Measles, Rubella and Congenital Surveillance in the Era of Elimination (including WHO verification framework)

Dr. Anna Clarke, HSE Eastern region
Dr. Suzanne Cotter, HSE HPSC
Scope of Presentation

• Measles and Rubella Elimination
  – Verification framework (WHO)
  – Criteria and performance indicators
• Current Irish epidemiological situation
• Performance monitoring
• Strengthening surveillance and control
  – Case investigation, contact tracing
  – Laboratory diagnosis/genotyping
  – Demonstrate immunity > 95%
Number of measles deaths (thousands) globally 2000-2010

In 2010, World Health Assembly committed to reduce measles deaths by 95% of the 2000 levels by 2015.

535,300 deaths in 2000

139,300 deaths in 2010
WHO Measles and Rubella Strategic plan 2012-2015

– Elimination of measles and rubella in at least 5 WHO regions

– Guidance on framework to monitor progress and verify elimination (endorsed Nov 2012)
Measles Rubella Elimination Goals by WHO region

Note: 3 of 6 WHO regions have set control or elimination targets for rubella.
Definition of elimination:
“the absence of endemic measles transmission in a defined geographic region for ≥ 12 months in the presence of a well performing surveillance system”

- Absence of endemic **measles** and **rubella** cases in all Member States,
  - resulting from complete interruption of endemic virus transmission, and
  - in the presence of high quality surveillance for a period of at least 3 years from the last known case
- Demonstrated ≥95% of **all population** is protected against measles and rubella
WHO Targets

- At least 95% coverage annually with both MMR1 and MMR2 in all areas and at national level.

- Less than 1 measles/rubella case per million population, excluding imported cases.

MCV - Measles containing vaccine
RCV – Rubella containing vaccine
WHO Indicators

- Vaccination coverage of MMR1, MMR2 whether delivered through routine or SIA*, as per national schedule

- Measles and rubella incidence (laboratory confirmed, epidemiologically-linked and clinical cases)

*SIA= supplementary immunization activity
Progress in MMR1 vaccination uptake at 24 months of age, 1999-2012

D3 = 3 doses Diphtheria containing vaccine
MMR1 = 1 dose Measles, Mumps Rubella vaccine
MMR1 uptake by LHO, 24 months of age, Q3 2012

% Immunisation Uptake
- 0 - 79
- 80 - 84
- 85 - 89
- 90 - 94
- 95 - 100
- No Data

HSE VPD training 18/04/2013
HSE school booster (MMR2, 4 in 1) uptake at 4-5 years of age, by region, 2012*

*HSE Schools programme only academic year 2011-2012

HSE VPD training 18/04/2013
Population immunity through analysis of MR vaccinated population cohorts

Immunization coverage (≥95%)

– Administrative reports
  • MMR1 and MMR2, SIA*

– Rapid coverage monitoring and survey
  • national and sub national levels

– Historic data
  • year of vaccine introduction, changes in vaccination strategies/calendar, coverage

– Additional information sources
  • specific population groups, vaccination dropout rate, modelling accumulation of susceptible,... to triangulate data

*SIA- Supplementary immunisation activity
Indicators

- Vaccination coverage of MMR1, MMR2 whether delivered through routine or SIA, as per national schedule

- Measles and rubella incidence (laboratory confirmed, epidemiologically-linked and clinical cases)

*SIA= supplementary immunization activity*
Measles Notifications, 1948-2013*

*CIDR: up to 08/04/2013
Measles notifications, case classification, 2007-2012

New case definition 2012!

CIDR, as of 12/04/2013
Measles notifications, case classification, 2007-2012

New case definition 2012!

