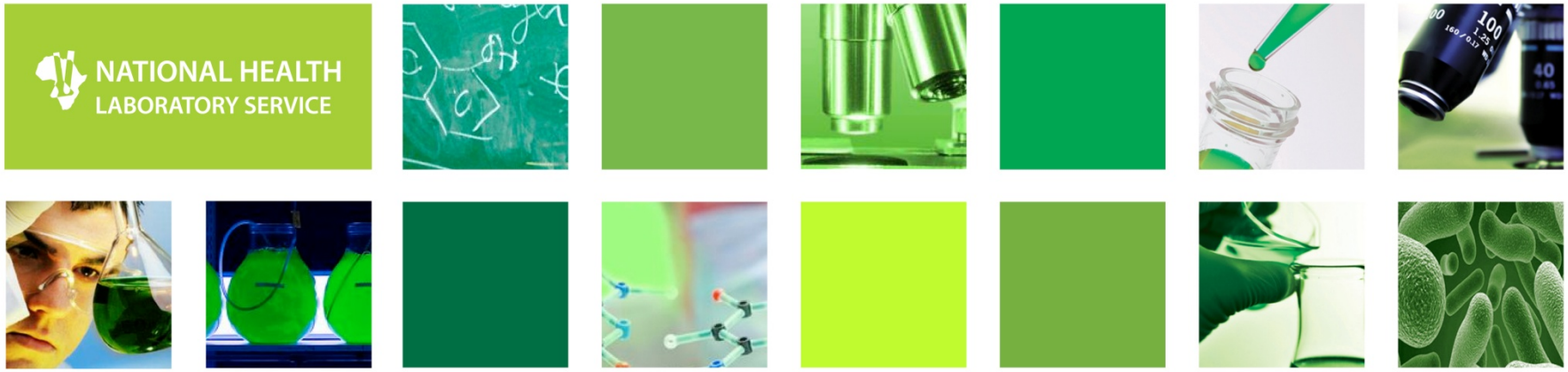

ACUTE FLACCID PARALYSIS SURVEILLANCE
A Laboratory Perspective

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Introduction

- Acute Flaccid Paralysis (AFP) is a clinical syndrome characterized by a sudden onset of weakness of a limb, described as flaccid in a child below 15 years of age
- AFP mimics the clinical presentation of poliomyelitis, hence AFP surveillance was adopted globally as a key strategy for monitoring the progress of the polio eradication initiative.
- A good AFP surveillance system serves as a sensitive tool for detecting potential poliomyelitis cases and thus alerting health managers and clinicians to timely institute appropriate interventions to interrupt any poliovirus transmission.
- Effective AFP surveillance is also crucial for verifying, with confidence, the absence of wild poliovirus circulation in countries that are no longer reporting cases of poliomyelitis.
- In RSA the last case of poliomyelitis due to the wild poliovirus was reported in 1989.
- However the country remains at risk of wild poliovirus re-importation from the remaining polio-endemic countries.

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Poliomyelitis- Epidemiology

1. Infectious Agent

- The polioviruses are three related enteroviruses : types 1, 2 and 3 (serotypes).
- All three types cause paralysis, but the most frequent cause of epidemic polio is poliovirus type 1
- Type 1 is most neurovirulent with case to infection ratio about 1:200)
- Most vaccine associated cases are due to type 2&3.
- Circulating wild type 2 poliovirus has not been isolated since October 1999

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Epidemiology

2. Infectivity & Immunity

Infectivity

- Highly infectious with an infected individual infecting all other non-immune persons in a household, especially where sanitation is poor.

Immunity

- Protective immunity against poliovirus infection develops by immunization or natural infection.
- Immunity to one type does not protect against the other types.
- Immunity following natural infection or administration of live oral polio vaccine (OPV) is believed to be life-long

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Epidemiology

Transmission

- Person-to-person via the faecal-oral route, i.e. the poliovirus multiplies in the intestines and is spread through faeco oral route;
- The incubation period is 7-21 days and virus spreads rapidly to the non-immune and transmission is usually widespread by the time of paralysis onset.
- The virus is intermittently excreted for 1 month or more after infection;

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Epidemiology

Reservoir

- Poliovirus infects only human beings and there is no animal reservoir.
- The virus does not survive long (less than a month) in the environment outside the human body.
- There is no long-term carrier state.
- Good candidate for eradication

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Global Polio Eradication Initiative

- Polio earmarked for eradication and strategy adopted at the 41st WHA in 1988 (initial plan was to eradicate polio by 2000)
- Revised target to interrupt wild poliovirus transmission by 2012
- Strategy pillars of the GPEI
  - High routine infant immunisation coverage
  - Supplementary immunisation via NID & SNIDS
  - Surveillance programmes
    - AFP
    - Laboratory virological studies
  - Targeted mop-ups operations in areas of focal transmission
- Afterwards-Polio Endgame
  - Polio-free certification.
  - Laboratory containment of poliovirus.
  - Stopping polio immunization.

