Rubella and CRS Elimination in the Americas

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Presentation

- Opportunities for a rubella elimination initiative
- The impact of the initiative
- Next steps
Challenges

• Rubella and CRS considered as a minor public health problem
  – Lack of knowledge regarding the burden of disease
  – How to improve the reporting and surveillance of CRS

• When the vaccine is introduced
  – No turning back
  – Close monitoring of coverage is required
  – Displacement of the disease from one age group to another

• The need for a surveillance infrastructure

• Sense of urgency
  – What strategies to use
  – The resources needed
# Burden of Disease

<table>
<thead>
<tr>
<th>Reporting Organization</th>
<th>Source</th>
<th>CRS Cases per Year (without control interventions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAHO</td>
<td>David Salisbury TAG 1997</td>
<td>20,000 Latin America and Caribbean</td>
</tr>
<tr>
<td>WHO</td>
<td>Cutts &amp; Vynnycky Int J. Epi 1999;28:1176-84</td>
<td>16,000 (4,500-36,000) Latin America and Caribbean</td>
</tr>
<tr>
<td>WHO</td>
<td>Cutts &amp; Vynnycky Int J. Epi 1999;28:1176-84</td>
<td>110,000 Worldwide</td>
</tr>
<tr>
<td>Country</td>
<td>Birth Cohort</td>
<td>Methodology</td>
</tr>
<tr>
<td>-------------------</td>
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<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Costa Rica 2001</strong></td>
<td>1996-2000 (&lt;1 year)</td>
<td>Review of clinical histories and lab registries</td>
</tr>
<tr>
<td><strong>El Salvador 2003</strong></td>
<td>1997-2002 (&lt;12 years)</td>
<td>Clinical review: Records hospitalized</td>
</tr>
</tbody>
</table>
Cataract, High Myopia, Deafness severe

Sensorineural, profound Deafness

CRS with Autism, Mental retardation

Is rubella a public health problem?

Infant with CRS Age 3 days

Congenital Glaucoma

Photos: Louis Z. Cooper, MD
Caribbean Community Establishes Rubella Elimination Goal

Resolution on the Elimination of Rubella

The Council for Human and Social Development:

Recognizing the importance of human resources to the continued development of the Caribbean Community;

Conscious that rubella in pregnancy gives rise to miscarriage and stillbirths while Congenital Rubella Syndrome gives rise to children with severe birth defects such as congenital heart disease, cataracts, deafness, mental retardation and microcephaly;

Further conscious of the continued transmission of rubella resulting in cases of Congenital Rubella Syndrome within the community with the concomitant costs for the care and rehabilitation of children with Congenital Rubella Syndrome;

Aware that cost-benefit studies in several Caribbean countries clearly indicate that the investment in Rubella elimination will bring tangible benefits within five years, given the high cost of care and rehabilitation of children with Congenital Rubella Syndrome;

Noting that, should an elimination program not be implemented, there could be a substantial number of cases of Congenital Rubella Syndrome over a 15-year period;

Further noting that the cost of the elimination program is estimated at seven per cent of the cost of providing care and rehabilitation for those cases;

Resolves that every effort will be made to eliminate Rubella and prevent the occurrence of new cases of Congenital Rubella Syndrome in the Caribbean Community by the end of the year 2000;

Urges PAHO to coordinate the mobilization of resources and technical support toward this end.

Kingston, Jamaica
21 April 1998
RUBELLA CASES AND INCIDENCE RATES*

English Speaking Caribbean & Suriname
1982- 2007

* Rate/100,000 population

Source: CAREC/PAHO
✓ PAHO estimated that rubella elimination initiative in LAC would be prevented over a 15-year period: 112,500 CRS cases (1)

✓ The benefit-cost ratio was estimated 10:1 - 12:1

✓ The cost-effectiveness of the mass campaigns was estimated to average $2900 per case of CRS prevented.


