Reintroduction of WPV1 in an IPV vaccinated population

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IPV vaccination coverage

• Israel ~ 95%
• Southern District ~ 92%
• Arabs ~ 97%
• Bedouins in Southern district ~ 90%

• Sero-prevalence study: 98.2% positive
Supplementary Environmental Surveillance

- Routine monthly sewage surveillance
  - 8-10 sites since 1989
  - 30% – 40% of entire population
  - Measure viral loads
The initial event: Observation of a Dramatic rise in plaques

<table>
<thead>
<tr>
<th>Location</th>
<th>Feb</th>
<th>Mar</th>
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</thead>
<tbody>
<tr>
<td>Beer-Sheva</td>
<td>2, 1, 0, 0</td>
<td>10, 10, 6, 3</td>
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<tr>
<td></td>
<td>0.4/ml</td>
<td>3.7/ml</td>
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<tr>
<td>Rahat</td>
<td>1, 0, 0, 0</td>
<td>57, 50, 48, 48</td>
</tr>
<tr>
<td></td>
<td>0.1/ml</td>
<td>25.4/ml</td>
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</tbody>
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Plaque assay of concentrated sewage on L20B
The WPV in Israel

- Identify viruses based on sequence
  - **May 29**
    - th non-Sabin type 1 poliovirus
  - CDC and WHO closest match to WPV1 SOAS from Pakistan 2012 and Egypt (Dec 2012)
  - Clade R3
WPV circulation in Israel and The PA

- 350 samples Israel and PA; 109 SOAS positive
- High viral load: Parts of Southern District, mainly in Bedouin settlements
- Low viral load: Four locations in Central Israel
- “Anecdotal” virus identification: Four other locations in Central Israel; three location in the PA
Public Health Response
1st Stage Response: June–July 2013: IPV phase

- Nationwide active IPV catch-up: with focus on South
  - Achieving >98% coverage among children
- Rahat: Single dose IPV for adults
- National hygiene campaign – hygiene
- Intensified environmental surveillance (>50 sites)
- Intensified AFP and aseptic meningitis surveillance
- Stool survey – Southern district (July 2013)
- Communication with health professionals and public
Stool survey (CDC and CVL, n=2,203)

- Identified reservoir
  - Bedouin children < 9 years old
    - Point prevalence: 4.2%
  - Jewish children < 9 years old
    - Point prevalence: 0.6%
  - 48/50 excretors among IPV-only vaccinated children
  - Distribution of excretors - consistent with environmental surveillance “hot spots”
2nd Stage Response Aug 5th & 18th bOPV

• Single bOPV dose if previous IPV dose.
• Aug 5 – Southern Israel– 180,000 Children <10 yrs
  – SIA – bOPV
  – 86% by Sept 26th
• Aug 18 – all other children- total of 1.2 Million
  – SIA bOPV
  – 70% by Sept 25th
Challenges of OPV SIA

• SIA in an IPV-only country with no clinical polio
• Identify the target population for SIA
• Reach consensus in the medical community
• Risk communication to general public:
  – “Traditional” media
  – “New” media: internet and social networks
  – Community leaders
• Appeal to Supreme Court against vaccination campaign
• “halo” effect on other routine vaccines
• Compliance
Rahat – WPV1 kinetics (high viral load)

WPV1/Sabin 1 concentration

- log(pfu/1 liter)
- soas 50-ct/ml/10
- s1 50-ct/ml/10

Vaccination

[Graph showing virus load over time with vaccination point]

Kiryat-Gat– WPV1 kinetics (low viral load)

WPV1/Sabin 1 concentration

$log(\text{pfu/1 liter})$

SOAS 50-ct/ml/10

S1 50-ct/ml/10

Vaccination

Next step(s)

- Additional round(s) of bOPV?

- Reexamination of childhood vaccination schedules: re-include tOPV or bOPV with IPV?
Conclusions

• Evidence: Introduction and sustained transmission of WPV1 in a highly vaccinated population

• Evidence-based national public health response
  — Time needed to acquire data and public trust
  — Consultation with external experts WHO and CDC

• Continuous Environmental surveillance - crucial for Early detection and monitoring intervention
Future International Considerations

• Applying research evidence from Israel’s event for polio endgame strategy

• We are open to suggestions to any additional studies that would help toward understanding this type of event
Immune status of population (during event)

- Neutralizing antibodies to type 1 poliovirus (>1:8)
  - 98.2%

- Neutralization of SOAS vs IPV Type 1
  - 3 fold less, but all STILL neutralize SOAS
    - convenient serum samples
    - low and mid range titers
    - Mahoney GMT = 41 SOAS GMT = 13
Environmental surveillance sites

- Include additional surveillance sites \((n>50)\)
- Increase frequency of testing from monthly to weekly
- Subdivide sampling sites (upstream branches)