Coughing up the Facts on Pertussis—Emerging Trends and Communication Efforts

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Acknowledgements: Stacey Martin and Michelle Basket

VIC Network
November 14, 2012
Pertussis (Whooping Cough)

- Highly contagious respiratory disease
- Severe, debilitating cough illness ("100 day cough") in persons of all ages
- Highest morbidity and mortality among infants
- Estimated worldwide deaths > 300,000/yr
- Vaccine-preventable
- Poorly controlled, despite high vaccine coverage

Source: Michelle Razore; Natalie survived her pertussis infection after ECMO

†Tetanus toxoid, reduced diphtheria toxoid and acellular pertussis vaccine
CLINICAL CHARACTERISTICS, TREATMENT & DIAGNOSIS
Clinical Course (in weeks)

Communicable period (onset to 3 weeks after start of paroxysmal cough)

Incubation period (typically 5-10 days; max 21 days)

Catarrhal stage (1-2 weeks)

Paroxysmal stage (1-6 weeks)

Convalescent stage (weeks to months)
Clinical Stages

- **Catarrhal**
  - Watery eyes, low-grade fever, malaise, mild eye inflammation, runny nose, late-phase nonproductive cough

- **Paroxysmal**
  - Paroxysms (bursts of coughing during a single exhalation) followed by an inspiratory "whooping" sound, post-tussive cyanosis, and vomiting
  - In infants younger than six months (especially those younger than four weeks): apnea, bradycardia, prolonged cough, poor feeding, no paroxysms

- **Convalescent**
  - Paroxysms gradually improve but recur with respiratory infections
Infant Pertussis

- Young infants at highest risk of disease and complications
- Atypical symptoms:
  - Catarrhal stage and cough may be minimal or absent
  - Apnea (sometimes with seizures)
  - Sneezing
  - Gagging, choking, vomiting
  - Whoop infrequent
- Cough illness among close contacts
- Presumptive treatment should begin immediately

Source: Shot of Prevention, Brady passed away at just 2 months from pertussis
Pertussis Among Adolescents and Adults

- Wide spectrum of presentation
  - Disease often milder than in infants and children
  - May be asymptomatic
  - Can be quite severe and with classic presentation
- Clinically difficult to distinguish from other causes of cough illness
- Persons with mild disease can transmit infection
Pertussis Treatment

- **When to treat**
  - Adults, adolescents, children
    - Antimicrobials may modify course if given early (reduce duration and severity of symptoms and lessen communicability)
    - Treatment >3 weeks after cough onset limited benefit
  - Infants and pregnant women near term
    - Treatment up to 6 weeks after cough onset should be considered

- **Recommended treatment**
  - Macrolide / azolide antimicrobial
    - 5 day course azithromycin
    - 7 day course clarithromycin
    - 14 day course erythromycin
  - Alternative agent:
    - 14 day course trimethoprim-sulfamethoxazole (Bactrim)
Overlooking Pertussis

- Anyone can get pertussis
  - On track for 50,000 reported cases in 2012
- Don’t overlook during flu season
  - Pertussis can occur at any time of year
- Flu: No cough or dryer cough, aches/systemic, fever
- Pertussis: No/low-grade fever, coughing, congestion (more like common cold)
Professional Resources

- Videos
  - Demonstrations
- PCR best practices
- Diagnostic timeline
- Vaccine recommendations
  - Summaries
  - Q&As
- Webcast
- Collaborating with AAP, Medscape, and others

www.cdc.gov/pertussis/clinical
VACCINATION & EPI TRENDS
Pertussis Immunization in the US

- **Infants/children**
  - Widely used since 1940s
  - Transitioned from DTP to DTaP throughout the 1990s
  - DTaP at 2, 4, 6 months; 15-18 months; 4-6 years
  - Children 7 through 10 years not fully immunized against pertussis should receive a single dose of Tdap

- **Adolescents/adults**
  - Licensed in 2005, recommended in 2006
  - Single Tdap, preferred at 11-12 years
  - All adolescents/adults who did not receive at 11-12 years should receive a single dose as soon as feasible (includes pregnant women and those 65 yr and older)
    - Tdap can be administered regardless of interval since the previous Td dose
Reported NNDSS Pertussis Cases: 1922-2011

Number of cases

Year


DTP


Tdap

DTaP

SOURCE: CDC, National Notifiable Diseases Surveillance System and Supplemental Pertussis Surveillance System and 1922-1949, passive reports to the Public Health Service
DTaP Coverage Among Children Aged 19 Through 35 Months — 2004-2011