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Surveillance

AFP Surveillance-role

- To identify high risk areas or groups
- To monitor progress
- To certify a country polio-free
- Utilize data to choose supplementary strategies

Laboratory surveillance-role

- Includes clinical and environmental samples
- WHO global polio laboratory network-145 accredited labs worldwide
- Use standardised diagnostic methods for viral isolation and intratypic differentiation
  - To trace the origin of a case
  - To certify that polio has been eradicated
  - To identify wild type vs vaccine derived polioviruses

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AFP surveillance standard case definitions

Any patient under 15 years of age with acute, flaccid paralysis, not caused by trauma

OR

A patient of any age in whom a clinician suspects poliomyelitis

For Surveillance purposes we are looking at AFP

<u>not Poliomyelitis</u>

Any condition which presents with rapid onset of paralysis or weakness

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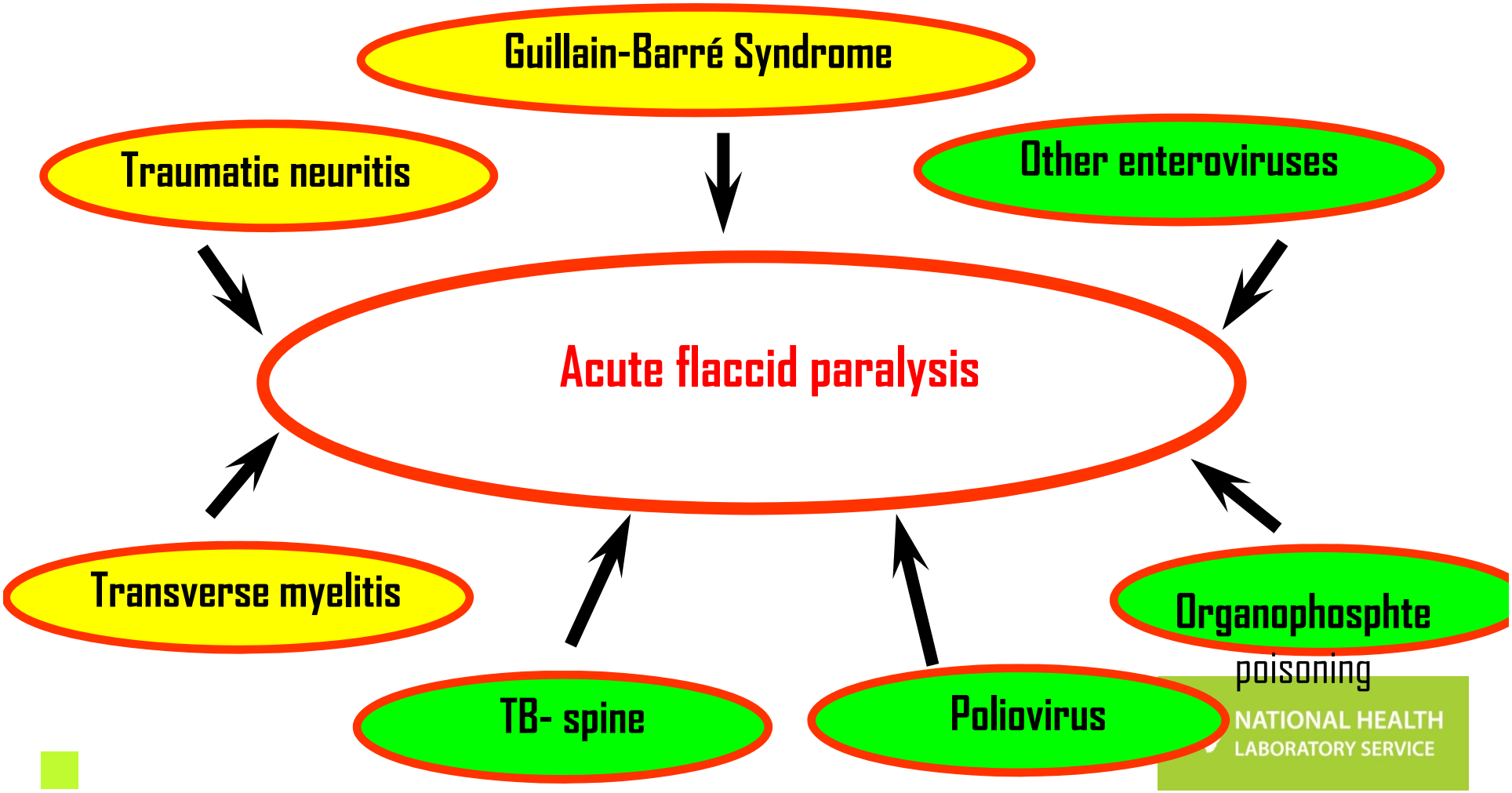
AFP DIFFERENTIAL DIAGNOSIS (CONDITIONS WHICH MAY GIVE AFP SYMPTOMS)



