Addressing an Epidemic: The Clinicians' Role in Preventing Pertussis

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Presented by:
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Co-sponsor:
California Immunization Coalition

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Objectives

Be able to describe pertussis

- Epidemiology in California during 2010
- Clinical presentation of illness
- Diagnosis
- Treatment
- Immunization recommendations
  - Ways to improve current low immunization rates in adults and adolescents to protect Californians, especially vulnerable young infants

Pertussis (Whooping Cough)

- Highly contagious bacterial respiratory disease
  - Spreads easily by aerosols or droplets
  - High community immunity level (92+%) needed to stop transmission – US levels far lower

- Affects all ages - young infants most vulnerable
  - ✓Highest rates of illness, hospitalization, death
  - ✓Exposed to infected close contacts

First-Hand Video Stories Online

www.ShotByShot.org

All Ages Vulnerable to Pertussis!

- <6 months: too young to be fully immunized
  - **Most of hospitalizations and deaths occur <3 months**
  - **Exposed to infected household contacts**
    - ✓**Parents , most often mothers, sibs, others**

- 6 months – ~10 years: protected if immunized
  - **5 doses of DTaP vaccine given from as early as 6 weeks – 5 years**
  - **Immunity wears off years after immunization or disease**

All Ages Vulnerable to Pertussis!

- Preteens – elderly: vulnerable once again
  - Disease on average milder – can still debilitate
  - Most cases are not recognized or reported
  - Since 2005: Tdap booster vaccine available
  - Uptake is low: 53% teens[1], ~6% in adults[2]

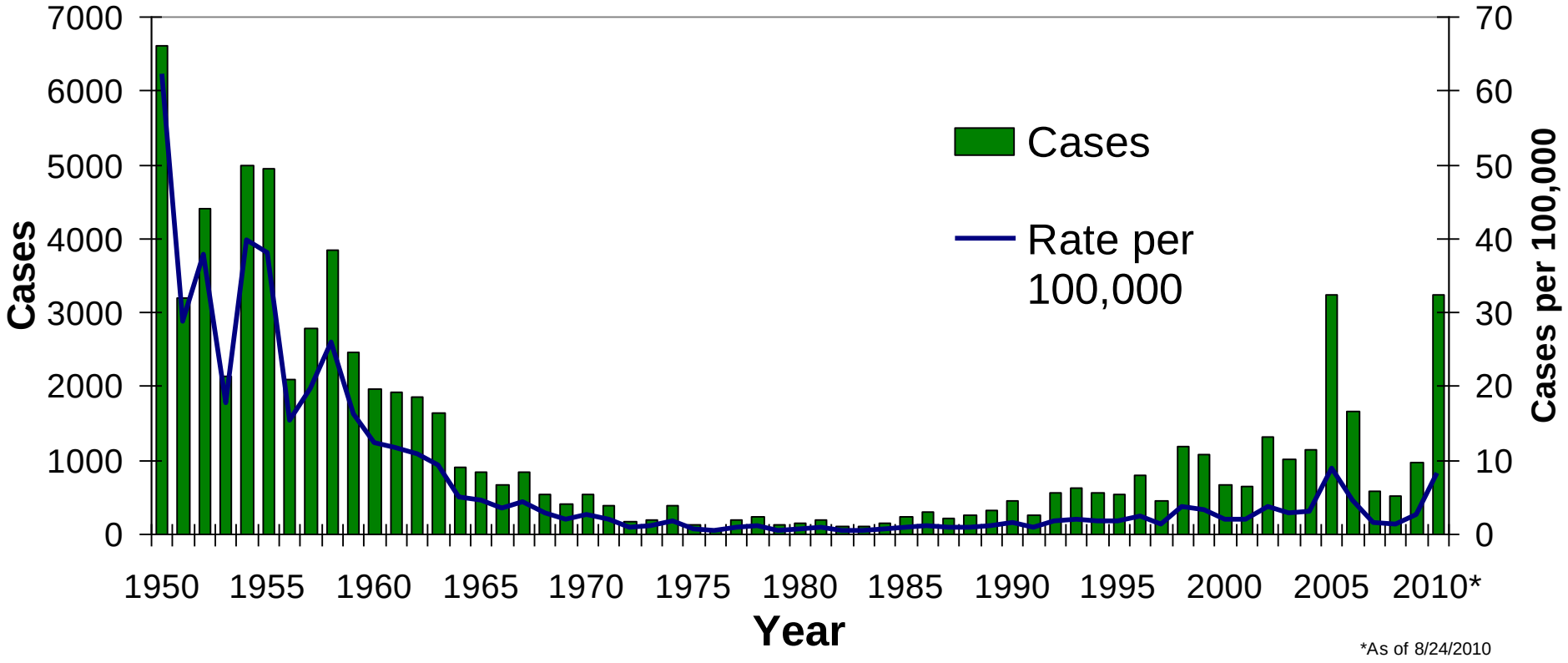
[1] **NIS data for CA, 2009: www.cdc.gov/mmwr/preview/mmwrhtml/mm5932a3.htm**

