Global Health Consortium (GHC)
INTERNATIONAL GLOBAL HEALTH CONFERENCE
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“Measles: a Global and Regional Threat”

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Regional Immunization Advisor
OPS/WHO Washington
Outline

❖ Global measles situation
❖ Main challenges of the post-elimination era in the Americas
❖ Conclusions
❖ Next steps
Measles virus

- Morbillivirus, Paramyxoviridae family.

The number of people that one sick person will infect (on average) is called $R_0$. Here are the maximum $R_0$ values for a few viruses:

- Hepatitis C (2)
- Ebola (2)
- HIV (4)
- SARS (4)
- Mumps (10)
- Measles (18)

EBOLA

3 feet

MEASLES

6 feet

Notes: Based on data received 2018-05 - Data Source: IVB Database - This is surveillance data, hence for the last month(s), the data may be incomplete.
Number and measles incidence rate per million

Top 10**

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>41041</td>
<td>30.99</td>
</tr>
<tr>
<td>Ukraine</td>
<td>13446</td>
<td>302.57</td>
</tr>
<tr>
<td>Nigeria</td>
<td>9315</td>
<td>50.08</td>
</tr>
<tr>
<td>Indonesia</td>
<td>6978</td>
<td>26.72</td>
</tr>
<tr>
<td>Philippines</td>
<td>6312</td>
<td>61.09</td>
</tr>
<tr>
<td>Pakistan</td>
<td>5982</td>
<td>30.96</td>
</tr>
<tr>
<td>China</td>
<td>4984</td>
<td>3.55</td>
</tr>
<tr>
<td>Italy</td>
<td>4450</td>
<td>74.88</td>
</tr>
<tr>
<td>Serbia</td>
<td>4349</td>
<td>493.08</td>
</tr>
<tr>
<td>DR Congo</td>
<td>3684</td>
<td>46.79</td>
</tr>
</tbody>
</table>

Other countries with high incidence rates***

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greece</td>
<td>2400</td>
<td>214.60</td>
</tr>
<tr>
<td>Liberia</td>
<td>892</td>
<td>193.33</td>
</tr>
<tr>
<td>Romania</td>
<td>3242</td>
<td>163.92</td>
</tr>
<tr>
<td>Georgia</td>
<td>538</td>
<td>137.06</td>
</tr>
<tr>
<td>Yemen</td>
<td>2449</td>
<td>88.78</td>
</tr>
<tr>
<td>Malaysia</td>
<td>2399</td>
<td>76.92</td>
</tr>
</tbody>
</table>

Measles cases from countries with known discrepancies between case-based and aggregate surveillance, as reported by country

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Cases</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>DR Congo</td>
<td>2017</td>
<td>45,165</td>
<td>SITUATION EPIDEMIOLOGIQUE DE LA ROUGEOLE EN RDC, Week of 27/3/2018</td>
</tr>
<tr>
<td>Somalia</td>
<td>2017</td>
<td>23,353</td>
<td>Somali EPI/POL Weekly Update Week 18, 2018</td>
</tr>
<tr>
<td></td>
<td>2018</td>
<td>5242</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Based on data received 2018-05 and covering the period between 2017-04 and 2018-03 - Incidence: Number of cases / population* * 100,000 - * World population prospects, 2017 revision - ** Countries with the highest number of cases for the period - *** Countries with the highest incidence rates (excluding those already listed in the table above)
Number of Reported Measles Cases. October 2017 – March 2018.

