Impacts of Rotavirus Vaccination

Daniel C. Payne, PhD, MSPH
US Centers for Disease Control and Prevention

ROTA Council
Manila, Philippines
February 23, 2018
GEMS: Most common severe diarrhea pathogens

**Infants:**
- **Rotavirus**
- Cryptosporidium
- ETEC

**1 year olds:**
- **Rotavirus**
- Shigella
- Cryptosporidium

**2-5 year olds:**
- Shigella
- **Rotavirus**
- C. jejuni
Impacts of rotavirus vaccination from the perspective of:

- Hospitalizations
- Mortality
- Economics
- Indirect health effects
Mean Percent Reductions in Rotavirus Hospitalizations Following Vaccine Introduction

<table>
<thead>
<tr>
<th>Country</th>
<th>Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>El Salvador</td>
<td>75%</td>
</tr>
<tr>
<td>Nicaragua</td>
<td>70%</td>
</tr>
<tr>
<td>Malawi</td>
<td>65%</td>
</tr>
<tr>
<td>Rwanda</td>
<td>60%</td>
</tr>
<tr>
<td>Kenya</td>
<td>80%</td>
</tr>
<tr>
<td>Ghana</td>
<td>70%</td>
</tr>
<tr>
<td>South Africa</td>
<td>75%</td>
</tr>
<tr>
<td>Armenia</td>
<td>90%</td>
</tr>
<tr>
<td>Finland</td>
<td>90%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>80%</td>
</tr>
<tr>
<td>United States</td>
<td>80%</td>
</tr>
</tbody>
</table>

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%
WHO child mortality quartiles vs. public health impacts

<table>
<thead>
<tr>
<th>Mortality strata</th>
<th>Reductions in rotavirus hospitalizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH</td>
<td>54-83%</td>
</tr>
<tr>
<td>INTERMEDIATE</td>
<td>61-75%</td>
</tr>
<tr>
<td>LOW</td>
<td>49-99%</td>
</tr>
</tbody>
</table>

Public health impacts are relatively similar across populations
# Diarrhea Mortality Reductions Among Infants Following Rotavirus Vaccine Introduction

<table>
<thead>
<tr>
<th>Country</th>
<th>Reductions in diarrhea deaths (hospitalized*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mexico</td>
<td>35%</td>
</tr>
<tr>
<td>Brazil</td>
<td>55%*</td>
</tr>
<tr>
<td>Zambia</td>
<td>27-33%*</td>
</tr>
<tr>
<td>Botswana</td>
<td>48%*</td>
</tr>
</tbody>
</table>

Richardson, et al. *NEJM* 2010  
Economic burden of rotavirus

Treating rotavirus diarrhea is expensive for families and countries

Inpatient admission for one episode of severe rotavirus diarrhea costs 10% of the average family’s monthly income

Treating one episode of rotavirus diarrhea can amount to 85% of the average family’s monthly income

Rotavirus hospitalization costs more than 25% of the average family’s monthly income
Rotavirus vaccine could avoid systemic complications from rotavirus infections (e.g. seizures)

Rotavirus vaccination was associated with a 20% reduction in risk of seizures requiring hospitalization/ED care compared with unvaccinated children during the year following vaccination.

**Protective Association Between Rotavirus Vaccination and Childhood Seizures in the Year Following Vaccination in US Children**


*Australia:* 36-38% reduction in ED/hosp. febrile seizures up to 2 years post-vaccination

(Sheridan SL, et al. *JPIDS* 2016)

*Spain:* 16-34% reductions in hospitalized seizures post-vaccination

Diarrhea is a significant contributor to malnutrition and stunting among children of lower socio-economic status


Diarrhea significantly increased the likelihood of stunting in an analysis of 9 African, South American, and Asian countries

Rotavirus gastroenteritis contributes to:

- Protein energy malnutrition
- Child growth faltering
- Cognitive delays
- Deepening vulnerability to further infections