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AFP investigation

- Collection of TWO stool specimens, 24 to 48 hours apart in the first 14 days following the onset of paralysis-packed on ICE
- Fill in AFP Case Investigation Form, include Epid #(NOT usual NHLS request form)
- AFP CIF is packed with sample, serves as request for the test
- Send specimen to NICD
- 60 day follow up, where indicated (incompletely investigated cases)
- Classification of cases by NPEC

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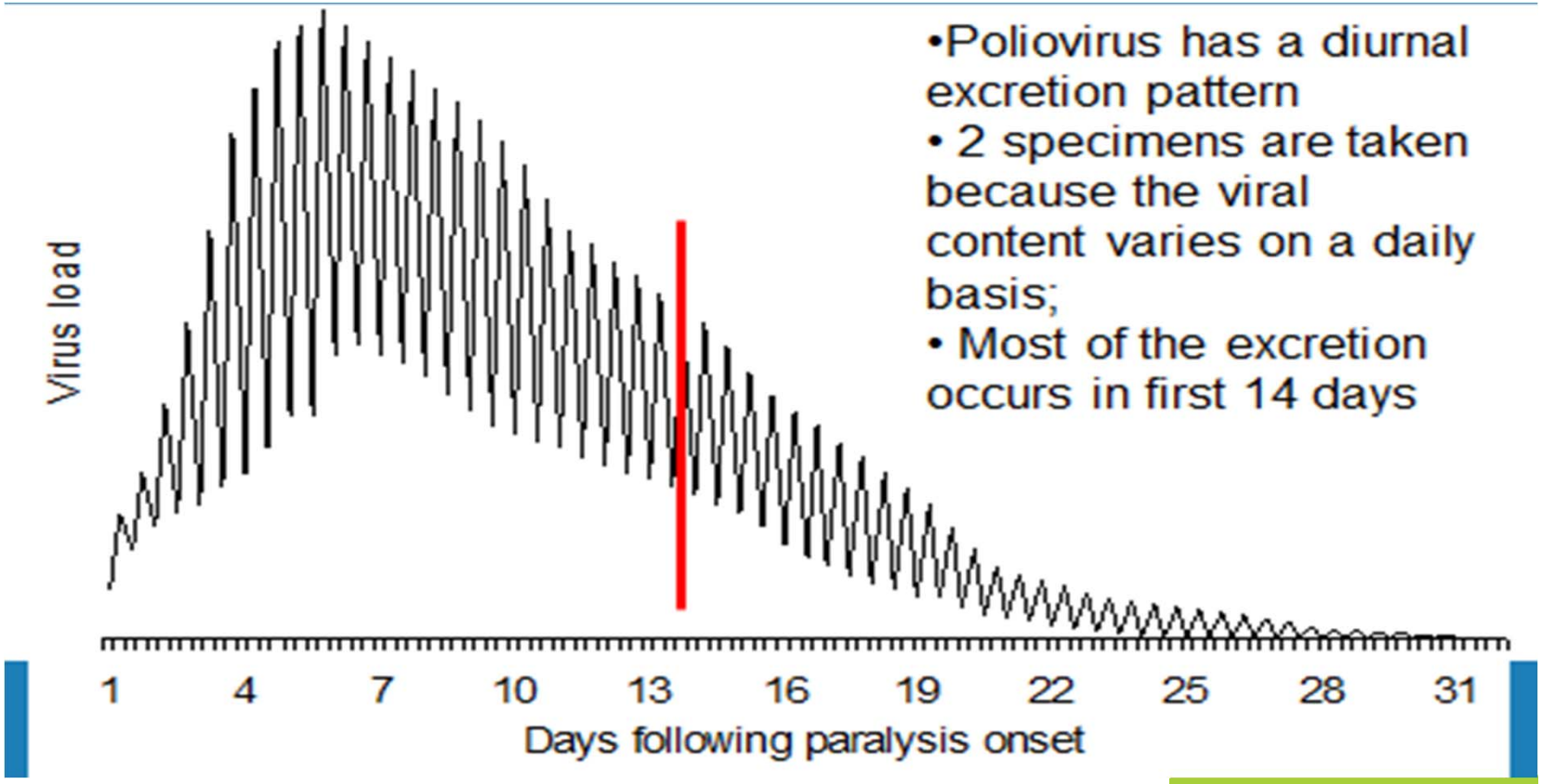
Why 2 stools within 14 days of AFP onset?



