The State of Pertussis in California

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Outline

• Very brief background
• Current epidemiology and how it has changed
• Control strategies:
  – Pertussis in adolescents
  – Pertussis in infants
Pertussis (whooping cough)

- Caused by *Bordetella pertussis*; characterized by prolonged cough
- Affects persons of all ages; most severe disease and nearly all deaths occur in infants <4 months of age
- Cyclical peaks (every 3-5 years) have been increasing nationwide since 1990s
  - Reasons for this include 1) Greater awareness 2) PCR diagnostics 3) Change from wP => aP vaccines 4) Evolution of bacteria?
- Beyond infancy, the peak age of disease activity is shifting upward
  - The peak in 2010 was age 10 and in 2014 was age 14-16
  - This is the cohort that has received only acellular vaccine
Number and incidence of reported pertussis cases by year of onset -- California, 1945-2016*

*Includes cases reported to CDPH as of 1/23/2017
Pediatric pertussis cases by age - California 2010 and 2014*

*Reported to CDPH as of 6/10/2015
High School outbreaks

• Incidence among older children and adolescents has been increasing nationwide

• Numerous reports in CA of HS pertussis outbreaks

• 29% of pediatric cases in 2014 were in 14-16 yo age group and nearly all (98%) with data were vaccinated with Tdap
  – Median time since last pertussis vaccine was 3 years (Tdap)
  – Less than 0.5% of cases in this age group were hospitalized; none were severely ill

• San Diego study found that of 13-17 yo adolescents with pertussis\(^1\)
  – 96% were previously-vaccinated with Tdap
  – Mean of 5.4 days of school missed (due to illness exclusion?)
  – Societal cost of $315/household

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Managing High School Outbreaks

• There is little data to demonstrate effectiveness of prevention and control measures
• The benefit of excluding cases until completion of 5 days of abx is unclear
• No CDC/CDPH definition for an outbreak
• CDPH recommends notification of the school community, with the goal of identifying persons at highest risk (e.g., pregnant women and infants) and assist in earlier identification of new cases.
Adolescent Tdap

- Recent studies estimate Tdap effectiveness at 60%-67% in the first year and declining rapidly by 2-4 years after receipt\(^1,2,3,4,5\)
  - One study found that Boostrix was more effective than Adacel
  - One study also concluded that routine Tdap did not prevent outbreaks\(^5\)
- ACIP voted against Tdap boosters for general public
  - Not considered cost-effective on a population level due to short duration of immunity; only recommended for pregnant women
- No data available to estimate the current impact of Tdap
- CDPH issued letter to ACIP to request formal review of the adolescent Tdap recommendation

Tdap for pregnant women

• In this changing landscape of pertussis, prevention of severe disease and death among infants has become the top priority in pertussis control.

• ACIP, ACOG and AAFP recommend Tdap vaccine during each pregnancy, preferably in the third trimester between 27-36 weeks gestation, regardless of their Tdap vaccination history.
  – Preferred over the “cocooning”
  – CDPH stressing that women receive Tdap at the earliest opportunity in this window.

• CDC/CDPH feel this is the most important strategy to prevent infection in infants who are too young to be vaccinated.
Pertussis Incidence among infants <4 months of age per 1,000 population, by county - California, 2016
Prenatal Tdap – safe and effective

• Antibodies to pertussis are actively transported across the placenta to the baby, primarily after 30w gestation\textsuperscript{1,2,3}
  • Timing is critical; recent study found that ab avidity (IgG to PT) in umbilical cord significantly higher in newborns when women vaccinated at 27-30w compared to 31-36w and >36w\textsuperscript{4}

• Ab levels in newborns decline rapidly but at 2 mos:
  • Significantly higher among infants whose mothers vaccinated during pregnancy\textsuperscript{5,6}
    • No known correlate of protection, though 66% of newborns had anti-PT levels $\geq 10$ IU/ml\textsuperscript{3}
    • Anti-PT is the most critical in preventing extreme leukocytosis => death

Prenatal Tdap – safe and effective

• Tdap for pregnant women in UK estimated to reduce disease in infants <2 months of age by 90%¹
• Data from California show infants born to mothers that received Tdap during pregnancy had both lower risk of disease and less severe disease when infected, compared to infants born to mothers that received Tdap postpartum²-³
• Repeated doses shown to be safe⁴

Reported Receipt of Tdap Vaccination During Pregnancy, Maternal Infant Health Assessment (MIHA) (California), 2015 Provisional Data

<table>
<thead>
<tr>
<th>Received Tdap vaccine during pregnancy</th>
<th>Prevalence</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Women</td>
<td>49%</td>
<td>47-51</td>
</tr>
<tr>
<td>Medi-Cal</td>
<td>36%</td>
<td>33-39</td>
</tr>
<tr>
<td>Private Insurance</td>
<td>65%</td>
<td>62-69</td>
</tr>
<tr>
<td>Hispanic</td>
<td>39%</td>
<td>35-41</td>
</tr>
<tr>
<td>Black</td>
<td>46%</td>
<td>40-51</td>
</tr>
<tr>
<td>Asian/PI</td>
<td>58%</td>
<td>52-65</td>
</tr>
<tr>
<td>White</td>
<td>62%</td>
<td>58-66</td>
</tr>
</tbody>
</table>