- Clinical only
- Clinical+epi-link
- Clinical+lab conf

Send all diagnostic samples to NVRL

CIDR, as of 12/04/2013
Measles notifications by MMR doses, 2012 (n=99)*

* CIDR, excludes children < 12 months (n=5)
Rubella notifications, Ireland (1948-2013*)

CIDR, as of 12/04/2013

HSE VPD training 18/04/2013
## Congenital Rubella Surveillance, Ireland 1989-2013*

<table>
<thead>
<tr>
<th>Year</th>
<th>Status</th>
<th>Mother nationality</th>
<th>Rubella vaccinated</th>
<th>Gestational age at infection</th>
<th>CRS manifestations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>Confirmed</td>
<td>Unk</td>
<td>Unk</td>
<td>Unk</td>
<td>Unk</td>
</tr>
<tr>
<td>1996</td>
<td>Confirmed</td>
<td>Non-national</td>
<td>Unk</td>
<td>2\textsuperscript{nd} month</td>
<td>Hearing, ophthalmic, neurological problems identified in 1\textsuperscript{st} month of life</td>
</tr>
<tr>
<td>1996</td>
<td>Confirmed</td>
<td>Unk</td>
<td>Unk</td>
<td>Unk</td>
<td>Unk</td>
</tr>
<tr>
<td>2001</td>
<td>Unk</td>
<td>Unk</td>
<td>Unk</td>
<td>Unk</td>
<td>? stillborn</td>
</tr>
<tr>
<td>2004</td>
<td>Confirmed</td>
<td>Non-national</td>
<td>Not</td>
<td>4\textsuperscript{th} - 5\textsuperscript{th} month</td>
<td>Microcephaly Deafness Cranial calcifications</td>
</tr>
</tbody>
</table>

*as of 15/04/2013
Role of population sero-surveillance studies

• Serological surveillance
  – To determine population immunity to measles/rubella
  – To identify age/gender immunity
  – Used to target interventions
Measles sero-survey 2003 (ESEN2)

95% target

STD POS/EQI: Vaccine Coverage
Measles sero-survey 2003 (ESEN2)

Target group in 2009 school and university MMR campaign

95% target
Molecular epidemiology of measles and rubella viruses

• Part of surveillance critical for elimination, identify origin of the virus > endemic or imported?

• Linkage of clinical and epidemiological segments by unique case ID

• WHO laboratory network as source of information

• Genetic baseline with genotype map of viruses and follow-up on currently circulating viruses
Overall quality of measles and rubella surveillance

Surveillance performance indicators:

- Timeliness
- Completeness
- Lab confirmation rate
- Detection rate
- Chains of transmission/outbreaks with genotype data
- Source of infection
- Adequacy of investigation
Performance Indicators, Targets and Performance 2012-2015....
<table>
<thead>
<tr>
<th>WHO Indicator</th>
<th>WHO Target</th>
<th>Ireland 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timeliness reporting</td>
<td>≥80% reports by deadline</td>
<td>Yes</td>
</tr>
<tr>
<td>Completeness reporting</td>
<td>≥80% reports</td>
<td>Yes</td>
</tr>
<tr>
<td>% cases lab investigated</td>
<td>≥80% cases tested* in a proficient laboratory</td>
<td>38% cases tested</td>
</tr>
<tr>
<td>Rate of discarded cases</td>
<td>≥ 2 discarded cases/100 000 population nationwide in 80% of sub-national level</td>
<td>Unknown</td>
</tr>
<tr>
<td>Chains of outbreaks investigated for virus genotype</td>
<td>≥ 80% of lab-confirmed chains of transmission tested for virus detection</td>
<td>52% cases epi-linked</td>
</tr>
<tr>
<td>Origin of infection identified</td>
<td>≥80% cases with origin of infection identified</td>
<td>68% cases reported</td>
</tr>
<tr>
<td>Timeliness of investigation</td>
<td>≥ 80% suspected cases adequate investigation initiated within 48 hours notification</td>
<td>82% - date investigation reported; same day for most</td>
</tr>
</tbody>
</table>
Measles and Rubella Surveillance and Control - Recommendations

**IMPROVE:**
- MMR 1 and MMR2 uptake (> 95%)
- Diagnosis, investigation and reporting of rash illnesses
- Laboratory confirmation (≥ 80% cases)
- Timeliness & completeness of surveillance indicators

**IMPLEMENT:**
- Enhanced surveillance for rubella and CRI
- Activities to increase surveillance for CRI

**CONSIDER:**
- Role of measles and rubella sero-surveys
- Modelling of data
Summary

• Well established surveillance and control  
  – already in place
• Room for improvement in surveillance and control identified
• National Verification Committee established
• Documentation process begun
• But monitoring will continue
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