- Poliovirus has a diurnal excretion pattern
- 2 specimens are taken because the viral content varies on a daily basis;
- Most of the excretion occurs in first 14 days

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Procedure for collection of stool

- Collect at least 1 adult thumb-sized amount of stool
- Place in wide-mouthed plastic container, with screw on cap tightly closed
- Label container with name, case Epid number & number of stool specimen (1 or 2)
- Specimen placed in a sealed plastic bag
- CIF placed in a separate & sealed plastic bag
- Transport specimen in a cool box below 8^0C
- Ensure arrival to NICD within 3 days of collection

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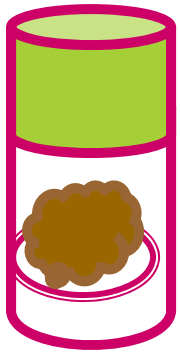
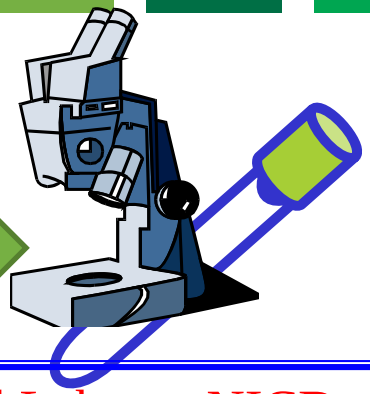
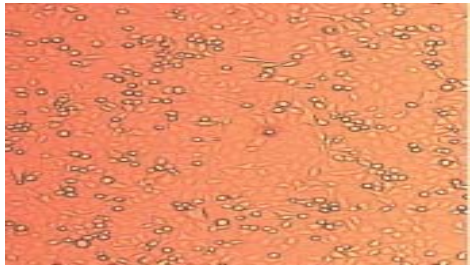
Stool Processing

Purification / virus extraction

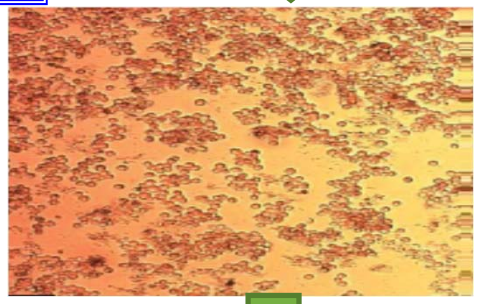




Isolation: 14/7



National Lab e.g. NICD



Stool Sample

Intratypic Differentiation Lab: 7/7
ITD (NSL/Discordant/ vaccine)

