Evaluation of Austrian measles surveillance, 2009-2013

Yung-Ching Lin ¹,², Franz Allerberger ², Peter Kreidl ³, Daniela Schmid ²

1. The European Programme for Intervention Epidemiology Training (EPIET), European Centre for Disease Prevention and Control (ECDC)
2. Austrian Agency for Health and Food Safety (AGES)
3. Austrian Ministry of Health
Background I

• Measles elimination
  - Absence of endemic measles in a defined geographical area ≥ 12 months
  - By 2015 in European Region

• Strategies
  - ≥ 95% coverage with two doses of immunization
  - Provide vaccination opportunities and high quality, evidence-based immunization information
  - Surveillance systems with rigorous case investigation and laboratory confirmation
Background II

- Measles notifiable in Austria since 2002
- National web-based reporting since 2009
- Case definitions comply with ECDC definitions
Number of reported measles cases, Austria, 2009-2013

Number of measles outbreaks, Austria, 2009-2013

Median age: 18 years (range: 0-97)
Male:Female = 1.2:1

Size of outbreaks:
Median: 2.5 cases/outbreak
Range: 2-35 cases/outbreak
• **Aim**
  - To identify areas for improving measles surveillance in Austria

• **Objectives**
  - To evaluate the attributes of Austrian measles surveillance system
  - To assess the performance of Austrian measles surveillance system using WHO surveillance performance indicators
Methods I

• Data source: 415 reported case-records in Austrian national web-based reporting system, 2009-2013

• Attributes (CDC) and performance indicators (WHO)
  - Data completeness
  - Reporting timeliness
  - Laboratory investigations
  - Rate of discarded cases
  - Proportion of outbreaks investigated for virus genotypes
Methods II

- **Data completeness (vaccination status)**
  - Proportion of reported cases with complete vaccination status data

- **Reporting timeliness**
  - Proportion of reported cases reported by healthcare providers ≤1 days after clinical diagnosis
  - WHO target: ≥80%

- **Laboratory investigations**
  - Proportion of reported cases tested in laboratories
  - WHO target: ≥80%
Methods III

• Rate of discarded cases
  - Rates of reported cases discarded as non-measles cases using laboratory testing among general population
  - A proxy for sensitivity
  - WHO target: ≥2/100,000 population per year

• Proportion of outbreaks investigated for virus genotypes
  - Proportion of outbreaks investigated for virus genotypes
  - WHO target: ≥80%
Data completeness

Proportion of case-records with complete vaccination status data, Austria, 2009-2013 (n=415)
Proportion of reported cases with timely reporting, Austria, 2009-2013 (n=309)

WHO target: ≥80%
Laboratory investigation

Proportion of reported cases with laboratory investigation, Austria, 2009-2013 (n=345)

WHO target: ≥80%
Rate of discarded cases

Rate of discarded cases, Austria, 2009-2013

WHO target: ≥2/100,000
Outbreaks investigated for genotypes

Proportion of outbreaks investigated for genotypes, Austria, 2009-2013 (n=42)

Outbreaks investigated for virus genotype

WHO target: ≥80%

2009 (n=3) 2010 (n=7) 2011 (n=19) 2012 (n=3) 2013 (n=10)

67% 29% 47% 0% 70%
# Results summary

<table>
<thead>
<tr>
<th>Attributes/Indicators</th>
<th>WHO Target</th>
<th>Median (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data completeness</td>
<td>-</td>
<td>64% (43%-73%)</td>
</tr>
<tr>
<td>Reporting timeliness</td>
<td>≥80%</td>
<td>59% (46%-74%)</td>
</tr>
<tr>
<td>Laboratory investigation</td>
<td>≥80%</td>
<td>73% (56%-84%)</td>
</tr>
<tr>
<td>Rate of discarded cases</td>
<td>≥2/100,000</td>
<td>0.01/100,000 (0-0.04)</td>
</tr>
<tr>
<td>Outbreaks investigated for virus genotypes</td>
<td>≥80%</td>
<td>47% (0%-70%)</td>
</tr>
</tbody>
</table>
Roles of attributes/indicators

- Presenting Case-patient
- Healthcare Providers
- Local Public Health Office
- National Web-based Reporting System
- Primary Laboratory
- National Reference Center
- TESSy ECDC
- Reporting timeliness

Specimens
Roles of attributes/indicators

Presenting Case-patient

Healthcare Providers

Local Public Health Office

- Reporting timeliness
- Data completeness
- Rate of discarded cases

Specimens

Primary Laboratory

National Web-based Reporting System

Specimens

National Reference Center

TESSy

ECDC
Roles of attributes/indicators

Presenting Case-patient

- Healthcare Providers
  - Reporting timeliness

Local Public Health Office
  - Data completeness
  - Rate of discarded cases

National Web-based Reporting System

Primary Laboratory
  - Laboratory investigation
  - Genotyping for outbreaks

Specimens

TESSy
ECDC
Possible explanations I

• Reporting timeliness
  - Low acceptability of notification obligation among healthcare providers
  - Healthcare providers awaiting laboratory confirmation

• Rate of discarded cases
  - Under-reporting by healthcare providers or public health authorities
  - Under-utilization of medical resources by the public
Possible explanations II

