributed via Regional Offices formally acknowledging countries for the completion of Phase I of GAPIII.
Poliovirus Materials Defined in GAPIII

WPV2 and cVDPV2
Infectious Materials

WPV2 and cVDPV2
Potentially Infectious Materials

OPV2 and Sabin2
Infectious Materials

OPV2 and Sabin2
Potentially Infectious Materials

What differentiates IM and PIM is the known or unknown presence of poliovirus

(+ Samples that have tested positive for the presence of PV.
  • These would usually be found in poliovirus laboratories and not non-polio labs.

WPV2 and cVDPV2
Infectious Materials

(+)

OPV2 and Sabin2
Infectious Materials

WPV2 and cVDPV2
Potentially Infectious Materials

• Testing is NOT needed.

WPV2 and cVDPV2
Potentially Infectious Materials

• These are samples that have been collected from person from areas where WPV2 and cVDPV2 were in circulation

OPV2 and Sabin2
Potentially Infectious Materials

• These are samples that have been collected from person from areas where OPV was in use
GAPIII REQUIRES that these materials can only be stored and handled if facilities that are designated by the governments fulfill the standards of GAPIII - Annex 2 and Annex 3.

WPV2 and cVDPV2 Infectious Materials
WPV2 and cVDPV2 Potentially Infectious Materials

According to GAPIII must implement Annex 2 of GAPIII

OPV2 and Sabin2 Infectious Materials
OPV2 and Sabin2 Potentially Infectious Materials

According to GAPIII must implement Annex 3 of GAPIII

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Why is Guidance for non-poliovirus facilities to minimize risk of sample collections potentially infectious for polioviruses needed?

Most of the surveys and inventories performed in the past have been limited to only polio laboratories. But we have stakeholders that we MUST collaborate with.

- **Global Rotavirus Lab**: As of January 2016, the network included 115 laboratories including 68 sentinel hospital laboratories (SHL), 37 national and provincial laboratories, 9 regional reference laboratories (RRL) and one Global Reference Laboratory (GRL).

- **Measles and Rubella Network**: 696 laboratories have been established in 164 countries

- **Flu**: Established in 1952, the network currently comprises 143 institutions in 113 WHO Member States, which are recognized by WHO as National Influenza Centres, 6 WHO Collaborating Centres, 4 WHO Essential Regulatory Laboratories, 13 WHO H5 reference laboratories, and ad hoc groups established to address specific emerging issues.

- **GPLN**: 146 labs (1/3 are PEFs)
Guidance for non-poliovirus facilities to minimize risk of sample collections potentially infectious for polioviruses

The purpose of this guidance is to assist facilities in assessing the risk of PV PIM in their possession and to implement appropriate risk reduction consistent with GAPIII.

**Polio Facilities**
- Polio focus: Presumably are better placed to recognize poliovirus and the implications of a facility-associated release of PV
- PV is often a desirable agent

**Non-Polio Facilities**
- Possible sources of PV transmission
- Require facility-specific risk assessments
- Require risk reduction measures

**Non-Polio Facilities with PIMs**
- Not polio: rotavirus, HAV, HEV, or other enteric agents, influenza viruses, measles virus, other respiratory agents, diarrhoeal disease and nutritional research using fecal samples, environmental research using concentrated raw sewage
- PV incidental, undesirable agent.
- PV present in samples at varying rates and moderate titers.
- Historic PIM collections are retained for special studies.

1 Approximate number of facilities is based on WHO Global Rotavirus Lab (115 labs), WHO Measles and Rubella Network (696 labs) and WHO Flu Network (143 labs) and Polio-non-essential-facilities of GPLN : 146 labs (1/3 are PEFs)
Guidance for non-poliovirus facilities to minimize risk of sample collections potentially infectious for polioviruses

Strategy to minimize the risk from non-polio facilities is consistent with GAPIII

**Risk elimination**
- Destruction
- Inactivation
- Transfer to a PEF

**Biorisk management**

WPV2/VDPV2 PIM retention requires the implementation of Annex 2 of GAPIII and CCS

<table>
<thead>
<tr>
<th>Level</th>
<th>WPV2/VDPV2 PIM retention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate</td>
<td>Requires implementation of Annex 2 of GAPIII and CCS</td>
</tr>
<tr>
<td>Low</td>
<td>OPV2/Sabin2 PIM retention requires the implementation of the risk-appropriate management standard described in the guidance. Compliance verification is the responsibility of the national authority e.g., MOH.</td>
</tr>
<tr>
<td>Lowest</td>
<td>Non-PIM CSF, serum/blood and other clinical material, materials inactivated by a validated method (e.g. formalin) Not applicable</td>
</tr>
</tbody>
</table>

**Collections with potential for only OPV/Sabin**

<table>
<thead>
<tr>
<th>Type of PIM</th>
<th>Accepted procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faecal samples or concentrated sewage</td>
<td>Inoculation into poliovirus-permissive cells</td>
</tr>
<tr>
<td>Moderate</td>
<td>Transfection into poliovirus-permissive cells</td>
</tr>
<tr>
<td>Low</td>
<td>No cell culture inoculation</td>
</tr>
<tr>
<td>Low</td>
<td>Inoculation into polio-permissive cells</td>
</tr>
<tr>
<td>Lowest</td>
<td>Transfection into poliovirus-permissive cells</td>
</tr>
<tr>
<td>Lowest</td>
<td>No cell culture inoculation</td>
</tr>
<tr>
<td>Lowest</td>
<td>No transfection into polio-permissive cells</td>
</tr>
<tr>
<td>Non-PIM</td>
<td>CSF, serum/blood and other clinical material, materials inactivated by a validated method (e.g. formalin) Not applicable</td>
</tr>
</tbody>
</table>
## Risk mitigation strategies

<table>
<thead>
<tr>
<th>Risk Mitigation Strategies</th>
<th>Moderate</th>
<th>Low</th>
<th>Lowest</th>
<th>Storage only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declare PIM in National Survey and maintain working inventory</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Biosecurity (locked freezers, limited access)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Good laboratory/microbiological practices, including documentation and validation of methods/SOPs</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>n/a</td>
</tr>
<tr>
<td>Risk assessment for specific procedures being used</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>n/a</td>
</tr>
<tr>
<td>Polio immunization for staff: Required</td>
<td>X</td>
<td>X</td>
<td>-</td>
<td>n/a</td>
</tr>
<tr>
<td>Polio immunization for staff: Recommended</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>n/a</td>
</tr>
<tr>
<td>Accreditation to a national or international biorisk management standard</td>
<td>X</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>

## Poliovirus Containment Resources

- **Containment resources (GAPIII, CCS, CCS forms, non-polio guidance)**
  
  http://polioeradication.org/polio-today/preparing-for-a-polio-free-world/containment/containment-resources/

- **Containment supporting groups (Information on CAG, GCC, CWG e.g., TORs)**
  
  http://polioeradication.org/who-we-are/governance-and-structure/

- **CAG meeting reports**
  
  http://polioeradication.org/tools-and-library/policy-reports/advisory-reports/containment-advisory-group/

- **GCC meeting reports (certification and containment reports)**
  

- **E-mail address to submit CCS applications (CCS SharePoint)**
  
  containmentcertification@workspace.who.int
The Containment Corner, a new GPEI publication to update stakeholders on key developments in global poliovirus containment. The e-newsletter replaces Polio Pipeline and will be biannual in frequency.

Thank you

For any questions or suggestions on poliovirus containment and GAPIII please contact:

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