<table>
<thead>
<tr>
<th>Top 10*</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>Cases</td>
</tr>
<tr>
<td>India</td>
<td>15992</td>
</tr>
<tr>
<td>Ukraine</td>
<td>11653</td>
</tr>
<tr>
<td>Philippines</td>
<td>5502</td>
</tr>
<tr>
<td>Serbia</td>
<td>4344</td>
</tr>
<tr>
<td>Nigeria</td>
<td>3298</td>
</tr>
<tr>
<td>DR Congo</td>
<td>2376</td>
</tr>
<tr>
<td>Greece</td>
<td>2175</td>
</tr>
<tr>
<td>Pakistan</td>
<td>1933</td>
</tr>
<tr>
<td>China</td>
<td>1910</td>
</tr>
<tr>
<td>Indonesia</td>
<td>1866</td>
</tr>
</tbody>
</table>

Notes: Based on data received 2018-05 - Surveillance data from 2017-10 to 2018-03 - * Countries with highest number of cases for the period.
Measles case distribution (EUR), 2014-2018

Notes: Based on data received 2018-05 - Data Source: IVB Database
Number of measles cases in Europe, 2007-2017*

- Bulgaria: 24,410
- Francia: 19,997
- Ucrania: 14,079
- Kirguistán: 18,097
- Georgia: 11,060
- Rumania: 5,562
- Italia: 5,006
- Ukraine: 4,767

n=21,315 cases in 2017
15,335 cases (72%) in 3 countries

Source: WHO regional office of Europe
Measles case distribution (AFR), 2014-2018

Notes: Based on data received 2018-05 - Data Source: IVB Database
DRC has experienced a nationwide epidemic that has affected all Provinces, however, only a small proportion of the measles cases in the IDSR aggregate reporting system are reflected in the case based data. As of 27 May 2013, South Sudan has reassigned to the Africa region (AFR) from the Eastern Mediterranean region (EMR). For data presentation and statistical purposes, South Sudan data is presented in AFR for all the years.
Measles case distribution (EMR), 2014-2018

Notes: Based on data received 2018-05 - Data Source: IVB Database
Measles case distribution (SEAR) (excl. India), 2014-2018

Notes: Based on data received 2018-05 - Data Source: IVB Database
Measles case distribution (SEAR, India), 2014-2018

Month of onset

Number of measles cases

Notes: Based on data received 2018-05 - Data Source: IVB Database
Measles cases: India 2016 - 2018

India age distribution, vaccination status, and incidence, 2017-04 to 2018-03

Number of cases

- <1 year
- 1-4 years
- 5-9 years
- 10-14 years
- 15-24 years
- 25-39 years
- 40+ years

Incidence rate per 1,000,000

- 0 doses
- 1 dose
- 2+ doses
- Unknown

Year | Confirmed Cases
--- | ---
2014 | 80306
2015 | 83026
2016 | 70798
2017 | 56302
2018 | 7645
Distribution of measles genotypes
(April 2017 – March 2018)

Notes: Data Source: MeaNS database (Genotypes) and IVB Database (Incidence) as of 2018-05-09 and covering the period 2017-04-01 to 2018-03-31 - Pie charts proportional to the number of sequenced viruses
Outline

- Global measles situation
- Main challenges of post-elimination era in the Americas
- Conclusions
Distribution of confirmed measles cases by countries. The Americas 2017-2018*.

Sources: Surveillance country reports sent to the Immunization Unit of PAHO/WHO and by the Ministry of Popular Power of Venezuela. *Data as of May 11, 2018
Measles outbreaks in the post elimination era. The Americas, 2003-2018*

Sources: Surveillance country reports sent to the Immunization Unit of PAHO/WHO and by the Ministry of Popular Power of Venezuela. *Data as of May 11, 2018
Reported measles cases by EW of rash onset. Venezuela. EW 26 of 2017 to EW 12 of 2018

Source: Venezuela Ministry of Popular Power for Health. Data reproduced by PAHO/WHO
Measles epidemiological situation in Venezuela, 2017 - 2018

- 15 year without endemic cases
- Index case detected at Caroní, Bolívar with DRO: July 1, 2017
- 10 months of viral circulation
- 2 deaths in children Bolívar.
- Genotype D8, imported from other regions of the world.
- No source of infection was identified
Distribution of measles cases in Venezuela. EW-16 2018

Fuente: Datos del Ministerio del Poder Popular para la Salud de Venezuela y reproducidos por la OPS/OMS.
Incidence rate and percentage of cases by age group. Venezuela, 2017-2018*
Distribution of measles cases in Brazil EW-16 2018

