Responding to the 2012 Pertussis Epidemic in Washington State

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Washington State Department of Health
Pertussis

- Highly contagious bacterial disease
  - Spreads easily by aerosols or droplets
  - High community immunity level needed to stop transmission
- Severe, debilitating cough illness in all ages
  - Infants have highest morbidity and mortality
- Estimated deaths > 300,000/yr worldwide
- Vaccine-preventable
  - Poorly controlled, despite high vaccine coverage
Reported NNDSS pertussis cases 1922-2012*

*2011 & 2012 data are provisional
SOURCE: CDC, National Notifiable Diseases Surveillance System and Supplemental Pertussis Surveillance System and 1922-1949, passive reports to the Public Health Service
Objectives

- Describe the epidemiology of 2012 WA State pertussis cases
- Explain decision-making process for declaring the epidemic
- Describe public health response to the epidemic
Surveillance Case Definitions

- **Probable (clinical case definition)**
  - 2-week cough AND paroxysms OR post-tussive vomiting OR whoop

- **Confirmed**
  - Culture positive
  - Clinical case definition + PCR positive
  - Clinical case definition + link to lab-confirmed case

- **Suspect (definition used in WA since 2007)**
  - PCR+ but does not meet clinical case definition (PCR+ suspect)
Key Dates

**August 2011**
- Localized outbreaks reported
  - Infant death; Case burden among school-aged children
  - Counties send out health care provider alerts;
  - State encourages adult vaccination

**December 2011**
- Several LHJs report infrastructure burden

**February 2012**
- DOH CD Epi office alerted other DOH offices

**March 2012**
- DOH forms cross-divisional pertussis workgroup

**April 3, 2012**
- Secretary of Health declares epidemic
  - 640 cases, 6-fold increase from same time period in 2011

**May 3, 2012**
- Gov. Chris Gregoire provides emergency funds

**May 4, 2012**
- Call for CDC Epi Aid

**December 2012**
- 4,918 confirmed and probable cases
  - plus 600 PCR+ suspect cases

LHJ = local health jurisdiction
CD Epi = WA DOH Communicable Disease Epidemiology Office
DOH = WA Department of Health
Pertussis Cases by Notification Week 2011 versus 2012

Number of Cases

Notification Week

Epidemic Declared

2012  2011
Pertussis Cases by Onset Month 2005–2012 and 2013 YTD (March)
## Case Classification 2007-2012

<table>
<thead>
<tr>
<th>Onset Year</th>
<th>All reports</th>
<th>Cases Reported to CDC (Confirmed &amp; Probable)</th>
<th>PCR+ Suspect</th>
<th>Confirmed, Probable, &amp; PCR+ Suspect</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>510</td>
<td>482</td>
<td>13</td>
<td>495</td>
</tr>
<tr>
<td>2008</td>
<td>502</td>
<td>461</td>
<td>19</td>
<td>480</td>
</tr>
<tr>
<td>2009</td>
<td>342</td>
<td>291</td>
<td>18</td>
<td>309</td>
</tr>
<tr>
<td>2010</td>
<td>682</td>
<td>608</td>
<td>32</td>
<td>640</td>
</tr>
<tr>
<td>2011</td>
<td>1,080</td>
<td>965</td>
<td>68</td>
<td>1,023</td>
</tr>
<tr>
<td>2012</td>
<td>5,864</td>
<td>4,918</td>
<td>600</td>
<td>5,518</td>
</tr>
</tbody>
</table>
Pertussis Rates by County
October – December 2011
Pertussis Incidence Rates by County January – March 2012

Incidence per 100,000 population Jan-Mar 2012
- 0.0
- 0.1—9.9
- 10.0—19.9
- 20.0—59.9
- 60.0—99.9
- >= 100.0
Pertussis Incidence Rates by County July – September 2012
## Case Characteristics (n=4,918)