RRL: Sequencing Lab: 7/7

Sequencing: Wild poliovirus/ VDPV/ Vaccine

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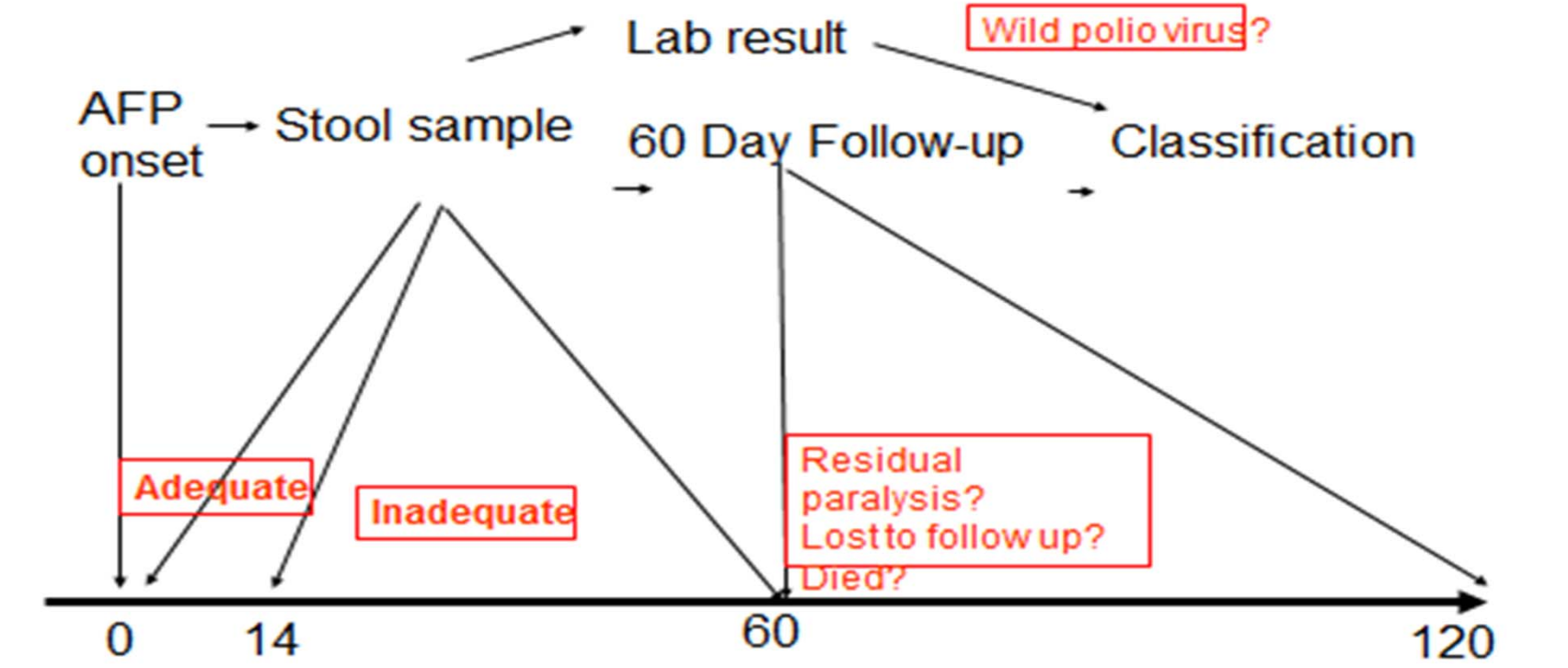
Timeline of AFP investigation



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Application of Lab results

- Suspected poliovirus: Inform program & refer for ITD (no program action yet)
- NSL at ITD: report, refer for sequencing for confirmation, respond as if WPV (outbreak investigation) ,
- WPV : Respond by outbreak investigation/ vaccination - Mop up activities
- VDPV: Surveillance for more and if circulating; respond exactly as for WPV

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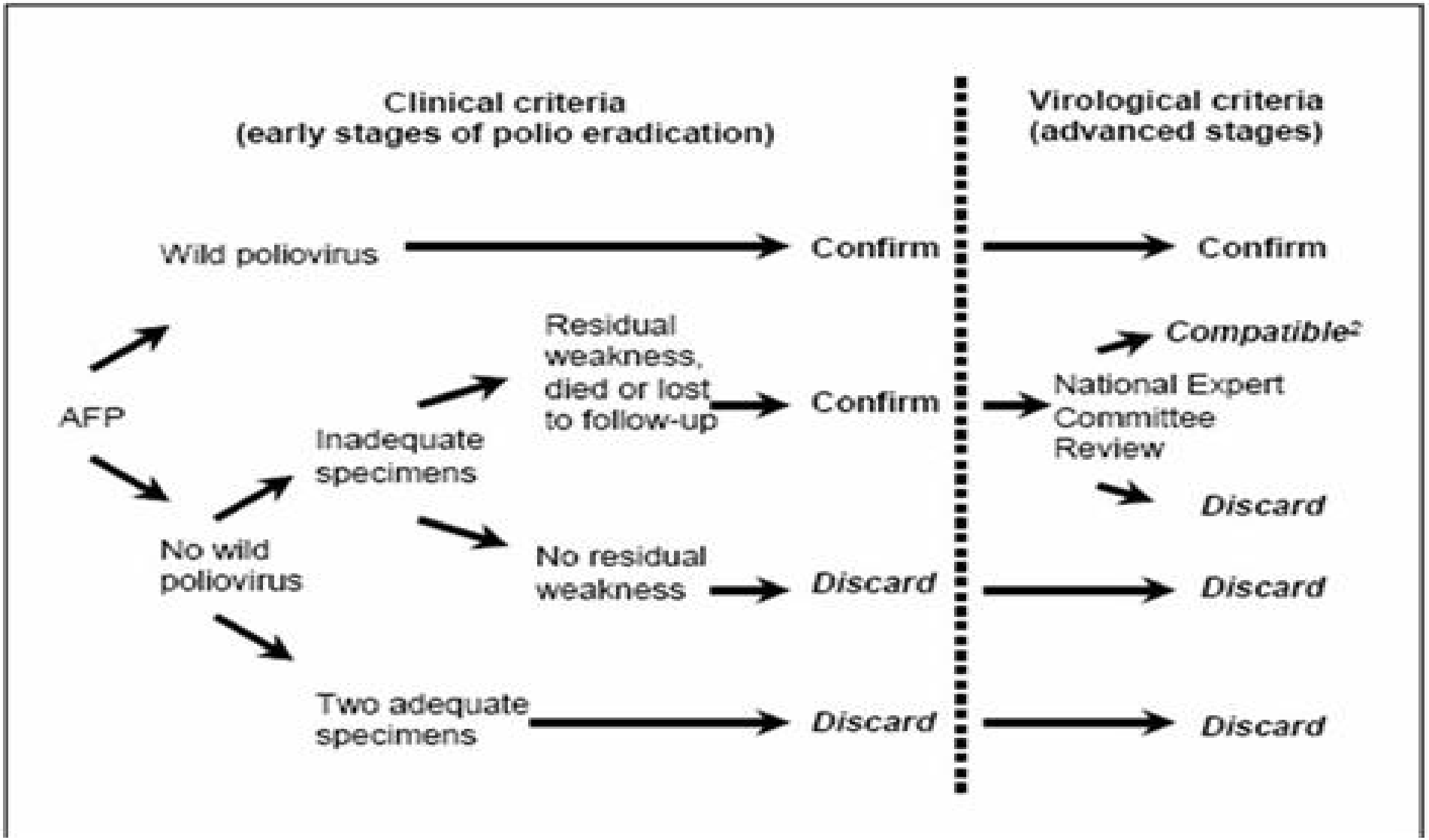
Classification of AFP cases