Fecha de inicio del exantema

Enero | Febrero | Marzo | Abril

Caso confirmado  | Caso sospechoso

Fuente: Datos publicados por el Ministerio de Salud de Brasil y reproducidos por la OPS/OMS.
<table>
<thead>
<tr>
<th>Faixa etária</th>
<th>Brasileiros</th>
<th>Venezuelanos</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Confirmados</td>
<td>Confirmados</td>
</tr>
<tr>
<td></td>
<td>(n) (%)</td>
<td>(n) (%)</td>
</tr>
<tr>
<td></td>
<td>Em investigação</td>
<td>Em investigação</td>
</tr>
<tr>
<td>&lt; 1</td>
<td>9 (37,5%)</td>
<td>10 (18,2%)</td>
</tr>
<tr>
<td></td>
<td>36 (32,4%)</td>
<td>23 (23,2%)</td>
</tr>
<tr>
<td>1 - 4</td>
<td>5 (20,8%)</td>
<td>14 (25,5%)</td>
</tr>
<tr>
<td></td>
<td>41 (36,9%)</td>
<td>25 (25,3%)</td>
</tr>
<tr>
<td>5 - 9</td>
<td>1 (4,2%)</td>
<td>15 (27,3%)</td>
</tr>
<tr>
<td></td>
<td>4 (3,6%)</td>
<td>20 (20,2%)</td>
</tr>
<tr>
<td>10 - 14</td>
<td>- (0%)</td>
<td>6 (10,9%)</td>
</tr>
<tr>
<td></td>
<td>- (0%)</td>
<td>11 (11,1%)</td>
</tr>
<tr>
<td>15 - 19</td>
<td>3 (13%)</td>
<td>3 (5,5%)</td>
</tr>
<tr>
<td></td>
<td>10 (9,0%)</td>
<td>2 (2,0%)</td>
</tr>
<tr>
<td>20 - 29</td>
<td>2 (8,3%)</td>
<td>7 (12,7%)</td>
</tr>
<tr>
<td></td>
<td>4 (3,6%)</td>
<td>11 (11,1%)</td>
</tr>
<tr>
<td>30 - 39</td>
<td>4 (16,7%)</td>
<td>- (0%)</td>
</tr>
<tr>
<td></td>
<td>7 (6,3%)</td>
<td>5 (5,1%)</td>
</tr>
<tr>
<td>40 - 49</td>
<td>- (0%)</td>
<td>- (0%)</td>
</tr>
<tr>
<td></td>
<td>5 (4,5%)</td>
<td>1 (1,0%)</td>
</tr>
<tr>
<td>50 - 59</td>
<td>- (0%)</td>
<td>- (0%)</td>
</tr>
<tr>
<td></td>
<td>1 (0,9%)</td>
<td>1 (1,0%)</td>
</tr>
<tr>
<td>≥ 60</td>
<td>- (0%)</td>
<td>- (0%)</td>
</tr>
<tr>
<td></td>
<td>- (0%)</td>
<td>- (0%)</td>
</tr>
</tbody>
</table>

**Mediana 12 anos (3 meses a 35 anos)**

Não foram contabilizados na análise: a) 01 caso de nacionalidade da Guiana Inglesa; b) 01 caso de nacionalidade da Guiana Inglesa e 05 casos sem informação.
BRAZIL: Vaccination campaign to halt measles outbreak
GOAL: 400,000 individuals aged 6mo-59yr in 15 municipalities, March-April, 2018
Challenges in vaccination coverage

1. Improve national MMR1 and MMR2 vaccination coverage.
2. Increase homogeneity at the municipality level to reach the goal of =>95%.
3. Improve data quality of vaccination coverage at the municipality level.
4. Push forward to nominal immunization registry.
5. Implement high-quality follow up campaigns.
MMR1 vaccination coverage in children 1 year of age
The Americas, 2016

MMR2 vaccination coverage in children
The Americas, 2016

Proportion of municipalities with different MMR1 coverage levels in children 1 year* of age. Latin America and the Caribbean, 2006-2016

Source: Country reports through the PAHO-WHO/UNICEF Joint Reporting Form (JRF).

