Measles in Orange County, 2015

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Measles in Orange County, 2015

- 35 cases
- 17 females
- Age range 9 months-70 years
- 14 children
- 4 hospitalized
- 22 cases in our County in first three months of 2014
Orange County Measles Cases
Rash Onset Dates 2015 (n=35)
Immunization Status of Cases

- 3 with 2 MMRs
- 2 with 1 MMRs
- 1 with evidence of seroimmunity
- 13 with no immunizations
  - Two under one year of age
  - 7 vaccine refusers
  - 13 of 14 pediatric cases with no MMR
- 16 with uncertain immunization status
Measles Symptoms
Measles Prodrome

• 8-12 day incubation period
• Prodrome lasts for 2-4 days and consists of:
  – Fever
  – Cough
  – Coryza
  – Conjunctivitis
  – Koplik’s Spots
  – Prodromal phase makes people sick!
Rash Develops at About 14 Days

• Starts on face, often top of forehead
• Spreads downward
• Initially maculopapular, then becomes confluent
• Most prominent on the face
• All but one of our cases in 2015 had rash
  – One who was close contact of a case presented with respiratory symptoms only and was OP PCR+
• All rashes started on face and descended but one
  – Child woke up in AM with “rash all over”
Symptoms

• Fever: 2 person did not report fever;
  – For those with temperature information, all but 1 reported a fever over 101°F (101.2 to 104.7)
• Cough: 83%
• Coryza: 80%
• Koplik Spots (N = 17): 29%
• Conjunctivitis: 56%
• Diarrhea: 14%
# Symptoms by Immunization Status, 2014 and 2015 OC Measles Cases

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Not vaccinated (n=20)</th>
<th>Vaccinated/serologic proof of immunity (n=10)</th>
<th>Unknown Vaccination Status (n=27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>100%</td>
<td>80%</td>
<td>92%</td>
</tr>
<tr>
<td>Cough</td>
<td>83%</td>
<td>50%</td>
<td>73%</td>
</tr>
<tr>
<td>Coryza</td>
<td>89%</td>
<td>55%</td>
<td>62%</td>
</tr>
<tr>
<td>Koplik spots</td>
<td>38%</td>
<td>25%</td>
<td>0%</td>
</tr>
<tr>
<td>Conjunctivitis</td>
<td>72%</td>
<td>33%</td>
<td>42%</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>11%</td>
<td>30%</td>
<td>8%</td>
</tr>
<tr>
<td>Rash duration</td>
<td>6 days (4-8d)</td>
<td>4.5 days (4-6d)</td>
<td>5 days (2-9d)</td>
</tr>
<tr>
<td>Hospitalized</td>
<td>20%</td>
<td>20%</td>
<td>19%</td>
</tr>
<tr>
<td>LOS</td>
<td>3-4 d</td>
<td>2-5 d</td>
<td>1-6 d</td>
</tr>
<tr>
<td>Otitis</td>
<td>11%</td>
<td>0%</td>
<td>4%</td>
</tr>
</tbody>
</table>
Hospitalization & Complications

Most common complications include:

• Pneumonia
• Encephalitis
• Thrombocytopenia
• Otitis media
• 1 in 1000 die due to measles complications
• 4 hospitalized in Orange County this year with measles-related disease
  – One otitis media only complication
Measles Testing
Satellite Clinic Site

- Outdoor clinic under a canopy
- One medical assistant
- One office technician
- For testing of suspect cases who have already been assessed by a medical provider
- Tests performed included:
  - Oropharyngeal PCRs
  - Serum IgM
## Measles Testing Results for 57 Measles Cases in 2014-15

<table>
<thead>
<tr>
<th></th>
<th>IgM</th>
<th>OP PCR</th>
<th>Urine PCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>35</td>
<td>47</td>
<td>20</td>
</tr>
<tr>
<td>Negative</td>
<td>13</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Not done</td>
<td>9</td>
<td>7</td>
<td>32</td>
</tr>
</tbody>
</table>

