Preventing Pertussis: Current and Needed Strategies

June 16, 2016 | 6PM – 8PM
Acknowledgements
Agenda

- Welcome and Introductions
- Epidemiology of Pertussis  
  *Essi M. Havor, MSN, APHN, RN*  
  *Houston Health Department*
- Preventing Pertussis: Current and Needed Strategies for Reducing Pertussis in Infants  
  *Michele Curtis, MD, MPH*
- Q&A
- Adjourn
“Haleigh was too young to receive the vaccine. It would have saved her life.”

-Rodney Throgmorton

Source: Vaccine-preventable Disease: The Forgotten Story
Pertussis Trends in Houston, Texas

Essi M. Havor MSN, APHN, RN
Houston Health Department
Immunization Bureau
**Pertussis Clinical Case Definition**

*Cough* lasting at least **2 weeks** and with **one** of the following:

- **Paroxysmal of coughing** or,
- **Inspiratory “whoop”** or,
- **Post-tussive vomiting**
- **If under 1 year old,** apnea with or without cyanosis
Laboratory Criteria for Diagnosis

- Isolation of Bordetella Pertussis from a clinical specimen \((\text{culture})\)

  or

- Positive polymerase chain reaction \((\text{PCR})\) for \(B\) Pertussis*

*Direct fluorescent antibody (DFA) staining of a patient’s specimen and serological laboratory results \((\text{pertussis IgG or IgM})\) are NOT considered confirmatory for pertussis.
Epidemiological Trends
Figure A.

Reported pertussis incidence by age group: 1990-2014

Incidence rate (per 100,000)

Year


<1 yr 1-6 yrs 7-10 yrs 11-19 20+ yrs

Chart courtesy of CDC
Figure 1.

Pertussis Incidence Rates in Texas, 2010 - 2014

* Graph provided via Texas DSHS
What Is Going On In Houston!!!???
Figure 3.

Pertussis cases by Month 2010 - 2014
Figure 4.

Pertussis by Sex, 2010 - 2014
Figure 5.

Pertussis by Age Group, 2010 - 2014

Incidance rate (per 100,000)

- 0
- 1-4
- 5-9
- 10-19
- 20-29
- 30-39
- 40-49
- 50-59
- 60+
Figure 6.
Reportable by Law in Texas

- **Healthcare Provider/Facilities responsibilities:**
  - Report confirmed & probable case to your local health department **within one work day** of diagnosis

- **Laboratory responsibilities:**
  - Report positive lab reports **immediately** to healthcare provider
  - Report positive lab reports **within one work day** of diagnosis to the local health department

- **Outbreaks** are to be reported **immediately**!
Conclusions

- The average number of pertussis cases significantly increased in 2013 which may be linked to the waning effectiveness of the pertussis vaccine after 3-4 years.
- The highest incidence of pertussis was observed in Hispanic Female infants under one year of age.
- The high rates within the Hispanic community may be due to a low level of immunization coverage in this group.
- Most reported cases are unvaccinated due to being under age making them more susceptible to infection.
- A Majority of cases in Houston occur between May and August, peaking in late June – early July.
Reference

- Figure A: http://www.cdc.gov/pertussis/images/incidence-graph-age.jpg
- Figure 1: http://www.dshs.state.tx.us/idcu/disease/pertussis/statistics/
Acknowledgements

- Houston Health Department,
  - Bureau of Epidemiology, Staff, Provider, and Patients.
  - Thomas Johnson, Public Health Investigator
- CDC Funding Agency
Preventing Pertussis: Current and Needed Strategies for Reducing Pertussis in Infants

Presented by Michele Curtis, MD, MPH

June 2, 2016
The Pertussis Problem

Infants <2 months have an annual incidence of pertussis of 160 per 100,000

1/2 of infants <1 year with pertussis are hospitalized

Sources:
### The Pertussis Problem

<table>
<thead>
<tr>
<th>Disease</th>
<th>Reproductive Rate</th>
<th>Herd Immunity Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pertussis</td>
<td>12-17</td>
<td>92-94%</td>
</tr>
<tr>
<td>Measles</td>
<td>12-18</td>
<td>83-94%</td>
</tr>
<tr>
<td>Mumps</td>
<td>4-7</td>
<td>75-86%</td>
</tr>
<tr>
<td>Influenza</td>
<td>1.19–1.37</td>
<td>&gt;60%</td>
</tr>
<tr>
<td>Ebola</td>
<td>1.5-2.5</td>
<td></td>
</tr>
</tbody>
</table>

Pertussis is roughly >6 times more contagious than Ebola.

Requires a high herd immunity threshold.