*Haiti administered MR vaccine to children <12 months.
Challenges in epidemiological surveillance

Improve detection:

- Virus importations from other regions of the world
- Arboviruses diseases in the Americas
- Use of sensitive and specific case definitions
- Health care workers do not recognize clinical aspects of measles, rubella and CRS
Rate of suspected measles and rubella cases per 100,000 inhabitants, 2017.

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

- Based on data received 2018-02 and covering the period between 2017-01 and 2017-12 - Target: >= 2 discarded cases* / 100,000 population** - * Suspected cases investigated and discarded as non-measles non-rubella using laboratory testing and/or epidemiological linkage to another etiology ** World population prospects, 2017 revision
Regional rate of suspected measles and rubella cases
Latin America and the Caribbean, 2005-2017

Sources: Surveillance country reports sent to the Immunization Unit of PAHO/WHO
Notification of suspected measles and rubella cases, Latin America and the Caribbean, epidemiological weeks 1-16 of 2017 and 2018*

Source: MESS, ISIS, and country reports sent to FPL-IM
*Data as of epidemiological week 16, 2018.
Challenges in rapid response

1. Rapid Response teams activated at national and subnational level

2. HCW training for rapid detection and investigation.

3. Cases and contacts tracing to stop transmission.

4. Health services organized for triage and isolation of measles highly suspected cases.

5. Vaccination activities have to be done to prevent the virus, not to go beyond it.
Confirmed measles cases following source of infection
The Americas, 2011-2018*

N=5,475

14% 46% 41%

Imported Import-related Unknown

Confirmed measles cases

Source: MESS, ISIS, and country reports sent to FPL-IM
*Data as of epidemiological week 18, 2018.
PAHO Regional Meeting and Rapid Response to Measles Imported Cases Workshops

- **2017:**
  - Regional Meeting and two Sub regional Workshops for rapid Response to measles imported cases.

- **2018:**
  - 7 National workshops in 6 countries: DOR, CUB, GUT, PER, BOL, ECU.
  - **July/August 2018:**
    - 1 Sub Regional English Caribbean
    - 1 National: HON
¿Dónde y de quién se ha contagiado?
- Identificación del periodo de exposición/incubación
- Contactos directos e indirectos
- Lugares visitados
- Transporte utilizado

Periodo de exposición/incubación
7 a 21 días entre la exposición y inicio de exantema

¿A quién y dónde contagió?
- Identificación del periodo de transmisibilidad
- Contactos directos e indirectos
- Identificación de las rutas del caso
- Lugares visitados
- Transporte utilizado

Periodo de transmisibilidad
4 días antes y 4 después de inicio de exantema

¿Cómo identificar los casos secundarios?
- Identificación del periodo de aparición de casos secundarios del caso índice
- Seguimiento de todos los contactos que presenten fiebre y erupción

Periodo de aparición de casos secundarios
7 días después del primer día del periodo de transmisibilidad hasta 21 días después del último día del periodo de transmisibilidad

Detecting suspect measles/rubella cases
Case and contact tracing to stop measles virus transmission
Distribution of confirmed measles cases by country Latin America and the Caribbean, 2013-2018*