NPEC-National Polio Expert Committee members

- Paediatrician
- Paediatric Neurologists
- Epidemiologist
- Public Health Specialist
- Virologist

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AFP Surveillance targets

- Good vaccine coverage >90% routine and >95% during mass campaigns
- Target of AFP cases = 4/100 000 (previously 2/100 000)
- AFP STOOL ADEQUACY= 80% (2 stool specimens, 24hrs apart, within 14 days of onset of paralysis)
- COMPLETENESS & TIMELINESS OF REPORTS (incl. weekly zero reports)

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AFP surveillance Indicators

Indicator	Target
Non-Polio AFP rate per 100,000 of the ≤15 yr old target population	**4.0/100 000**
Stool adequacy: cases with 2 adequate stools collected 24 to 48 hours apart within 14 days of onset of paralysis	**80%**
Specimens arriving at lab <3 days of being collected	**80%**
Specimens arriving at lab in good condition (± 5g, on ice, not leaking)	**90%**
Non-polio Enterovirus isolation rate	**10%**
Lab results available within 14 days of receipt	**80%**

Lab performance indicators

Indicators	Min target
Number of isolation samples annually	At least 150
ITD test results reported within 7 days:	>80%
Wild poliovirus and suspected VDPV isolates from AFP cases and contacts referred for sequencing within 7 days of detection	>80%
Score on most recent Isolation/ intratypic differentiation PTs is at least 90%:	>90%
Score on annual on-site review is at least 90%:	>90%
Reporting isolation results of AFP clinical specimens within 14 days of receipt	>80%
Annual NPEV isolation rate	10%

Vaccine Derived Polioviruses (VDPVs)

- Oral polio vaccine related viruses that have re-acquired the transmission characteristics of wild polioviruses
- Genetically different to Sabin vaccine viruses by >1% in the major surface protein-VP1
- The genetic change occurs when Sabin vaccine viruses recombine with other enteroviruses in the gut.
- 3 types of VDVPs
  - cVDPV-circulating VDPVs emerge when poor vaccine coverage allowing their circulation in susceptible communities
  - iVDPV-occurs in small number of patients with primary immunodeficiencies
  - aVDPV-little known, occur in situations with insufficient clinical, epidemiological and virological data.
- VAPP-vaccine associated paralytic polio
  - Rare paralytic disease in a vaccine recipient or close contact (1-3-5million OPV cases)