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
<th>Rate per 100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Female</strong></td>
<td>2,651</td>
<td>54%</td>
<td></td>
</tr>
<tr>
<td><strong>Age Group (years)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1</td>
<td>378</td>
<td>8%</td>
<td>428.0</td>
</tr>
<tr>
<td>1-6</td>
<td>940</td>
<td>19%</td>
<td>177.8</td>
</tr>
<tr>
<td>7-10</td>
<td>1,012</td>
<td>20%</td>
<td>293.6</td>
</tr>
<tr>
<td>11-14</td>
<td>989</td>
<td>20%</td>
<td>283.2</td>
</tr>
<tr>
<td>15-19</td>
<td>523</td>
<td>11%</td>
<td>142.4</td>
</tr>
<tr>
<td>20+</td>
<td>1,075</td>
<td>22%</td>
<td>21.3</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>752</td>
<td>23%</td>
<td>99.5</td>
</tr>
<tr>
<td>American Indian</td>
<td>61</td>
<td>2%</td>
<td>57.4</td>
</tr>
<tr>
<td>White</td>
<td>2,257</td>
<td>70%</td>
<td>45.0</td>
</tr>
<tr>
<td>Asian/ Pacific Islander</td>
<td>91</td>
<td>3%</td>
<td>16.1</td>
</tr>
<tr>
<td>Black</td>
<td>48</td>
<td>1%</td>
<td>17.0</td>
</tr>
<tr>
<td><strong>Western Washington</strong></td>
<td>3,389</td>
<td>79%</td>
<td></td>
</tr>
</tbody>
</table>
Lab Confirmation
2012 Confirmed Cases (n=4,230)

<table>
<thead>
<tr>
<th>Method</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab-confirmed</td>
<td>3,585</td>
<td>85</td>
</tr>
<tr>
<td>PCR only</td>
<td>3,266</td>
<td>91</td>
</tr>
<tr>
<td>Culture only</td>
<td>81</td>
<td>2</td>
</tr>
<tr>
<td>PCR &amp; Culture</td>
<td>238</td>
<td>7</td>
</tr>
<tr>
<td>Epi-linked</td>
<td>645</td>
<td>18</td>
</tr>
</tbody>
</table>
# Severity of Disease

## 2011 versus 2012

<table>
<thead>
<tr>
<th>Outcome</th>
<th>2011</th>
<th>2012</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N=965</td>
<td>N=4,918</td>
<td></td>
</tr>
<tr>
<td></td>
<td>% (n)</td>
<td>% (n)</td>
<td></td>
</tr>
<tr>
<td>Hospitalized</td>
<td>5.1 (49 / 965)</td>
<td>2.1 (105 / 4913)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>4.4 (40 / 906)</td>
<td>2.4 (110 / 4546)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Death §</td>
<td>0.2 (2 / 965)</td>
<td>0* (0/ 4918)</td>
<td>--</td>
</tr>
</tbody>
</table>

§ All reported deaths were among infants under one year of age

* Note: there was one death in an infant who tested positive for pertussis by PCR in late 2012
## Vaccination Status of Cases 2012

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Total Number of Cases</th>
<th>Cases with Valid Vaccination History</th>
<th>Up-to-date (UTD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td><strong>UTD for age per ACIP</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3m-10 y</td>
<td>2,218</td>
<td>2,101</td>
<td>95</td>
</tr>
<tr>
<td>11-12 y</td>
<td>397</td>
<td>376</td>
<td>95</td>
</tr>
<tr>
<td><strong>Receipt of Tdap</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-14 y</td>
<td>592</td>
<td>558</td>
<td>94</td>
</tr>
<tr>
<td>15-18 y</td>
<td>523</td>
<td>479</td>
<td>92</td>
</tr>
</tbody>
</table>

Note: Surveillance case report vaccination information is “self-reported”
2012 Pertussis Cases & Rates by Single-year Age Group

No. Cases vs Rate per 100,000 population by age
2012 Pertussis Cases & Rates by Single-year Age Group
Sounding the Alarm

- February 2012 – growing concern about sustained increase in reported pertussis cases
  - Alerted other DOH offices
  - Began planning for more streamlined surveillance
  - Worked with CD Epi Office Director to ensure adequate pertussis surveillance resources
Why Declare an Epidemic?

- Growing number of cases, babies at risk
- Coordinate public health response
- Mobilize resources
- Alert and engage providers
- Inform and educate public
WA Department of Health (DOH) Pertussis Response Structure

Managing Executive
Allene Mares

Health Officer
Maxine Hayes

Communications Liaison
Tim Church

Local Health Jurisdiction Liaison
Marie Flake

Policy Liaison
Brian Peyton

Finance Liaison
Harvey Perez

Incident Commander
Janna Bardi

Assignment Coordinator and
CDC Liaison
Lin Watson

PHEPR staff

Media/Communications Team
Michele Roberts

Vaccine Team
Jan Hicks-Thomson

Surveillance Team
Chas Debolt

Provider Engagement Team
Diana McMaster
Revision of Investigation Guidelines

- April 9 – convened LHJ workgroup to discuss surveillance changes
- April 30 – rolled out revised guidelines and new algorithm for pertussis investigation work flow to all LHJJs
- Developed tools/templates to facilitate reporting to public health
  - provider, school, and child care
- May 9 – held statewide conference call to discuss changes with all LHJJs
Flow chart for public health pertussis investigations in Washington State
5/11/2012

Triage reports of pertussis
An indication of a high-risk contact/setting will increase the priority of a report.
Investigations need to be performed even if resources are extremely limited for:
• Culture- or PCR-positive cases (includes those whose illness does not yet meet the clinical case definition)
• Epi-linked cases that meet the clinical case definition
• Infants < 12 months of age

Investigations can be temporarily suspended if resources are limited for (in order of importance): (Reports should be entered in PHIMS as usual whether further investigated or not.)
1. Cases that meet the clinical case definition but have no epi-link or lab confirmation (‘probable’ cases)
2. Cases with classic symptoms (paroxysmal cough, post-tussive emesis, or whooping) and < 2 week cough duration with no testing or a negative test
3. Cases with an epi-link that do not yet meet the clinical case definition (symptomatic contacts of a case)

Contact Provider
- Verify that patient is aware of the diagnosis
- Request pertussis immunization history and pertinent clinical information
- Ask about high-risk* contacts/settings
- Verify appropriate treatment
- Determine what exclusion recommendations were made
- Determine whether high-risk household contacts received chemoprophylaxis

Interview Patient
Case
- Determine clinical symptoms and onset of illness
- Provide education about period of communicability, method of transmission, and avoidance of high-risk persons/settings
- Recommend avoiding all public settings until 5 days of antibiotics (Day 6) or 21 days after onset of cough if not treated

Contacts
- Identify high-risk close contacts* or setting for follow-up
- If no high-risk close contacts or setting are identified, instruct patient to inform contacts of exposure and to seek advice from their own healthcare provider regarding chemoprophylaxis

Symptomatic — High-risk Close Contacts* — Asymptomatic

Activities
- Educate
- Facilitate evaluation, testing, treatment, and exclusion as appropriate
- Notify facility if high-risk setting identified
- Report those who meet clinical case definition

Activities
- Educate
- Advise symptom watch
- Facilitate chemoprophylaxis
CDC Epi Aid

- Confirm *B. pertussis* as etiologic agent
  - Rule-out pseudo-outbreak due to contamination
  - Rule out co-circulation of *B. holmesii*

- Conduct in-depth analysis of WA cases & compare to national data

- Submit WA State pertussis isolates to CDC lab for molecular characterization testing

- Survey WA clinical labs to determine statewide pertussis PCR practices
Alerting and Engaging Providers

- State Health officer requests action from all providers
- Joint letter from WA Hospital Assn/DOH to all hospitals
- Held CDC webinar training for providers (CME’s)
- Regular updates to local/tribal health and professional medical associations

DOH = WA State Department of Health
Call for Provider Action

✔ Ensure staff and patients up-to-date for pertussis immunization

✔ Vaccinate all women of childbearing age and postpartum patients

✔ Recommend and refer household contacts and caregivers for Tdap vaccination at least 2 weeks before baby due

✔ Early testing of symptomatic patients

✔ Early treatment

✔ Prompt reporting of suspected cases
Access to Tdap Vaccine

- Promoted national program that provides free vaccine
- Allocated >32,000 federally funded Tdap doses to LHJs and tribes for under- and uninsured adults
- Worked with LHJs to organize community vaccination clinics
- State immunization registry: tracked Tdap doses administered; made annual comparisons

LHJ = local health jurisdiction
Informing the Public

- Tdap vaccination mailings
  - reached 470,000 families
- Radio/TV ads, English/Spanish
- YouTube, other social media
- Regular website updates
- News releases and news conferences
- Billboards and bus ads
Evaluation of Tdap Vaccine

- Collaborative project between CDC and WA DOH

- Objectives
  - Assess Tdap vaccine effectiveness (VE)
  - Evaluate duration of immunity
  - Evaluate impact of brand on Tdap VE

DOH = WA State Department of Health
Summary

- Record number of cases in WA in 2012
- Pertussis continues to be a public health problem despite a well-implemented vaccination program
  - Unexpected high rates in 13-14 year olds with high Tdap coverage
- WA trends reflect national trends
- Observational data suggesting early waning of immunity from acellular vaccines
Summary

- Will we see a new baseline in terms of expected cases?
- Prevention and control efforts should continue to focus on protecting infants too young to be vaccinated and at highest risk of disease
Acknowledgements

Disease Investigators and Health Officers from the 35 Local Health Jurisdictions in WA State

WA Department of Health
- Marisa D’Angeli, MD, MPH
- Kathy Lofy, MD
- Pat DeHart, ScD
- Laurie Stewart, MS
- Wayne Turnberg, PhD

CDC NCIRD
- Manisha Patel, MD, MS
- Sarah Meyer, MD, MPH
- Anna Acosta, MD
- Stacey Martin, MS
Resources

- www.doh.wa.gov
  - Frequently asked questions
  - Weekly updates on reported cases
  - Guidance on surveillance, testing, treatment and vaccination
  - Posters, facts sheets and more that you can order for free


- www.cdc.gov/MMWR
QUESTIONS?
PUBLIC HEALTH
ALWAYS WORKING FOR A SAFER AND
HEALTHIER WASHINGTON
Multitarget PCR Results

- **Seattle Children’s Clinical Microbiology Lab**
  - 5,086 specimens tested
    - *B. pertussis* 175 (90.7%)
    - *B. parapertussis* 11 (5.7%)
    - *B. holmesii* 2 (1%)
    - Indeterminate 5 (2.6%)

- **CDC confirmation of positive specimens from WA PHL and a commercial lab**
  - 69 specimens tested
    - *B. pertussis* 59 (85.5%)
    - *B. holmesii* 1 (1.5%)
    - Indeterminate 9 (13%)
Confirmed pertussis cases by diagnosis method

54% of confirmed cases PCR+ in 2007
Versus 77% in 2012
Confirmed pertussis cases by diagnosis method

54% of confirmed cases PCR+ in 2007
Versus 77% in 2012

- Epi-linked
- PCR alone
- Culture

Year

Number of Cases
2011 Cumulative Pertussis Incidence
Washington State

Incidence per 100,000 population per year

- 0.0
- 0.1–9.9
- 10.0–19.9
- 20.0–59.9
- 60.0–99.9
- ≥ 100.0