### Costs of Measles and Rubella Vaccination (US$)

<table>
<thead>
<tr>
<th>Unit cost for vaccine*</th>
<th>Unit cost for syringe*</th>
<th>Unit cost for operation</th>
<th>Total cost of vaccination</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.51 MR</td>
<td>$0.04</td>
<td>$0.55</td>
<td>$1.10</td>
</tr>
</tbody>
</table>

*Costs based on vaccines 10-dose vials and 1cc 25G x 5/8” syringe*
**Interruption of Rubella/CRS Transmission in the Americas**

**CONTROL**
- Introduction of the rubella vaccine: 1997

**ACCELERATED CONTROL**
- Mass MR vaccination campaigns in women only or all adults: 1999

**ELIMINATION**
- Mass MR vaccination campaign in all adults: 2003

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**2003 & 2006 Directing Council Rubella Resolutions**

 Calls Member States to:

(g) “eliminate rubella and congenital rubella syndrome from their countries by the year 2010”

44th DC, September 2003

(a) “implement policies and operational strategies to meet the rubella and CRS elimination target by 2010”

47th DC, September 2006
Definitions of Elimination

**Definition of Measles Elimination**
Interruption of endemic measles virus transmission in all the countries of the Americas for $\geq 12$ months, in the presence of high-quality surveillance.

**Definition of Rubella Elimination**
Interruption of endemic rubella virus transmission in all the countries of the Americas for $\geq 12$ months without the occurrence of CRS cases associated with endemic transmission, in the presence of high-quality surveillance.

Elimination Strategies

- Accelerate the implementation of vaccination strategies
- Integration of measles/rubella surveillance
- Implement CRS surveillance system
- Viral detection and isolation
## Alignment of Measles and Rubella Elimination Strategies

<table>
<thead>
<tr>
<th>Vaccination</th>
<th>Surveillance</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Catch-up” campaign; children aged 1 to 14 years.</td>
<td>1. Integrated measles/rubella surveillance</td>
</tr>
<tr>
<td>“Keep-up” to maintain coverage ≥95% in the routine program; children aged 1 year.</td>
<td>2. CRS surveillance</td>
</tr>
<tr>
<td>“Follow-up” campaign; preschool-aged children</td>
<td>3. Laboratory activities</td>
</tr>
<tr>
<td>Introduction of MMR or MR in <strong>routine</strong> program; children aged 1 year.</td>
<td>• Serological diagnosis</td>
</tr>
<tr>
<td>“Speed-up” campaign in adolescents and adults.</td>
<td>• Viral detection/isolation</td>
</tr>
</tbody>
</table>

(The age group of men and women to be vaccinated depends on the year of vaccine introduction, follow-up campaigns, epidemiology, and fertility rates in the countries.)
Adolescent and Adult Rubella Vaccination (“Speed-up”) Campaigns, The Americas*

The commitment of the countries to conduct “speed-up” campaigns ultimately prevented the reestablishment of endemic measles virus transmission in the Region.

Source: Country reports to FCH/IM.
* Includes rubella and measles cases reported to PAHO as of epidemiological week 39/2010.
**Countries that implemented “speed-up” campaigns (1st phase) in women only.
Campaign Characteristics

1. Nontraditional groups vaccinated
   - Adolescents and adults: men and women

2. Large proportion of population to be vaccinated
   - Range of 40-70% of total population

3. Broad and timely social mobilization
   - Political commitment and partner participation at all levels

4. Detailed plans of action monitored in the field
   - Requires 100% coverage (total immunity)

5. Short time period
   - Intense: 6 weeks
High Political Commitment and Participation

President launching campaign

[Image of a conference setting with individuals standing and seated, a flag, and a table with microphones and papers.]

[Image of a newspaper clipping with a table titled "Los 100 días bajo la luna de Lima." The table includes columns for socioeconomic level and sex, with a highlighted row under "La vacuna contra la rubéola" (The vaccine against measles).]
Rubella Elimination in the Americas, 1982-2011

>36 months with no endemic rubella cases in the Region.

Beginning in 2001, over a 15 year period the rubella and CRS initiative will have saved an estimated US $3 B by preventing more than 112,500 CRS cases in Latin America and the Caribbean.