[2] **cdc.confex.com/cdc/nic2010/webprogram/Paper22766.html**

Cyclical Pattern

- Whooping cough peaks every 2-5 years in California and the U.S.
  - Numbers of susceptible people increase, allowing sustained transmission of disease

Pertussis cases reported in California, 1950-2010

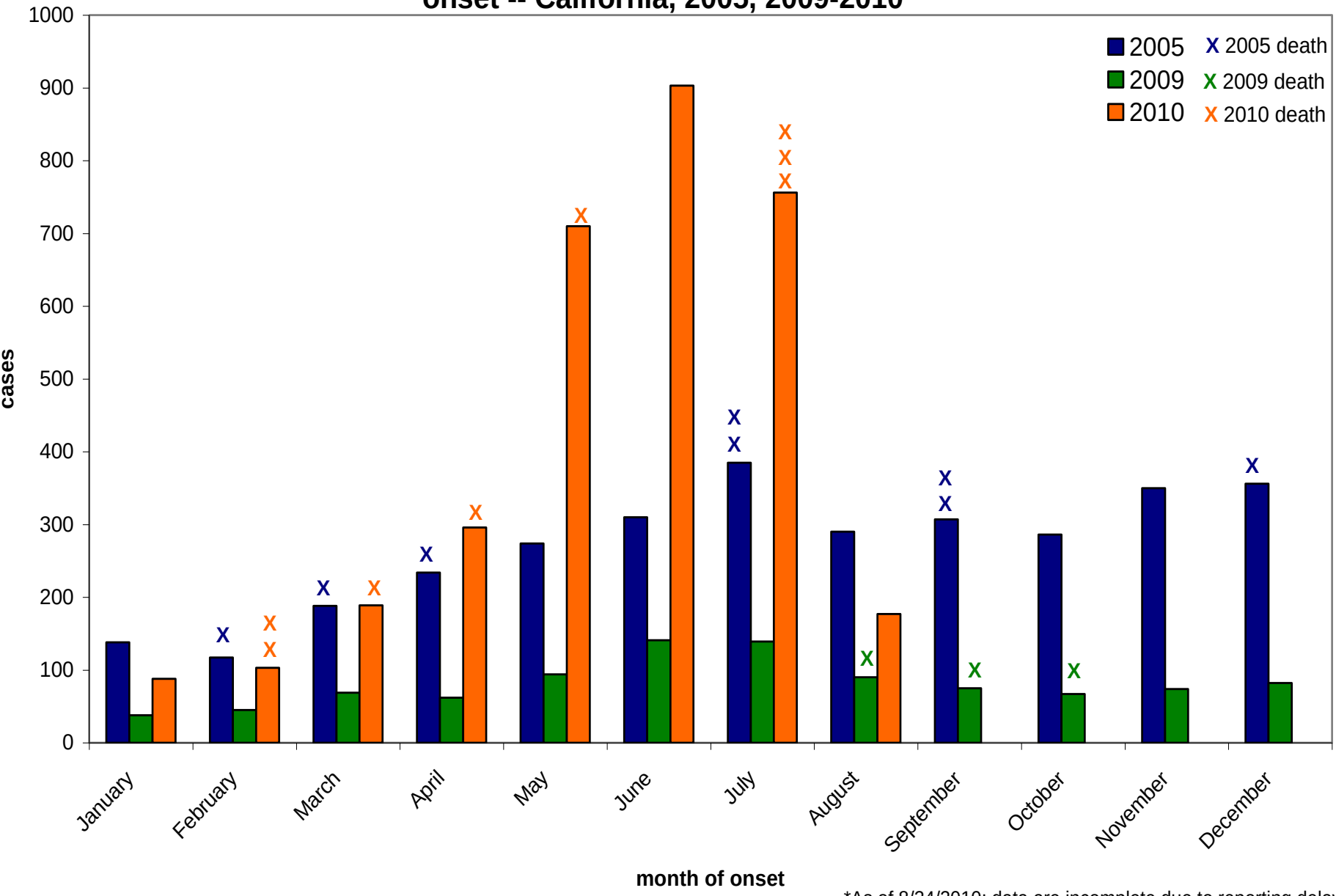


*As of 8/24/2010

CA Pertussis Cases (August 2010)