2015 data are provisional. 2015 provisional MIHA estimates are weighted to preliminary California birth certificate data and will differ slightly from MIHA estimates weighted to the final 2015 Birth Statistical Master File.
Enhanced surveillance of infant cases

- Of 55 (56%) pertussis cases <4 months of age reported to CDPH from January 2016 through January 30, 2017
  - 21 (38%) mothers received Tdap during pregnancy
    - Most (86%) were vaccinated during their routine OB visit; 71% rec’d Tdap ≤36 weeks gestation
  - 34 (62%) mothers did not receive Tdap during pregnancy
    - 12 (35%) received Tdap at the hospital at/after delivery
    - 15 (44%) unvaccinated mothers were offered Tdap but refused for various reasons.
- Having Tdap stocked onsite in the mother’s prenatal care provider office was highly correlated with receiving vaccine (p-value=<.0001).
  - Prenatal providers for Medi-Cal patients were less likely to stock than providers of those privately insured.
    - 31 (60%) women participated in Medi-Cal; only 12 (39%) providers stocked Tdap.
    - 21 (40%) women had private insurance; 13 (62%) providers stocked Tdap.
  - Inadequate reimbursement and cost of vaccine are the most commonly cited reason for not stocking Tdap by providers
- Current off-site referral practices are not working.
  - Only 2 of the 13 mothers who were referred off-site received Tdap.
December 30, 2016

To: Medi-Cal Managed Care, Fee-For-Service and Comprehensive Perinatal Services Program Prenatal Care Providers, the California Association of Health Plans (CAHP), Local Health Plans of California (LHPC), and members of the American College of Obstetricians and Gynecologists (ACOG), the California Nurse Midwives Association (CNMA), the California Academy of Family Physicians (CAFPM), the National Hispanic Medical Association (NHMA), the California Medical Association (CMA), the Network of Ethnic Physician Organizations (NEPO), California Association of Physicians Groups (CAPG), and the California Primary Care Association (CPCA)

cc: The California Conference of Local Health Officers (CCLHO) and the County Health Executives Association of California (CHEAC)

SUBJECT: Implement Prenatal Tdap Program to Prevent Infant Pertussis in California

California recently experienced its second pertussis infant death of 2016. One of these deaths was in a healthy, full-term Hispanic baby. Hispanic infants are 40% more likely to be reported with pertussis in comparison to non-Hispanic White infants in California.*

These deaths are a devastating reminder that all prenatal care providers should have a program in place to ensure that all pregnant women are immunized with Tdap at the earliest opportunity between 27-36 weeks gestation of every pregnancy, regardless of the mother’s Tdap history. At least two weeks are needed for the development of sufficient maternal antibodies to be transplacentally transferred to the infant, so it is preferred that the immunization be administered at the beginning of the third trimester. Since postpartum Tdap vaccination and coecocooning does not provide direct protection to the infant, these two strategies alone are no longer considered optimal for preventing infant pertussis.

The California Department of Public Health (CDPH) strongly recommends that every prenatal care provider have a prenatal Tdap program that includes the following activities:

1. If vaccinating on-site:
   a. Routinize the offer of prenatal Tdap for all pregnant women at the beginning of the third trimester to protect babies who might be born prematurely. Consider combining Tdap vaccination with the glucose screening test at 25 weeks and/or calling your electronic health record (EHR) vendor to request a flag that automatically reminds you to offer the vaccination to all prenatal patients. See also state regulations on standardized nursing procedures you can implement (an example is available at: http://bit.do/nursingprocedures).
   b. Ensure that staff members are aware of their important role in helping ensure Tdap vaccination at the earliest opportunity between 27-36 weeks gestation of every pregnancy.

* CDPH data presented in this report is provisional data only. 2013 provisional MHA estimates are weighted to preliminary California birth certificates data and will differ from MHA estimates weighted to final 2013 Birth and Vital Statistics File.
Summary

• It is likely CA will experience increases in pertussis incidence in the coming year

• Public health focus has changed from reducing overall morbidity to targeting those at highest risk of severe disease and death
  – This occurs almost exclusively among young infants <4 mos of age
  – Key strategies are vaccinating pregnant women starting at 27 weeks during each pregnancy and ensuring infants receive DTaP on time, starting as early as 6-8 weeks

• Prenatal Tdap rates in CA still suboptimal
  – CDPH requests that LHDs continue to investigate infant cases to identify systematic barriers that can be eliminated and collaborate with MCH programs locally
Thank you!

Data:
Updated surveillance summary:
http://www.cdph.ca.gov/programs/immunize/Pages/PertussisSummaryReports.aspx
Updated VPD report (2015):

Quicksheet:

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