Global Rotavirus Surveillance Network

Dr. Adam L. Cohen
World Health Organization
7 September 2016
Vaccine-preventable disease surveillance

- Active vs. passive
- Sentinel site vs. national
- Case-based vs. aggregated
- Laboratory-confirmed vs. syndromic
- Hospitalized (severe) vs. outpatient or community (mild)
Vaccine-preventable disease surveillance

- Active vs. passive
- Sentinel site vs. national
- Case-based vs. aggregated
- Laboratory-confirmed vs. syndromic
- Hospitalized (severe) vs. outpatient or community (mild)

How to conduct surveillance for rotavirus?
WHO-coordinated Global Sentinel VPD Surveillance Networks

- Syndromes and pathogens currently under surveillance
  - Diarrhea (for rotavirus)
  - Invasive Bacterial Vaccine-Preventable Disease (IB-VPD)
    • Meningitis (for pneumococcus, Hib, and meningococcus)
    • Pneumonia/sepsis (for pneumococcus and Hib)

- Coordinated by WHO with partners since 2008

- Funding from Gavi, so a focus on low income countries where surveillance data was lacking
WHO’s role in VPD surveillance

- To generate and monitor VPD trends globally
- To lead, coordinate, and advocate for surveillance activities with countries and partners, including EQA/QC
- To set global norms and standards for surveillance
- To support countries with technical assistance and evidence-based policy decisions
- To support research that uses surveillance data, builds on surveillance platforms, and informs surveillance, vaccine impact and policy
Objectives of Global Rotavirus Surveillance Network (GRSN) -- from 2008

During the pre-vaccine introduction period
- Document presence of disease, describe the disease epidemiology and provide data for estimating disease burden
- Establish system to measure impact after vaccine introduction
- Identify circulating genotypes

In the post-vaccine introduction period
- Assess disease trends over time
- Monitor vaccination program impact
- Monitor changes in circulating genotypes
- Platform for vaccine effectiveness and safety evaluation
Rotavirus disease surveillance in GRSN

- **Active** vs. passive
- **Sentinel site** vs. national
- **Case-based** vs. aggregated
- **Laboratory-confirmed** vs. syndromic
- **Hospitalized (severe)** vs. outpatient or community (mild)
Countries that Reported Data to GRSN, by Gavi Status--2015

Data Source: WHO/IVB Database as at 05 September 2016. Map production: Immunization Vaccines and Biologicals, (IVB), World Health Organization

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 lines on maps represent approximate border lines for which there may not yet be full agreement.

© WHO 2016. All rights reserved
Global Rotavirus Laboratory Network and countries reporting genotype data

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 dashes lines on maps represent approximate border lines for which there may not yet be full agreement. ©WHO 2014. All rights reserved.

*CDC, Atlanta RRL for AMRO/PAHO.
Rotavirus positivity among countries reporting data to GRSN, 2014

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethiopia (N=311)*</td>
<td>20%</td>
</tr>
<tr>
<td>Gambia (N=105)*</td>
<td>25%</td>
</tr>
<tr>
<td>Kenya (N=352)</td>
<td>25%</td>
</tr>
<tr>
<td>Angola (N=161)</td>
<td>27%</td>
</tr>
<tr>
<td>Ghana (N=403)*</td>
<td>28%</td>
</tr>
<tr>
<td>Tanzania (N=2907)*</td>
<td>94%</td>
</tr>
<tr>
<td>Niger (N=90)</td>
<td>80%</td>
</tr>
<tr>
<td>Uganda (N=528)</td>
<td>31%</td>
</tr>
<tr>
<td>Cote d’Ivoire (N=222)</td>
<td>32%</td>
</tr>
<tr>
<td>Cameroon (N=294)</td>
<td>32%</td>
</tr>
<tr>
<td>Zambiya (N=1304)*</td>
<td>33%</td>
</tr>
<tr>
<td>Senegal (N=118)</td>
<td>34%</td>
</tr>
<tr>
<td>Central African Rep.</td>
<td>35%</td>
</tr>
<tr>
<td>Seychelles (N=163)</td>
<td>37%</td>
</tr>
<tr>
<td>Nigeria (N=641)</td>
<td>40%</td>
</tr>
<tr>
<td>Zimbabwe (N=1014)</td>
<td>43%</td>
</tr>
<tr>
<td>Mauritius (N=281)</td>
<td>46%</td>
</tr>
<tr>
<td>Burkina Faso (N=875)*</td>
<td>48%</td>
</tr>
<tr>
<td>Sierra Leone (N=159)</td>
<td>50%</td>
</tr>
<tr>
<td>Madagascar (N=375)</td>
<td>54%</td>
</tr>
<tr>
<td>Togo (N=214)</td>
<td>56%</td>
</tr>
<tr>
<td>Benin (N=46)</td>
<td>59%</td>
</tr>
<tr>
<td>Swaziland (N=183)</td>
<td>60%</td>
</tr>
<tr>
<td>Cote d’Ivoire (N=198)</td>
<td>63%</td>
</tr>
</tbody>
</table>

*Indicates countries that have introduced RV vaccine by 2013

Latest bulletin at http://eepurl.com/bZTDAz
How is GRSN data being used?

- Models of global rotavirus disease burden at CDC and Johns Hopkins and monitoring of disease for Gavi

- Country, regional, and global analyses, including understanding what percentage of pediatric diarrhea is watery, bloody, and persistent
Vaccine impact studies using surveillance as a platform or administrative data

- Targeted countries
  - Cameroon
  - Madagascar
  - Mauritius
  - Nepal
  - Philippines
  - Senegal
  - Togo
  - Uganda

- WHO and partners such as U.S. CDC

Gheorgita, et al. CID. 2016
Evolving objectives and future directions of GRSN

- Remaining gaps for rotavirus
  - Focus burden & vaccine impact in regions with data gaps: Asia
  - Long-term impact after vaccine intro and different formulations

- Rotavirus surveillance is diarrhea surveillance
  - Can monitor other enteric VPDs (ETEC, Shigella, norovirus, cholera) and non-vaccine interventions

- Broaden scope and strengthen network sustainably
  - Support and coordinate with regional networks
  - Coordinate with other initiatives such as RAVIN
  - Polio containment
Enteric Pathogens
TaqMan Array Card (TAC) Study

- TAC tests for >25 enteric pathogens other than rotavirus

- Phase 1 retrospective testing of GRSN specimens
  - TAC capacity built at 5 regional references laboratories
  - >1200 specimens from 11 countries in Asia, Africa, and Americas
  - Rotavirus, norovirus, Shigella, and *E. coli* among most common

- Phase 2 expands to more countries, including Europe, and enrolls prospectively (2016-2018)

- University of Virginia, U.S. CDC, WHO, participating countries, Bill and Melinda Gates Foundation
Survey of norovirus laboratory testing capacity in GRSN laboratories

- In 2015, Product Development for Vaccines Advisory Committee (PDVAC) advised adding norovirus to GRSN.

- Survey found that most surveyed GRSN laboratories already have capacity to detect and characterize norovirus strains and others could build capacity.
Thank you

Adam L. Cohen

World Health Organization

cohen@who.int

If you would like to learn more about or collaborate with GRSN, or know of countries conducting rotavirus surveillance that are not part of GRSN, please let us know.