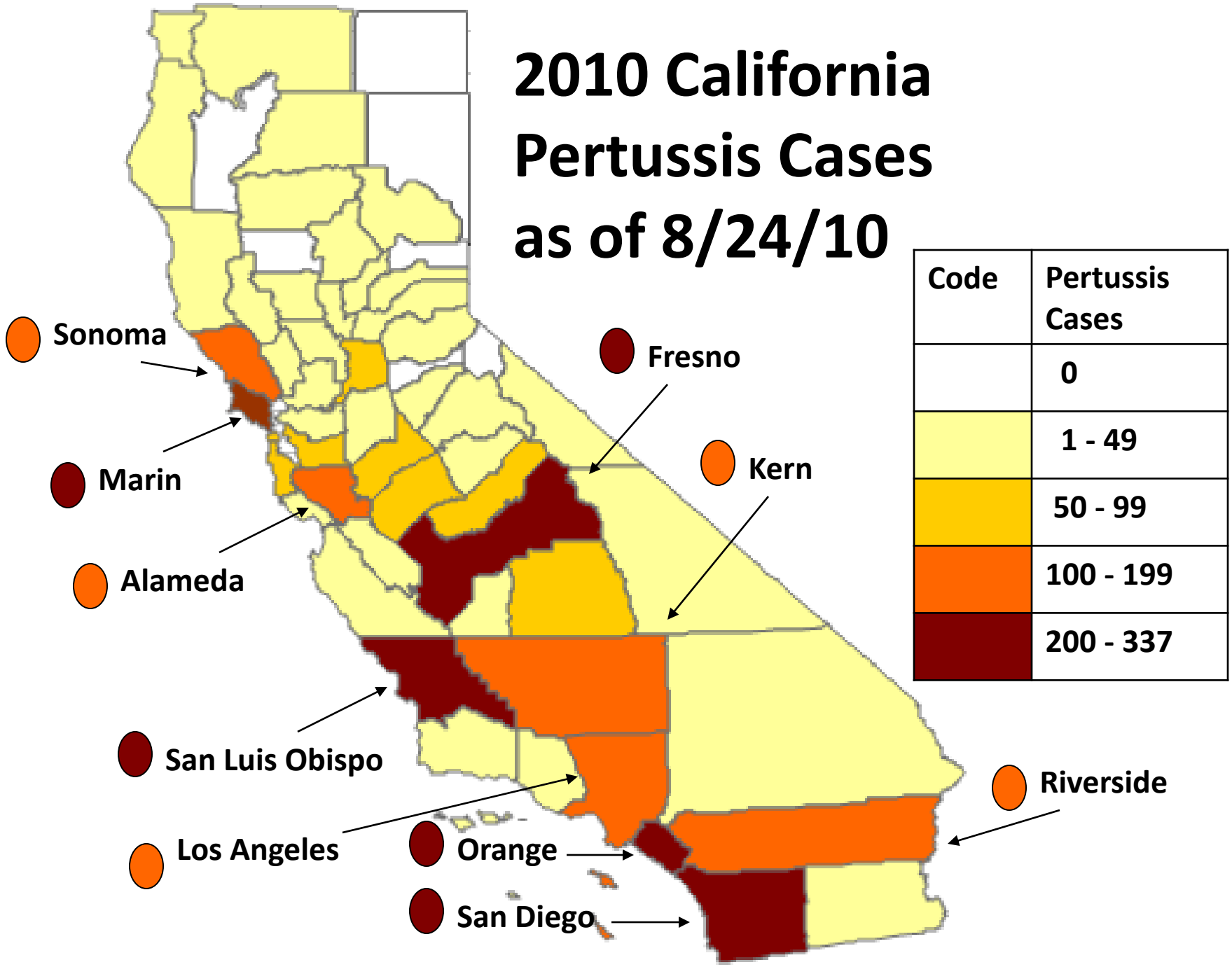
- **3,311** confirmed, probable and suspect cases, 8**.5 cases/100,000**
- **7-fold increase** from reported cases during the same time period in 2009 (**434** cases)
- **8** deaths to date
  - **7 infants <3 months; no DTaP doses**
  - **1 premature infant, age 2 months: 1 DTaP**
  - **Cough illness common in parents or sibs**

Figure 1. Epidemic curve of reported pertussis cases and deaths by month of onset -- California, 2005, 2009-2010*