- **Data completeness**
  - Unattainable data from healthcare providers and district public health authorities

- **Laboratory investigation and genotyping**
  - Specimen submission and laboratory result reporting among healthcare providers, primary laboratories and national reference center
Limitations

- Data validity not checked
  - 23 of 415 case-records with dates of report earlier than dates of diagnosis were excluded in reporting timeliness analysis
Conclusion

• In 2009-2013, none of the attributes/indicators of Austrian measles surveillance system met WHO targets sustainably

• Root causes of under-performance of the surveillance system need to be identified
Recommendations

• To conduct a knowledge/attitude/practice survey among healthcare providers and local public health authorities to understand reporting behavior

• To conduct a survey among primary laboratories and the national reference center on reporting behavior and specimen submission for genotyping
keinemasern.at • Was sind Masern? • Risiken von Masern • Die Impfung • FAQ

BUNDESMINISTERIUM FÜR GESUNDHEIT

WAS SIND MASERN?

DIE IMPFUNG

RISIKEN VON MASERN

FAQ

Impfstellen >
## Table

<table>
<thead>
<tr>
<th>Year (Number of reported cases)</th>
<th>Data completeness</th>
<th>Reporting timeliness</th>
<th>Laboratory investigation</th>
<th>Discarded cases</th>
<th>Outbreaks investigated for genotype</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009 (n=78)</td>
<td>47/78 (60%)</td>
<td>25/54 (46%)</td>
<td>29/52 (56%)</td>
<td>0.01/100,000</td>
<td>2/3 (67%)</td>
</tr>
<tr>
<td>2010 (n=69)</td>
<td>30/69 (43%)</td>
<td>30/51 (59%)</td>
<td>48/66 (73%)</td>
<td>0.04/100,000</td>
<td>2/7 (29%)</td>
</tr>
<tr>
<td>2011 (n=135)</td>
<td>99/135 (73%)</td>
<td>75/112 (67%)</td>
<td>98/117 (84%)</td>
<td>0/100,000</td>
<td>9/19 (47%)</td>
</tr>
<tr>
<td>2012 (n=37)</td>
<td>26/37 (70%)</td>
<td>17/31 (55%)</td>
<td>20/28 (71%)</td>
<td>0/100,000</td>
<td>0/3 (0%)</td>
</tr>
<tr>
<td>2013 (n=96)</td>
<td>61/96 (64%)</td>
<td>45/61 (74%)</td>
<td>63/82 (77%)</td>
<td>0.01/100,000</td>
<td>7/10 (70%)</td>
</tr>
<tr>
<td>WHO targets</td>
<td>-</td>
<td>≥80%</td>
<td>≥80%</td>
<td>≥2/100,000</td>
<td>≥80%</td>
</tr>
</tbody>
</table>
Number of outbreak and sporadic measles cases, Austria, 2009-2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Outbreak cases</th>
<th>Sporadic cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009 (n=59)</td>
<td>41</td>
<td>18</td>
</tr>
<tr>
<td>2010 (n=58)</td>
<td>19</td>
<td>39</td>
</tr>
<tr>
<td>2011 (n=120)</td>
<td>57</td>
<td>63</td>
</tr>
<tr>
<td>2012 (n=35)</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>2013 (n=76)</td>
<td>45</td>
<td>31</td>
</tr>
</tbody>
</table>
Data Completeness

• Data status of vaccination status, Austria, 2009-2013

Data status (%)

- Complete
- Unknown
- Missing

Year
- 2009: 60% Complete, 17% Unknown, 23% Missing
- 2010: 43% Complete, 14% Unknown, 42% Missing
- 2011: 73% Complete, 18% Unknown, 9% Missing
- 2012: 70% Complete, 30% Unknown, 0% Missing
- 2013: 64% Complete, 22% Unknown, 15% Missing
# Reporting Timeliness

• Data status of reporting timeliness, Austria, 2009-2013

<table>
<thead>
<tr>
<th></th>
<th>Valid dates</th>
<th>Diagnosis earlier than report</th>
<th>No diagnosis date</th>
<th>No report date</th>
<th>No diagnosis and report dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>54 (69%)</td>
<td>4 (5%)</td>
<td>1 (1%)</td>
<td>10 (13%)</td>
<td>9 (12%)</td>
</tr>
<tr>
<td>2010</td>
<td>51 (74%)</td>
<td>4 (6%)</td>
<td>11 (16%)</td>
<td>2 (3%)</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>2011</td>
<td>112 (83%)</td>
<td>6 (4%)</td>
<td>5 (4%)</td>
<td>12 (9%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>2012</td>
<td>31 (84%)</td>
<td>2 (5%)</td>
<td>2 (5%)</td>
<td>2 (5%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>2013</td>
<td>61 (64%)</td>
<td>7 (7%)</td>
<td>12 (13%)</td>
<td>13 (14%)</td>
<td>3 (3%)</td>
</tr>
<tr>
<td>Subtotal</td>
<td>309 (74%)</td>
<td>23 (6%)</td>
<td>31 (7%)</td>
<td>39 (9%)</td>
<td>13 (3%)</td>
</tr>
</tbody>
</table>