Sources: Surveillance country reports sent to the Immunization Unit of PAHO/WHO
*Data as of epidemiological week 18, 2018.
<table>
<thead>
<tr>
<th>Signos y síntomas</th>
<th>Dengue</th>
<th>Chikingunya</th>
<th>Zika</th>
<th>Sarampión</th>
<th>Rubéola (c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiebre</td>
<td>Indispensable</td>
<td>Indispensable</td>
<td>Puede aparecer</td>
<td>Indispensable</td>
<td>Indispensable</td>
</tr>
<tr>
<td>Exantema maculopapular</td>
<td>Frecuente</td>
<td>Frecuente</td>
<td>Indispensable</td>
<td>Indispensable</td>
<td>Indispensable</td>
</tr>
</tbody>
</table>
| Hiperemia conjuntival                         | Puede aparecer  | Puede aparecer
d| Frecuente                              | Frecuente       | Puede aparecer |
| Mialgia                                       | Frecuente       | Frecuente       | Puede aparecer           | Ausente         | Ausente    |
| Artralgia y/o poliartralgia para arbovirosis | Frecuente       | Indispensable   | Frecuente                | Ausente         | Puede aparecer |
| Edema en manos y pies                         | Puede aparecer  | Frecuente       | Frecuente                | Ausente         | Ausente    |
| Dolor retroocular                             | Frecuente       | Puede aparecer  | Ausente                  | Ausente         | Ausente    |
| Linfadenopatía                                | Ausente         | Puede aparecer
d| Retro auricular                        | Ausente         | Frecuente |
| Tos                                           | Ausente         | Ausente         | Ausente                  | Frecuente       | Ausente    |
| Coriza                                        | Ausente         | Ausente         | Ausente                  | Frecuente       | Puede aparecer |
| Hemorragia                                    | Puede aparecer
e| Ausente         | Ausente                  | Ausente         | Ausente    |
| Leucopenia                                    | Frecuente       | Puede aparecer  | Puede aparecer           | Puede aparecer  | Puede aparecer |
Maculopapular rash due to Zika virus infection

Photo credit: Health Secretariat of Ceará, Brazil
Outline

❖ Global measles situation
❖ Main challenges of post-elimination era in the Americas
❖ **Conclusions**
❖ Next steps
Conclusions

❖ Risk: Import and reestablish endemic transmission of measles and rubella virus, losing the elimination gains.
❖ Challenge: Maintain the adequate equilibrium towards the fulfillment of three key strategies:

1. Guarantee high (=> 95%) and homogeneous coverage with two doses of MMR vaccine, in each district or municipality.

2. Guarantee a high quality surveillance system, with the ability to detect any suspected case of measles, rubella and CRS in a timely manner.

3. Implement a rapid response to imported cases of measles, rubella and CRS, following standardized mechanisms to prevent the reestablishment of endemic transmission.
Outline

❖ Global measles situation
❖ Main challenges of post-elimination era in the Americas
❖ Conclusions
❖ Next steps
TAG Working Group: Sustainability of Elimination

• Monitoring the sustainability of the elimination by tracking progress towards the fulfillment of the objectives and indicators of the plan of action.

• Developing a **regional framework**, with new rules of the game, and the actions to take in the event of the reestablishment of endemic transmission.

- **Resolution to eliminate measles by 2000**
- **Last endemic measles case**
- **Last endemic rubella and CRS case**
- **PoA for Documentation and Verification of elimination**
- **Certification of rubella and measles elimination**
- **Plan of Action for the sustainability of elimination**
- **Regional Framework**
- **Regional report**

Date:
- 1994
- 2002
- 2009
- 2011
- 2015
- 2016
- 2017
- 2018
- 2023
Ministries of Health of the Americas pledge action to keep the region free of measles and rubella

During the 29th Pan American Sanitary Conference, Ministers of health from the countries of the Americas approved a plan to keep the region free of measles, rubella, and congenital rubella syndrome (CRS) for the period 2018-2023. This plan of action lays out four strategic lines of action to follow in order to sustain the elimination: guarantee universal access to measles and rubella vaccination services; strengthen the capacity of epidemiological surveillance; develop national operational capacities to maintain the elimination; and establish standard mechanisms for rapid response to imported cases.
Gracias!
Thanks!
dpastor@paho.org
Distribution of confirmed measles cases by country
The Americas, 2011-2018*

Sources: Surveillance country reports sent to the Immunization Unit of PAHO/WHO
*Data as of epidemiological week 18, 2018.