For 10 Vaccinated Patients:
- 5 IgM negative, 3 IgM positive, 2 Not Done
- All 9 tested were OP PCR positive

All 15 unvaccinated patients tested were IgM +
Measles is Passed by Airborne Route

- Very infectious
- Virus can remain in air after infected person leaves
- Patients infectious from 4 days before rash starting until 4 days after rash starts
- No minimal period of exposure exists
Measles Infection Control

- Airborne precautions necessary in clinical settings
- Facilities without negative pressure room can see patient:
  - At end of day
  - Outside
- N-95 masking recommended for healthcare workers
- Masking of measles case in facility is of uncertain benefit
  - Science would say that airborne virus not prevented from spread by mask
  - Significantly ill patients don’t keep the mask on
  - Public health recommendation would still be to conduct a contact investigation
  - Masking case when going to and from isolation room is recommended
Potential Exposure Venues

• Household
• Sharing the same airspace in:
  – Work
  – Healthcare facility
  – School/daycare
• Community exposures
  – Malls
  – Restaurants
  – Public transportation
  – Etc.
Orange County Measles Cases by Exposure Source (n=35)
Orange County Cases and Their Connections, 2015

Disney visitors
Disney staff
Mall exposure
Household
Healthcare
Work site
Unknown

12/30
Measles and Disney Staff

- 6 cases in Disney cast members
- Disney has small occupational health program
- They worked to survey staff and conduct contact investigations
- Those with close contact furloughed with pay until end of potential incubation period
- 27,000 cast members
- 3600 vaccinated during this outbreak
Measles Follow Up of Exposed

- **Exposure**
  - Vaccine w/in 72h
- **Rash onset**
- **Time in days**
  - Shortest: 0 - 7
  - Longest: 14 - 21
- **Incubation periods**
  - Vaccine w/in 72h
  - IG w/in 6 days
  - Exclusion from work d5-21 post exposure
Number of Community Measles Exposures, 2015

• 1955 community contacts identified in total thus far
• 1858 were healthcare facility contacts
  – These are significant underestimations
  – Awaiting data from facilities
  – Approximately 20% of identified contacts cannot be reached
• 828 contacts attempted by OCHCA
  – Majority of non-high risk healthcare contacts in 2015 contacted by the facility
Healthcare Facility Response

Can include hospitals, emergency departments, clinics, private practices, urgent care

Need to assess:

• Patients
• Patient’s friends and family
• Facility staff
Healthcare Facility Transmission, 2014 and 2015

• 57 cases
• 91 healthcare facility exposure events
• >3000 patients and staff exposed
• 10 total transmissions
• 7 healthcare workers
  – 1 additional healthcare worker developed disease - likely patient exposure, though no source identified
• 3 patients
  – 9 month old
  – 18 yo with history of two MMRs
  – 19 yo with unknown immunization history
OCHCA Healthcare Facility Response, 2015

- Emphasize that facilities assure that exposed staff have evidence of immunity
- Exclude from days 5-21 exposed staff without proof of immunity
- Emphasize that healthcare staff with evidence of immunity still have a small risk of developing disease
- Facilities (in general) contacted low risk patients by phone or letter to inform them of exposure:
  - Over 1 year of age
  - Immunocompetent
  - Not pregnant
  - Not healthcare worker
OCHCA Followed Up on High Risk Persons

- Under one year of age generally
  - Pediatric practices and area pediatric children’s hospital followed up with this group with their exposures
  - Over 100 IG doses given in the community
- Pregnant women
- Immunocompromised
- Health care workers
- In 2014, we found that surveying low risk contacts for immunity was low yield
  - Over 95% of those with no history of immunity were still immune
- Caveat: OCHCA would conduct follow up on ALL contacts with smaller outbreaks
## Healthcare Workers with Measles Clinical and Epidemiologic Features, 2014