CDC National Immunization Survey
Reported Pertussis Incidence by Age Group: 1990-2011

Incidence rate (per 100,000)

Year


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

SOURCE: CDC, National Notifiable Diseases Surveillance System and Supplemental Pertussis Surveillance System
EVALUATION OF DTaP VACCINE EFFECTIVENESS (VE) AND DURATION OF PROTECTION
# Pertussis Disease Among Unvaccinated Compared to Vaccinated Children

<table>
<thead>
<tr>
<th>Vaccination Status</th>
<th>Pertussis</th>
<th>OR (95% CI) *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unvaccinated</td>
<td>Case: 53</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Control: 629</td>
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* Accounting for clustering by county and provider
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<th>Control (n)</th>
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Tdap IMPLEMENTATION AND IMPACT
Tdap Coverage Among Adolescents Aged 13–17 years — 2006–2011

Percentage (%)

- 2006: 10.8
- 2007: 30.4
- 2008: 40.8
- 2009: 55.6
- 2010: 68.7
- 2011: 78.2

Incidence of Reported Pertussis — 1990–2010

Cases/100,000 Population

Year


TDap

CDC unpublished data

Overall
Accelerated Decline of Pertussis

Rate ratios of pertussis incidence among adolescents 11-18 years, 1990-2009

Slope = -0.4752, p<.0001

Slope = +0.2225, p<.0001

### Absence of Indirect Effects of Tdap

Mean incidence of reported pertussis among infants

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<th>2006-2009 (post-peak)</th>
<th>p-value</th>
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</thead>
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<td>Mean incidence</td>
<td>52.1</td>
<td>55.4</td>
<td>0.64</td>
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<tr>
<td>(per 100,000)</td>
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Tdap and DTaP Studies
Summary and Conclusions

- Tdap program has reduced the burden of pertussis in adolescents
- No evidence for “herd immunity”
- Excellent initial DTaP vaccine effectiveness
- Modest but immediate waning of immunity from DTaP
- Pertussis burden in children aged under 10 years appears to be a “cohort effect” from change to all aP vaccines
  - i.e. a problem of susceptibility despite vaccination
2012 U.S. PERTUSSIS ACTIVITY
Reported NNDSS Pertussis Cases: 2012 (44th Week)

<table>
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<tr>
<th>Current week</th>
<th>Previous 52 weeks</th>
<th>Cum 2012</th>
<th>Cum 2011</th>
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<td>Med</td>
<td>Max</td>
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<td>159</td>
<td>681</td>
<td>1,221</td>
<td>34,867</td>
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Changes in Pertussis Reporting by State from 2011 to 2012* †

*Data for 2012 are provisional and subject to change.
†Cases reported through Week 37 in 2011 were compared with cases reported through Week 37 in 2012; fold-changes were calculated for each state.

*2012 data are provisional and reflect cases reported to NNDSS through September 4.
SOURCE: CDC, National Notifiable Diseases Surveillance System and Supplemental Pertussis Surveillance System and 1922-1949, passive reports to the Public Health Service
VACCINATION STRATEGIES TO PROTECT INFANTS
Source of Pertussis Transmission to Infants

- <50% of infants with pertussis had a potential source identified

- Of identified sources, household members responsible for 75%–83%

- Parents and siblings were common sources
  - Parents (55%)
  - Siblings (16%-20%)
  - Aunts/uncles (10%)
  - Friends/cousins/others (10%-24%)
  - Grandparents (6%)
  - Caretakers (2%)

Pregnancy and Cocooning
ACIP Recommendations

- Vaccinate pregnant women, preferably during the third or late second trimester. Alternatively, administer Tdap immediately postpartum.

- Cocooning is the strategy of vaccinating all close contacts of infants with Tdap to reduce the risk of transmission:
  - Ideally at least 2 weeks before contact with the infant
  - Parents, siblings, grandparents, child-care providers and health-care personnel
Shifting the Timing of Mother’s Tdap Dose: Postpartum to Pregnancy

- Provides earlier benefit to mother, thereby protecting infant at birth
- High levels of transplacental maternal antibodies in infants of mothers vaccinated during pregnancy
  - Likely provides direct immunity to infant

Pregnancy

Postpartum
Final Epi Thoughts...

