Factors for measles transmission in Kamwenge District, April-Aug 2015

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Kamwenge measles investigation
Measles outbreak (5+ suspected or 3 IgM +) in district within 30 days

Kamwenge measles investigation
Justification for Kamwenge Investigation

- Rwamwanja refugee settlement;
  - Popn: 57,473
  - <5 years: ~10,000
- Recent influx of refugees
- Close to Uganda-DRC border
Increasing number of suspected measles cases since March 2015

Kamwenge measles investigation
Objectives

- To identify risk factors for measles transmission
- To estimate the vaccination coverage
- To determine vaccine effectiveness
- To recommend control measures
Case definition

- **Probable case**: Onset of fever and generalized rash with at least one of the following:
  - Cough
  - Running nose
  - Conjunctivitis

- **Confirmed case**: Probable case with IgM (+)
Case finding

- Reviewed patient records at Biguli Health Center and Rwamwanja Health Center III
- Community case finding with the help of village health teams
Case count  30\textsuperscript{th}-Aug-15

<table>
<thead>
<tr>
<th>Case type</th>
<th>Number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probable</td>
<td>213</td>
</tr>
<tr>
<td>Confirmed</td>
<td>18</td>
</tr>
</tbody>
</table>
Epidermic curve shows sustained community transmission.

Kamwenge measles investigation
Males and females had similar attack rates

<table>
<thead>
<tr>
<th>Sex</th>
<th>Freq</th>
<th>Popn</th>
<th>AR/10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>111</td>
<td>205,802</td>
<td>5.4</td>
</tr>
<tr>
<td>Female</td>
<td>102</td>
<td>215,668</td>
<td>4.7</td>
</tr>
</tbody>
</table>
<5 yrs had highest attack rate
Attack rate highest in Biguli sub-county
Attack rate in refugees was 1.5 times higher than nationals.

<table>
<thead>
<tr>
<th>Nationality</th>
<th>Popn (2014)</th>
<th>AR/10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>National</td>
<td>381,734</td>
<td>4.6</td>
</tr>
<tr>
<td>Refugee</td>
<td>57,473</td>
<td>6.8</td>
</tr>
</tbody>
</table>
Hypothesis generation

- Interviewed 18 case-patients about risk factors
  - 9 case patients had visited health centers
  - 5 going to school
  - 4 going to church
- Observed patient waiting areas at health centers
Rwamwanja H/C III Out Patient Department
Hypotheses

- Attending health centers
- Going to church
- School
Case-control Study

- 50 cases
- 200 controls
- Matched by age and place of residence
- Collected risk factor info during effective exposure period (7-21 days before case-patient’s rash onset)
Exposure period estimation

Exposure period

Rash onset

21  14  7 days

Case

21  14

Control

Kamwenge measles investigation
# Attending Health Centers Significantly Associated with Disease

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Cases n=50</th>
<th>Controls n=200</th>
<th>OR&lt;sub&gt;M-H&lt;/sub&gt; (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visiting Health Centers</td>
<td>42</td>
<td>12</td>
<td>6.1 (2.7-14)</td>
</tr>
<tr>
<td>School</td>
<td>32</td>
<td>29</td>
<td>1.4 (0.52-4.0)</td>
</tr>
<tr>
<td>Church</td>
<td>58</td>
<td>64</td>
<td>0.69 (0.35-1.4)</td>
</tr>
<tr>
<td>Measles vaccine ≤2yrs</td>
<td>29</td>
<td>58</td>
<td>0.20 (0.06-0.65)</td>
</tr>
</tbody>
</table>
Estimation of Vaccine Effectiveness ≤2yrs

\[ VE = 1 - RR \]
\[ \approx 1 - OR \]
\[ = 1 - 0.20 \]
\[ = 0.80 \]
\[ = 80\% (95\%CI : 35 - 94\%) \]

Where:
- **VE** = Vaccine effectiveness
- **RR** = Relative risk of vaccinated vs. unvaccinated
- **OR** = Odds ratio (In rare disease OR \(\approx\) RR)
Estimation of Proportion of Popn Vaccinated ≤ 5 years using control-persons

<table>
<thead>
<tr>
<th>Age</th>
<th>Control-persons immunized (n)</th>
<th>Control-persons (n)</th>
<th>%</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤2</td>
<td>53</td>
<td>92</td>
<td>58</td>
<td>47-68</td>
</tr>
<tr>
<td>2-5</td>
<td>34</td>
<td>41</td>
<td>83</td>
<td>68-93</td>
</tr>
</tbody>
</table>
Conclusion

- Exposure to measles patients in crowded health centers along with low vaccination coverage and sub-optimal vaccine effectiveness propagated this outbreak
Recommended public health actions

- National Medical Stores should immediately distribute emergency vaccines
- Identify and immunize all susceptible children 6-59 months
- Change policy for measles vaccination schedule from 1 dose to 2 doses
- Triage all febrile and rash illnesses at health centers
Public health actions

- Quantified and coordinated vaccine delivery
- Triage system put in place
- School administration and pupils sensitized on early identification and referral
- Public awareness: treatment, immunization
Acknowledgements

- UNEPI
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  - Simba Soyekwo
- District Health Team
- Ministry of Health
- PHFP-Supervisors
  - Dr. Bao-Ping Zhu
  - Dr. Ario Alex