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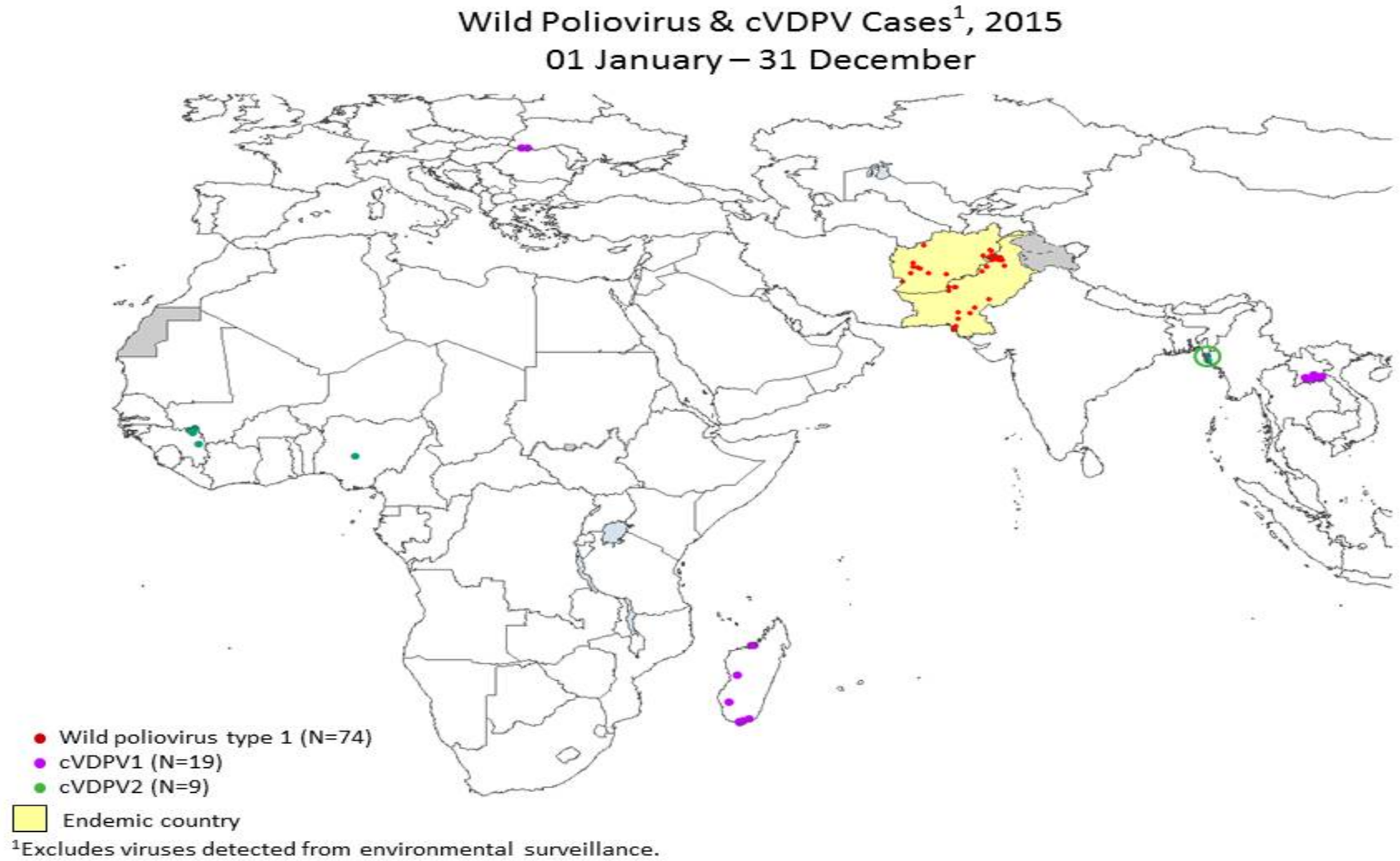
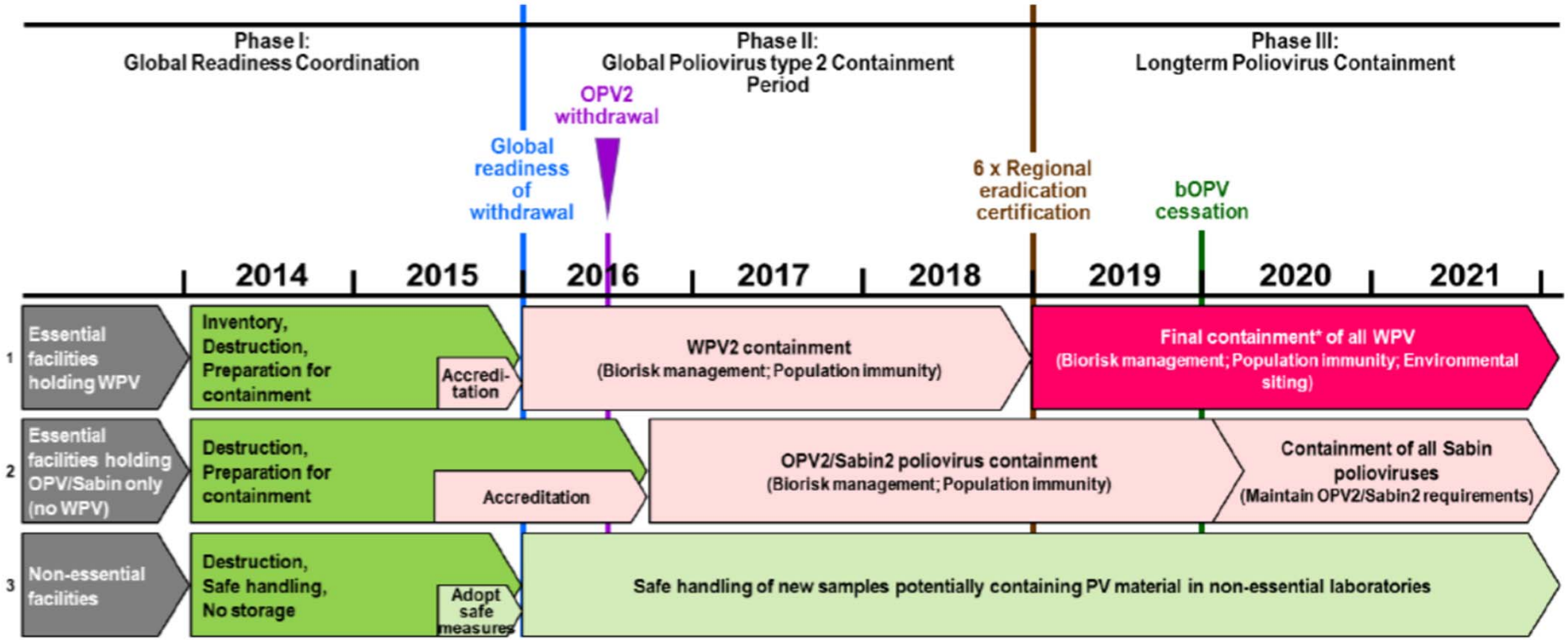
Status update-Wild and Vaccine derived polio