- Pertussis continues to be a significant public health problem
- Vaccination is our best prevention tool
- Goal is no infant deaths
  - Improve Tdap coverage in adults
  - Remove barriers to vaccination of pregnant women
  - Implement cocooning
- Maintain high levels of coverage with DTaP
- Continue to evaluate and refine vaccination policy and prevention and control recommendations
PERTUSSIS COMMUNICATIONS
Communications Goals

- Increase awareness among general public and providers about:
  - Vaccine recommendations (prevention/control)
  - Seriousness of disease in infants and need for rapid treatment
  - Signs/symptoms

- Increase providers’ recognition of pertussis and use of appropriate tests

- Develop resources and inform partners of these resources to promote clear, consistent communication

Calls to Action:

- Know the signs and symptoms and seek treatment (no whoop)
- Get vaccinated
Call to Action: Get Vaccinated
Maximizing the Vaccination Program

- Sustain DTaP coverage
- Increase Tdap coverage
- Vaccinate to protect infants/Cocooning
Pertussis Key Messages

- One of the most commonly occurring vaccine-preventable diseases in the US, with cases typically reported annually in every state
  - 2010 last peak year, with 27,550 reported cases – the most since 1959
  - Fully vaccinated people can catch this very contagious disease
- Can be serious, especially for young children including hospitalization/death
- Vaccines are the safest and most effective tool for preventing pertussis; no longer seeing 200,000 cases per year as in the pre-vaccine era
- Vaccines are recommended for children, adolescents and adults
- Waning immunity – vaccine protection decreases over time
  - Duration of protection may differ for DTP vs. DTaP
  - This year is first cohort of teenagers who got only DTaP for all 5 doses
  - Looking into duration of protection for Tdap
- Illness is typically milder in those who have been vaccinated, protecting from severe disease
Outbreak Support and Technical Assistance to States

- **Communication Support**
  - Strategy
  - Linkages
  - Key Messages
  - Media Outreach (Leveraging Resources / providing CDC spokespeople)
  - Materials – public and healthcare providers
  - NPHIC collaboration will bring addition tools/support

- **Epi Support**
Media Outreach Efforts

- Media Inquiries
- National Telebriefing – July 19
  - 5 states, 25 million impressions
- Ethnic Media Roundtable
- Social Media Outreach
- Matte Articles
- Web

CDC: Nation on track for most whooping cough cases since 1959; adults urged to get vaccinated

The return of whooping cough
Social Media

**Facebook**
- Ranked #1 in July for CDC highest engagement
- 434 likes (top 25 of CDC postings)
- 764 shares (highest # CDC shares this year)
- 697 click throughs
- 46,164 reach (4th for CDC this year)
- 66 comments (typical average is 10)
Reaching Expectant Mothers

CDC Urges Pregnant Women to Get the Whooping Cough Vaccine

Did you know there’s a whooping cough epidemic going on? Why the CDC is urging pregnant women to get the vaccine: bit.ly/O2KQk3

Retweets 20
Favorites 3
Parent and Public Resources

- Disease overview
  - Audio and video of “the cough”
- Vaccine recommendations
- Diagnosis and treatment guidelines
- Multimedia
  - Podcasts
  - Videos
  - ecards
  - Print materials
  - Matte articles
  - Photo novela
  - Photos

www.cdc.gov/pertussis

Can also use www.cdc.gov/whoopingcough
Posters, Billboards and Bus Ads

- Posters: 2 Sizes
- English/Spanish
- Co-branding

Website

- **Outbreak Webpage**
  - Trends, US map
  - Examples, case counts
  - Publications
  - [www.cdc.gov/pertussis/outbreaks](http://www.cdc.gov/pertussis/outbreaks)

- **Features/Syndicate**
  - [www.cdc.gov/features/pertussis](http://www.cdc.gov/features/pertussis)
  - [www.cdc.gov/espanol/tosferina](http://www.cdc.gov/espanol/tosferina)

Spike after press briefing
Looking Ahead

- New recommendation voted on at October’s ACIP Meeting (Tdap during every pregnancy)
- Vaccine effectiveness evaluation in WA state – results expected in 2013
- Sustaining DTaP coverage
- Increasing Tdap coverage among adolescents (78%), adults (8%) and pregnant women (3%)
- Reaching expectant mothers
- Continue to promote cocooning
- New materials: PSA, infographics, print and digital materials
Thank you!

Please visit www.cdc.gov/pertussis

Questions? E-mail MVPDB@cdc.gov

For more information please contact Centers for Disease Control and Prevention
1600 Clifton Road NE, Atlanta, GA 30333
Telephone, 1-800-CDC-INFO (232-4636)/TTY: 1-888-232-6348
E-mail: cdcinfo@cdc.gov Web: www.cdc.gov

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.