Source: Country reports to PAHO/WHO.
Routine MCV1 Coverage, Measles-Rubella Elimination Campaigns and Confirmed Rubella Cases, Chile, 1997-2009*

Catch-up, 1992
9m-14 yrs
MCV (99%)

MMR introduction:
1990

Speed-up campaign
19-29yr
Men only
MR
93%

Follow-up campaign
1-5yr
MR
93%

Follow-up campaign
1-4yr
M
99%

Speed-up campaign
10-29yr
women only
R
98%

Catch-up, 1992
9m-14 yrs
MCV (99%)

*Data until EW 52/2009.
Source: Country reports to PAHO.

Outbreaks in male populations!!!
Rubella Vaccination in Women Unknowingly Pregnant during Campaigns in Select Countries of the Americas, 2001-2006

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of Vaccinated Women</th>
<th>Number of Reported pregnant women who were vaccinated</th>
<th>Number of Susceptible pregnant Women</th>
<th>Number of Births with follow-up</th>
<th>Number of Infants with Infection Only (IgM+)</th>
<th>Number of infants with CRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argentina</td>
<td>6,718,314</td>
<td>476</td>
<td>20</td>
<td>19</td>
<td>2* (11.7%)</td>
<td>0</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>800,000</td>
<td>3,810</td>
<td>163</td>
<td>104</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Brazil</td>
<td>26,361,761</td>
<td>22,708</td>
<td>2,332</td>
<td>1,647</td>
<td>66 (4.0%)</td>
<td>0</td>
</tr>
<tr>
<td>El Salvador</td>
<td>1,400,000</td>
<td>909</td>
<td>59</td>
<td>54</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ecuador</td>
<td>2,400,000</td>
<td>1,291</td>
<td>172</td>
<td>43</td>
<td>2 (5%)</td>
<td>0</td>
</tr>
<tr>
<td>Paraguay</td>
<td>1,862,178</td>
<td>945</td>
<td>238</td>
<td>215</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>39,542,253</strong></td>
<td><strong>30,139</strong></td>
<td><strong>2,894</strong></td>
<td><strong>1,980</strong></td>
<td><strong>70 (3.5%)</strong></td>
<td><strong>0</strong></td>
</tr>
</tbody>
</table>

*In Argentina, out of 19 births with follow-up, only samples from 17 infants were processed for IgM.

**Source:** Country reports.
Rubella - Measles Reporting Network

✓ 30,000 reporting sites, target was to have at least one per 100,000 population integrated for measles and rubella surveillance

✓ 148 sub-national, national, and regional laboratories

✓ 14 PAHO field epidemiologists in priority countries

✓ Case-based community surveillance with data flow to Regional office

✓ MESS & ISIS computer software
On going support to strengthen measles/rubella surveillance system Indicators, Region of the Americas, 2007-2011

Source: Country reports to PAHO.
CRS Surveillance among Infants < 1 year of age

Infant born to a mother with history of suspect or confirmed rubella during pregnancy

or

Infant born with anomalies compatible with CRS (congenital cataracts, heart defects, purpura, or deafness)

Health worker suspects CRS

Adequate blood sample collected?

No

Clinically Confirmed*

Yes

IgM Positive

Lab Confirmed CRS

IgM Negative

Discarded

*IgM Positive

IgM Negative

Discarded

* Based on clinical data (Surveillance FAILURE)
What is the entry point into the surveillance system?

- Low birth weight
- TORCH
- “Red eye” reflection
- Hearing screening
- Congenital infection clinic
Suspected and confirmed CRS cases reported by countries. Region of the Americas, 2007-2009*

<table>
<thead>
<tr>
<th>Year</th>
<th>New Cases</th>
<th>Reported by</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>8</td>
<td>4 countries</td>
<td>51%</td>
</tr>
<tr>
<td>2008</td>
<td>3</td>
<td>4 countries</td>
<td>13%</td>
</tr>
<tr>
<td>2009</td>
<td>3</td>
<td>4 countries</td>
<td>8%</td>
</tr>
</tbody>
</table>