<table>
<thead>
<tr>
<th>Age (y)</th>
<th>Measles Immunity Prior to Exposure</th>
<th>Exposure</th>
<th>Illness Onset</th>
<th>Fever</th>
<th>Cough</th>
<th>Coryza</th>
<th>Rash</th>
<th>Days Considered infectious while asymptomatic</th>
<th>Days working during active symptoms</th>
<th>Number of patients exposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>IgG+</td>
<td>3/3/2014</td>
<td>3/17/2014</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>3/18/14</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>36</td>
<td>IgG+</td>
<td>3/3/2014</td>
<td>3/14/2014</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>3/18/14</td>
<td>0</td>
<td>4</td>
<td>850</td>
</tr>
<tr>
<td>41</td>
<td>2 MMR</td>
<td>3/7/2014</td>
<td>3/18/2014</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>3/20/14</td>
<td>2</td>
<td>2</td>
<td>26</td>
</tr>
<tr>
<td>37</td>
<td>4 MMR IgG+</td>
<td>3/7/2014</td>
<td>3/16/2014</td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>3/20/14</td>
<td>0</td>
<td>4</td>
<td>72</td>
</tr>
<tr>
<td>40</td>
<td>Unknown vaccine history, IgG equivocal</td>
<td>3/7/2014</td>
<td>3/19/2014</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>3/21/14</td>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Of 10 healthcare facility transmissions:

- 5 of 7 healthcare cases had a history of face-to-face exposure to case of measles
- 1 was healthcare worker who denied face to face exposure to patient
- 1 was custodial worker who cleaned room after patient left
- 3 were patients in same waiting room at same time as cases
Four School Exposures in 2015 Measles Outbreak

• One preschool, one grade school, one high school, one high school entrance test
• Student immunization rates over 98% in all facilities
• All students without proof of at least one dose of MMR were excluded for days 7-21 after exposure
  – OCHCA tried to define which students were at risk, but this was frequently problematic
• 37 students were excluded
• No secondary cases
School Exposures: Staff

• Most staff do not know their immunization status
• For a large school, hundreds of staff will be potentially exposed
• We worked with the school to identify staff most likely to be exposed: teacher in the classroom, etc.
• We conducted clinics at the school to test staff who were exposed
• All staff tested proved to be immune
MMR Vaccination

- Recommended in two doses:
  - 12-15 months of age
  - 4-6 years of age
- No downside to extra dose of MMR
- 95% are immune after first dose
- 97-99% immune after second dose
- No need for “booster”
MMR Vaccination in an Outbreak: Variation Options

• Second dose can be given anytime 28 days after the first dose
  – Not formally recommended, though offered as an option for OC providers

• Vaccine can be given from 6-11 mos of age if travel or outbreak setting, though dose will need to be repeated
  – Seems that titers reached with revaccination are lower*
  – Not recommended by OCHCA unless infants are traveling

• OCHCA’s main emphases:
  – Vaccinate kids and vaccinate them on time!
  – MMR can be given to anyone who are not sure that they were vaccinated or had disease previously
Measles Immunity Recommendations for Health Care Workers

• Proof of immunity as evidenced by:
  – Two doses of MMR
  – Serologic measles IgG +

• Wear N-95 mask even if you think you are immune!
Summary Points

• Measles disease in Orange County was weighted toward unvaccinated cases
• Measles transmission was rare due to high immunization rates
• Healthcare providers who care for measles patients are at particular risk of disease
Thank you!

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Measles Resources on the CDPH Website

• CDPH Measles Website:
  http://www.cdph.ca.gov/HealthInfo/discond/Pages/Measles.aspx

• Measles surveillance updates:
  http://www.cdph.ca.gov/HealthInfo/discond/Pages/MeaslesSurveillanceUpdates.aspx

• Measles Investigation Quicksheet:

• Measles Laboratory Quicksheet: