NYS Trends in Vaccine Preventable Disease Control

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Objectives

• Participants will be able to identify disease outbreaks that impacted NYS 2010-2012

• Participants will be able to identify “lessons learned” from current disease outbreaks

• Participants will be able to recognize NYS role in understanding the current epidemiology of measles, mumps and pertussis
Epidemiology of Mumps Outbreak in New York (excluding NYC)

- 1100 confirmed cases, 106 probable as of 5/7/2010
- 99% members of the Hasidic Jewish community
- 66% male
- 61% age 7 – 18 years; median age 14 years (range 6 months – 75 years)
- Of the 81% of cases with known vaccine status, 77% had 2 or more doses of MMR, 11% 1 dose MMR, 12% unvaccinated
- Few complications: 26 orchitis (4.7% of males > 10 years old), 7 hospitalizations (<1%), 1 meningitis (<1%)
Community Factors Favoring A Mumps Outbreak

• Insular population
  • Limited interaction with outside communities
  • Close contact within the community
• Dense living conditions
  • Large families (median household size: 10 persons)
• Dense educational conditions, particularly for boys
  • Learning style emphasizes close contact between student partners
  • Adolescent males attend school for 12+ hours a day

Lessons Learned

• Mumps can occur in highly-vaccinated populations
  • Even a small number of unvaccinated people can provide a “foothold” for mumps, particularly in congregate settings

• Outbreaks can occur following importation of mumps from endemic areas outside the United States

• Timely reporting of mumps cases is critical for rapid outbreak identification and control
Mumps Outbreak in Orthodox Jewish Communities in the United States

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Margaret K. Doll, M.P.H., Kisha P. Cummings, M.P.H., E. Oscar Alleyne, Dr.P.H.,
Patricia High, M.H.S., Jacqueline Lawler, M.P.H., Andria Apostolou, Ph.D., M.P.H.,
Debra Bogie, M.D., M.P.H., Christopher M. Zimmerman, M.D., M.P.H.,
Barbara Montano, M.D., M.P.H., Rafael Harpaz, M.D., Carol J. Hickman, Ph.D.,
Paul A. Rota, Ph.D., Jennifer S. Rota, M.P.H., William J. Bellini, Ph.D.,
and Kathleen M. Gallagher, H.Sc., M.P.H.

Adverse events following a third dose of measles, mumps, and rubella vaccine in a mumps outbreak

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2012 Mumps Case Definition for Case Classification

Suspect:
- Parotitis, acute salivary gland swelling, orchitis, or oophoritis unexplained by another more likely diagnosis with no or negative laboratory tests for mumps and no epidemiologic linkage OR
- A positive lab result with no mumps clinical symptoms (with or without epidemiologic linkage to a confirmed or probable case)

Probable:
- Acute parotitis or other salivary gland swelling lasting at least 2 days, or orchitis or oophoritis unexplained by another more likely diagnosis, AND EITHER:
  - A positive test for serum anti-mumps IgM antibody, OR
  - Epidemiologic linkage to another probable or confirmed case or to a group/community defined by public health during an outbreak of mumps

Confirmed:
- A positive mumps laboratory confirmation for mumps virus with real time RT-PCR or culture in a patient with an acute illness characterized by any of the following:
  - Acute parotitis or other salivary gland swelling, lasting at least 2 days
  - Aseptic meningitis
  - Encephalitis
  - Hearing loss
  - Orchitis
  - Oophoritis
  - Mastitis
  - Pancreatitis
Mumps: When to Test and Report

• Every suspected case should be tested and reported at the time of initial clinical suspicion
• Virus detection by either real time RT-PCR or culture are the only confirmatory tests for mumps
  – Buccal swabs should ideally be obtained within 1-3 days of symptom onset but may be positive up to 11-14 days after parotitis onset in unvaccinated persons
• Serologic testing for mumps IgM and IgG lack the sensitivity and specificity to either confirm or rule out mumps infection

<table>
<thead>
<tr>
<th>Disease</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemophilus Influenza, Inv B (≤ 5 yo)</td>
<td>0</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>48</td>
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<tr>
<td>Hepatitis B, acute (Infant Perinatal)</td>
<td>0/58</td>
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<tr>
<td>Measles, Import non US, indigenous</td>
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<tr>
<td>Mumps</td>
<td>10</td>
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<tr>
<td>Pertussis</td>
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<tr>
<td>Rubella</td>
<td>0</td>
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<td>S. Pneumo Invasive, Drug Res</td>
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<tr>
<td>S. Pneumo Invasive, Intermediate</td>
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<tr>
<td>S. Pneumo Invasive, Sens / Unk</td>
<td>895/202</td>
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<tr>
<td>Tetanus</td>
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VPD Annual Surveillance Report
New York State 2011

<table>
<thead>
<tr>
<th>Year</th>
<th>US Measles</th>
<th>NYS* measles</th>
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</thead>
<tbody>
<tr>
<td>2007</td>
<td>43</td>
<td>2</td>
</tr>
<tr>
<td>2008</td>
<td>140</td>
<td>2</td>
</tr>
<tr>
<td>2009</td>
<td>71</td>
<td>0</td>
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<tr>
<td>2010</td>
<td>57</td>
<td>2</td>
</tr>
<tr>
<td>2011</td>
<td>222</td>
<td>7 NYS/25 NYC</td>
</tr>
</tbody>
</table>

* Upstate NY, excluding New York City

International Measles Headlines 2011

- France: Since January 1, 2008 over 20,000 cases of measles have been reported
  - Over 9000 notifications received between October 2010 and March 2011
  - Over 3000 cases were reported in March 2011 alone

- Canada: Quebec reporting over 300 cases in the province in 2011
Measles Impact 2011

- NYS: 7 confirmed cases
  - Hundreds exposed at hospital Emergency Departments
  - All cases import related

- NYCDOHMH: 25 confirmed cases
  - >70 investigations completed, thousands exposed

- US: 222 confirmed cases
  - Most reported since 1996

Measles in the United States

- January 1, 2011 to December 31, 2011
  - 222 cases reported
    - 196 U.S. residents
    - 129 unvaccinated
    - 37 vaccination status not documented

  - 200 associated with importations from other countries
    - 72% U.S. travelers returning to the U.S.
    - 28% travelers coming to the U.S.

  - 86% of current cases were unvaccinated or no documentation of vaccination
SIR (Secondary Immune Response) to Measles

• HCP exposed in a NYC clinical setting
  – DOB 1959, history of IgG+ for measles 1993
  – Developed rash, “waxed and waned”, subjective fever, mild cough, no other symptoms
  – Acute serology IgG+, IgM-
  – Paired sera IgG strongly positive with no 4 fold increase
  – Viral culture negative
  – PCR+ per CDC lab
  – Reported to CDC as measles

SIR (con’t)

• SIR
  – Immunity to measles may not be absolute
  – Depending on preexisting antibody, may reflect a continuum of clinical illness
  – Intensity of exposure is important risk factor
    • Absence of periodic boosting may alter paradigm of lifelong immunity
  – Additional studies needed to determine whether modified measles is infectious
    • Absence of spread suggests limited replication of virus in vaccinated persons with mild or short-lived symptoms
Prevention of Imported Strains of Measles from Establishing Endemic Transmission

- Rapid detection of cases is necessary so that appropriate control measures can be quickly implemented
- The major challenges to sustaining the elimination of measles from the United States are:
  - Continuing to vaccinate all children aged 12–15 months with a first dose of MMR
  - Ensuring that all school-aged children receive a second dose of MMR vaccine
  - Working with other countries to set and achieve national measles elimination goals

### Preliminary VPD Annual Surveillance Report New York State 2012

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<td>Hepatitis A</td>
<td>64</td>
</tr>
<tr>
<td>Hepatitis B, acute (Infant Perinatal)</td>
<td>55/1</td>
</tr>
<tr>
<td>Measles, Import non US, indigenous</td>
<td>1</td>
</tr>
<tr>
<td>Mumps</td>
<td>6</td>
</tr>
<tr>
<td>Pertussis</td>
<td>2719</td>
</tr>
<tr>
<td>Rubella</td>
<td>1</td>
</tr>
<tr>
<td>S. Pneumo Invasive, Drug Res</td>
<td>31</td>
</tr>
<tr>
<td>S. Pneumo Invasive, Intermediate</td>
<td>26</td>
</tr>
<tr>
<td>S. Pneumo Invasive, Sens / Unk</td>
<td>795/184</td>
</tr>
<tr>
<td>Tetanus</td>
<td>0</td>
</tr>
</tbody>
</table>
NYS Preliminary Pertussis Statistics 2012

- Preliminary year-to-date confirmed and probable cases through December: 2,719
  - Incidence rate: 24.5/100,000
  - 219 infants less than 1 year old
  - No infant deaths in 2012
  - 1,302 cases in children aged 10-19 years

USA Preliminary Pertussis Statistics 2012

- Last peak 2010: 28,000 cases
- 2012 through December 2012
  - 49 states plus Washington D.C. report significant increases in cases
  - >41,000 cases
  - 18 pertussis related deaths, majority in infants less than 3 months old
  - Highest incidence is in infants, 7-10 year olds and 13-14 year olds
Vaccine Issues

- Acellular and whole-cell vaccines both have high efficacy during the first 2 years after vaccination

- Recent changes in the epidemiology of pertussis in the US strongly suggest diminished duration of protection afforded by childhood acellular vaccine (DTaP) compared with that of diphtheria and tetanus toxoids and whole-cell pertussis (DTwP) vaccine

Vaccine Issues (cont.)

- Vaccination provides some protection
  – Less infectious
  – Milder symptoms and shorter illness duration
  – Reduced risk for severe outcomes, including hospitalization

- Acellular pertussis vaccines provide excellent short-term protection

- Early waning of immunity might be contributing to increasing population-level susceptibility
Vaccine Issues (cont.)

- Vaccination continues to be the **single most effective strategy** to reduce morbidity and mortality caused by pertussis
- Vaccination of pregnant women and contacts of infants is recommended to protect infants too young to be vaccinated
- Efforts should focus on full implementation of DTaP and Tdap recommendations to prevent infection and protect infants

### Recommended DTaP/Tdap Schedule

<table>
<thead>
<tr>
<th>Pregnant women</th>
<th>Updated Recommendations: On October 24, 2012, the ACIP voted to recommend that health-care personnel should administer a dose of Tdap during each pregnancy irrespective of the patient's prior history of received Tdap. Optimal timing for Tdap administration is at 27 through 36 weeks gestation</th>
</tr>
</thead>
</table>

Published February 22, 2012

[http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6207a4.htm](http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6207a4.htm)
“Pertactin-negative variants of *Bordetella pertussis* in the United States”

  - 11 of the 12 strains did not express pertactin
  - “Although much attention has been given to the waning immunity associated with the introduction of acellular vaccines, another factor contributing to the outbreaks may be the adaptation of *B. pertussis* to vaccine selection pressure.”

**CDC Talking Points 2013**

- This finding represents the first time pertactin negative variants of *B. pertussis* were found in the United States
- Implications:
  - Without pertactin, there is one less component for pertussis vaccines to target
  - There is no suggestion that these variants are causing more severe cases of pertussis
  - It also does not appear that these variants are the reason the United States has experienced a dramatic increase in the number of reported pertussis cases recently, but we will continue to closely monitor the situation before drawing any conclusions
  - Reported pertussis cases have been increasing since the early 1980s, well before these pertactin variants appeared
  - The timing of the appearance of pertactin negative isolates does not match the beginning of the pertussis resurgence. Of note, historic isolates from the U.S. have been looked at, and these new pertactin negative variants were not found
Is it all B. Pertussis?

- Large Outbreak of Pertussis-Like Illnesses Associated With Co-circulating Bordetella holmesii and Bordetella pertussis—Ohio, 2010–2011
  - 80 cases per 100,000 persons, 675 confirmed and probable cases
  - PCR results: 68% B. pertussis, 29% B. holmesii, 2% co-infection
  - Majority of cases in 11-18 year olds
  - After proper treatment cough lasted longer in B. pertussis cases
  - Pertussis Toxin (PT) is lacking in B. holmesii
    - Cough duration for B. holmesii averaged 10 days
- Recommendation for improved multi-targeted PCR assay availability
  - Wadsworth Center has multi-targeted PCR assay and can assist in outbreaks

http://cid.oxfordjournals.org/content/56/3/322.full.pdf+html

2013 Revised CDC Guidelines for the Prevention and Control of Pertussis Objectives

- Primary: Preventing death and serious complications in individuals at increased risk of severe and/or complicated disease, including infants less than 12 months
- Secondary:
  - Limit transmission in outbreak setting
  - Limit further spread and duration of transmission within closed communities
  - Decrease morbidity in affected populations
  - Lower risk of dissemination to unaffected groups within an outbreak
2013 Revised CDC Pertussis Outbreak and Control Guidelines Overview

• Emphasis on those at highest risk
  – Lack of evidence of broad-scale prophylaxis limiting transmission
    • Not all exposures will result in acquisition of pertussis
    • Difficult to identify all exposed individuals
• Tiered approach offers flexibility but encourages judicious use of antibiotics
• Alternatives to prophylaxis
  – Cough exclusion and “watchful waiting”
• Opportunity to increase pertussis vaccine coverage

Summary Of New PEP Recommendations

• Providing PEP to all household contacts of a pertussis case

• Providing PEP to persons exposed to pertussis who are at high risk of severe illness or who will have close contact with a person at high risk of severe illness. These include:
  – Infants and women in their third trimester of pregnancy –
  – All persons with pre-existing health conditions that may be exacerbated by a pertussis infection
  – Contacts who themselves have close contact with either infants under 12 months, pregnant women or individuals with pre-existing health conditions at risk of severe illness or complications
  – All contacts in high risk settings that include infants aged <12 months or women in the third trimester of pregnancy

http://www.cdc.gov/pertussis/outbreaks-PEP.html
Key Message: We keep learning

QUESTIONS????