Source: Country reports

*Data as of EW 47/2009

** Countries with rubella outbreaks
Distribution of rubella genotypes
Americas 1985 - 2009*

1C (only in Americas)
1E y 1g (associated to imported case)

Source: CDC, Fiocruz, PAHO
Road Map for the Documentation of Measles and Rubella Elimination, 2009-2012

- Presentation of the plan of action during the XVIII Technical Advisory Group (TAG) Meeting
- Form national commissions and prepare the national plan of action
- Compile and analyze evidence from the countries
- Meeting of the International Committee of Experts
- Review of the evidence by the International Committee of Experts
- Presentation of the final analysis by the PAHO Directing Council

- 2009
- 2009-2010
- 2009-2011
- 2010
- 2010-2011
- 2012
Partners for Rubella and CRS Elimination
Summary (1)

- Identify CRS as a public health problem and use it in key advocacy efforts.

- The introduction of the rubella vaccine in the routine program should be accompanied by accelerated control strategies, vaccinating adolescents and adults.

- The availability of an efficacious and affordable combination vaccine provides an opportunity to integrate measles and rubella elimination activities.

- Each country should determine the group of adolescents and adults to vaccinate and monitor that the cohorts aged 1-40 years have received a measles-rubella containing vaccine.

- Permanent risk of virus importations from other regions.
Integration of measles and rubella surveillance is possible

Achieve performance indicators to ensure quality

Increase suspicion of CRS cases by detecting alerts at the primary care level

A genotype baseline map of viruses found in each country should be developed.
Thank you

www.paho.org/immunization
Initial strategies of Rubella/CRS control in the Americas

Rubella cases by age group
Chile, 1989 y 1998

Source: MoH
Recommendations of the Technical Advisory Group (TAG) of the Americas Vaccination Strategies to Rubella Control

• **Rubella control:**
  – incorporate rubella-containing vaccine into childhood vaccination programs.
  – reduce the number of rubella susceptible women of childbearing age through targeted efforts (i.e. post-partum immunization; immunization in family planning clinics, schools and in the workplace).

• **Accelerated control:**
  – conduct a one time mass campaign to vaccinate **all females 5-39 years** of age with MR vaccine **to prevent and control CRS**.
  – conduct a one time mass campaign to vaccinate **BOTH males and females 5-39 years** of age with measles and rubella containing vaccine **to prevent and control both rubella and CRS**.
Reported Measles and Rubella Cases during the Measles Pre-Elimination Era, The Americas

Rubella cases
The Americas, 1998
1 dot = 1 case

Source: Country reports
Vaccination strategies and changes in rubella incidence (x100,000) by age group. Costa Rica, 1977-2001

Source: Ministry of Health
### CRS Incidence by 1,000 Live Births Prior to Vaccine Introduction in Selected Countries

<table>
<thead>
<tr>
<th>Country</th>
<th>CRS Incidence</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil</td>
<td>0.6, 4.3</td>
<td>2000-1 Outbreak during peak months</td>
</tr>
<tr>
<td>Baja California</td>
<td>4.1</td>
<td>1998</td>
</tr>
<tr>
<td>Jamaica</td>
<td>0.4</td>
<td>1995 Outbreak</td>
</tr>
<tr>
<td>Panama</td>
<td>2.2</td>
<td>1986-87</td>
</tr>
<tr>
<td>Trinidad y Tobago</td>
<td>0.6</td>
<td>1982-83</td>
</tr>
</tbody>
</table>

Cost-Benefit of the Implementation of Accelerated Rubella Control English-speaking Caribbean

1997 to 2012 without prevention would expect 1500 cases with spending in care and rehabilitation in 15 years for estimated US$ 60 millions.

Does not include indirect costs.

The Interruption Strategy will cost estimated US$ 4.5 millions.

Source: CAREC
Incidência da Rubéola por Faixa Etária e Sexo

Masculino, Brasil, 1997 - 2011*

Estimativa de pessoas desatualizadas (%) por faixa etária e gênero, Brasil, 2007

2008 campanha brasileira almejou vacinar 20-39 anos de ambos os gêneros.