Data in WHO HQ as of 16 February 2016

POLIOVIRUS CONTAINMENT TIMELINE



No containment

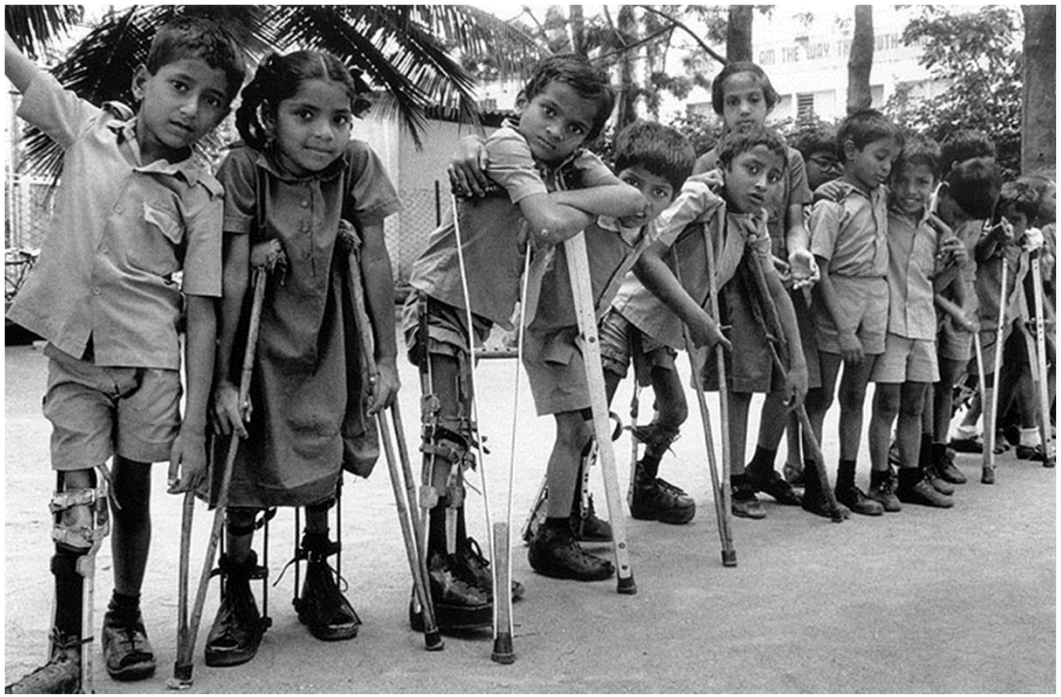
Adoption of safe handling measures

Containment of WPV2, OPV2/Sabin2; Final containment of all OPV/Sabin polioviruses

Final containment of all WPV

*proposed major facility enhancements:

1. exhaust air filtration
2. effluent treatment



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