Sources:
- Michigan Center for Public Health Awareness, [https://practice.sph.umich.edu/micphp/epicentral/basic_reproduc_rate.php](https://practice.sph.umich.edu/micphp/epicentral/basic_reproduc_rate.php)
- Seasonal influenza in the United States, France, and Australia: transmission and prospects for control, [http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2680121/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2680121/)
Current Strategies

Early Childhood Vaccination
Adolescent and Adult Vaccination
“Cocooning”
Maternal Vaccination
Current Strategies

Early Childhood Vaccination

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BENEFITS

Effective for 8 or 9 out of 10 children

Among children who get all 5 doses of DTaP vaccine on schedule 98 out of 100 are fully protected within the year following the 5th dose

7 out of 10 of children are fully protected 5 years after getting their last dose of DTaP vaccine and the other 3 are protected against serious disease.

Recommended Schedule, 2016

Current Strategies

Early Childhood Vaccination

Adolescent and Adult Vaccination

“Cocooning”

Maternal Vaccination

Recommended Schedule, 2016

Pertussis Vaccination among Children 19-35 months, 2014

Sources:
Center for Disease Control and Prevention, [www.cdc.gov/vaccines](http://www.cdc.gov/vaccines)
National Immunization Survey, 2014
Healthy People 2020,
Current Strategies

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CHALLENGES
First dose isn’t until 2 months
Immunity wanes over time
Multiple doses mean more opportunities to fall behind, as is demonstrated by the difference in rates between 3 doses and 4 at the state level
Some evidence showing it doesn’t prevent transmission, only disease

Sources:
Acellular pertussis vaccines protect against disease but fail to prevent infection and transmission in a nonhuman primate model, http://www.pnas.org/content/111/2/787
Current Strategies

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BENEFITS

Provides a booster to protect and continue immunity

Given at the same time as other adolescent vaccines

Doubles as a tetanus booster

In general, protects 7 out of 10 people who receive it

Protects younger family members

**Recommendation: 1 dose at age 11-12**
**Recommendation: 1 dose during adulthood**

**Recommended For You:** This vaccine is recommended for you unless your healthcare professional tells you that you cannot safely receive it or that you do not need it.

**May Be Recommended For You:** This vaccine is recommended for you if you have certain risk factors due to your health, job, or lifestyle that are not listed here. Talk to your healthcare professional to see if you need this vaccine.

If you are traveling outside the United States, you may need additional vaccines. Ask your healthcare professional about which vaccines you may need at least 6 weeks before you travel.

For more information, call 1-800-CDC-INFO (1-800-232-4636) or visit www.cdc.gov/vaccines

**INFORMATION FOR ADULT PATIENTS**

2016 Recommended Immunizations for Adults: By Age

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Flu</th>
<th>Tetanus, diphtheria, pertussis</th>
<th>Shingles Zoster</th>
<th>Pneumococcal</th>
<th>Meningococcal</th>
<th>MMR</th>
<th>HPV</th>
<th>Chickenpox</th>
<th>Hepatitis A</th>
<th>Hepatitis B</th>
<th>Hib</th>
</tr>
</thead>
<tbody>
<tr>
<td>19 - 21 years</td>
<td>Flu Influenza</td>
<td>TD/Tdap</td>
<td>Shingles Zoster</td>
<td>Pneumococcal</td>
<td>Meningococcal</td>
<td>MMR</td>
<td>HPV</td>
<td>Chickenpox</td>
<td>Hepatitis A</td>
<td>Hepatitis B</td>
<td>Hib</td>
</tr>
<tr>
<td>22 - 26 years</td>
<td>Flu Influenza</td>
<td>TD/Tdap</td>
<td>Shingles Zoster</td>
<td>Pneumococcal</td>
<td>Meningococcal</td>
<td>MMR</td>
<td>HPV</td>
<td>Chickenpox</td>
<td>Hepatitis A</td>
<td>Hepatitis B</td>
<td>Hib</td>
</tr>
<tr>
<td>27 - 49 years</td>
<td>Flu Influenza</td>
<td>TD/Tdap</td>
<td>Shingles Zoster</td>
<td>Pneumococcal</td>
<td>Meningococcal</td>
<td>MMR</td>
<td>HPV</td>
<td>Chickenpox</td>
<td>Hepatitis A</td>
<td>Hepatitis B</td>
<td>Hib</td>
</tr>
<tr>
<td>50 - 59 years</td>
<td>Flu Influenza</td>
<td>TD/Tdap</td>
<td>Shingles Zoster</td>
<td>Pneumococcal</td>
<td>Meningococcal</td>
<td>MMR</td>
<td>HPV</td>
<td>Chickenpox</td>
<td>Hepatitis A</td>
<td>Hepatitis B</td>
<td>Hib</td>
</tr>
<tr>
<td>60 - 64 years</td>
<td>Flu Influenza</td>
<td>TD/Tdap</td>
<td>Shingles Zoster</td>
<td>Pneumococcal</td>
<td>Meningococcal</td>
<td>MMR</td>
<td>HPV</td>
<td>Chickenpox</td>
<td>Hepatitis A</td>
<td>Hepatitis B</td>
<td>Hib</td>
</tr>
<tr>
<td>65+ years</td>
<td>Flu Influenza</td>
<td>TD/Tdap</td>
<td>Shingles Zoster</td>
<td>Pneumococcal</td>
<td>Meningococcal</td>
<td>MMR</td>
<td>HPV</td>
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Sources:
Center for Disease Control and Prevention, www.cdc.gov/vaccines
National Immunization Survey, 2014
Healthy People 2020,
Disease Outbreaks and Exemptions

Source: Graphics and table from the Texas Department of State Health Services presentation, “Immunization Coverage in Texas: Child and Adolescent Vaccine Coverage”. Can be accessed at: https://www.dshs.state.tx.us/immunize/partners/TISWG111214_CoverageLevels.pdf
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CHALLENGES

Booster dose may come too late, as immunity from childhood vaccination begins to wain around ages 7-10 years

Many adults don’t know about the recommendation

Protection fades over time. Only 3 or 4 out of 10 people are fully protected 4 years after getting Tdap

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BENEFITS

Because a young infant is most likely to get pertussis from someone close to them, vaccinating all close contacts at least 2 weeks prior to meeting the baby helps to limit opportunities for exposure.

Source:
Center for Disease Control and Prevention, [http://www.cdc.gov/pertussis/pregnant/mom/protection.html](http://www.cdc.gov/pertussis/pregnant/mom/protection.html)
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CHALLENGES
Not effective on its own
Access challenges for low-income adults, including many childcare workers

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BENEFITS

Most effective strategy for preventing pertussis in infants <8 weeks old

Safety profile has been well established

Source:
**Recommendation: 1 dose during every pregnancy at 27-36 weeks' gestation regardless of interval since prior Td or Tdap vaccination.**
Strong Provider Recommendation is Critical to Vaccine Uptake

Presumptive recommendation vs permissive recommendation

**Presumptive:** “I’d like to give you the Tdap vaccine today to protect your baby from pertussis. Do you have any questions?”

**Permissive:** “Would you like the Tdap vaccine today?”
Strong Provider Recommendation is Critical to Vaccine Uptake

Offering the vaccine is not the same as recommending it.

**Recommending:** “I want you and your baby to be protected against pertussis. I think it’s really important that you receive the vaccine today.”

**Offering:** “If you’d like, we can vaccinate you against pertussis today.”
Strong Provider Recommendation is Critical to Vaccine Uptake

Same day: Recommend AND administer Tdap vaccine during the same visit, if possible
Responding to Hesitancy Using the CASE Method

**Corroborate**

*Acknowledge the parents’ concern and find some point on which you can agree. Set the tone for a respectful, successful talk.*

**About Me**

*Describe what you have done to build your knowledge base and expertise.*

**Science**

*Describe what the science says.*

**Explain/Advise**

*Give your advice, based on the science.*

Source: Autism Science Foundation
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CHALLENGES

Not all prenatal care providers stock vaccines at their site
Needed Strategies

Increase education/outreach among key populations
Increase Collaborations with Pharmacists
Enact Policies that Encourage Uptake and Increase Access
Improve Vaccine Effectiveness
Increase education/outreach among key populations

- Providers
- Pregnant Women
- Adults with infants under 1 year
- Childcare Workers
- Pharmacists
Increase Collaborations with Pharmacists

Pharmacists can provide additional immunization services for patients whose healthcare providers do not stock vaccines.

Communication between pharmacists and other health care providers is critical to ensure continuity of care.
Enact Policies that Encourage Uptake and Increase Access

Change Immunization Registry from Opt-in to Opt-out

Tightening exemptions around school vaccine requirements

Consider modifying vaccination schedule to incorporate booster dose(s) earlier and/or more often
Enact Policies that Encourage Uptake and Increase Access

Expand access through Adult Safety Net Program
  - Allow commercial pharmacies and other convenient locations to participate
  - Broaden criteria so that more low-income adults can participate

Revisit childcare worker vaccination policy law to more strongly encourage Tdap requirements for infant caretakers
Improve Vaccine Effectiveness

In addition to maintaining a strong safety profile, a new vaccine is needed that:

- Has longer immunity
- Prevents transmission as well as disease
- Can be given in fewer doses

Some have suggested a return to former vaccine, DTP, for the first dose or for the entire series
Thank you!