*As of 8/24/2010; data are incomplete due to reporting delays

2010 California Pertussis Cases as of 8/24/10



Code	Pertussis Cases
	0
	1 - 49
	50 - 99
	100 - 199
	200 - 337

CA Pertussis Rates (8/24/2010)

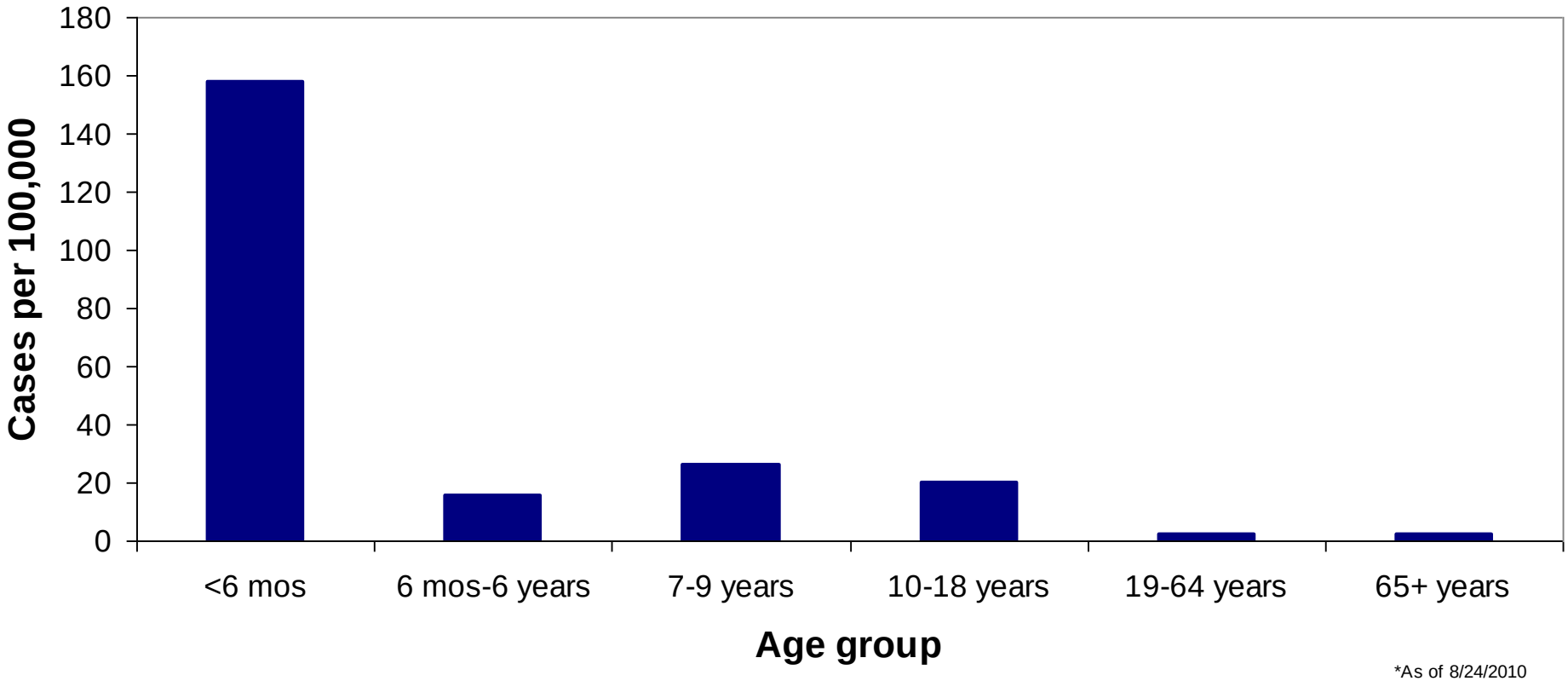
Age

- **<6 months** (158/100,000)
- **7-9 years** (26/100,000)
- **10-18 years** (20/100,000); **peak @ 10 y**

Race/ethnicity – highest for

- **All Ages: Whites** (7.7/100,000)
- **<6 months: Hispanics** (199/100,000)

Rates of reported pertussis by age -- California, 1 Jan - 24 Aug 2010



*As of 8/24/2010

Pertussis Hospitalizations California Jan – Aug 2010

Incomplete data

12% of reported cases hospitalized

- **60% of these <3 months**
- **75% <6 months**
- **79% Hispanic**

2005 Medical charges for pertussis >$23 million[1]

[1]OSPHD hosp. discharge data

Pertussis Symptoms

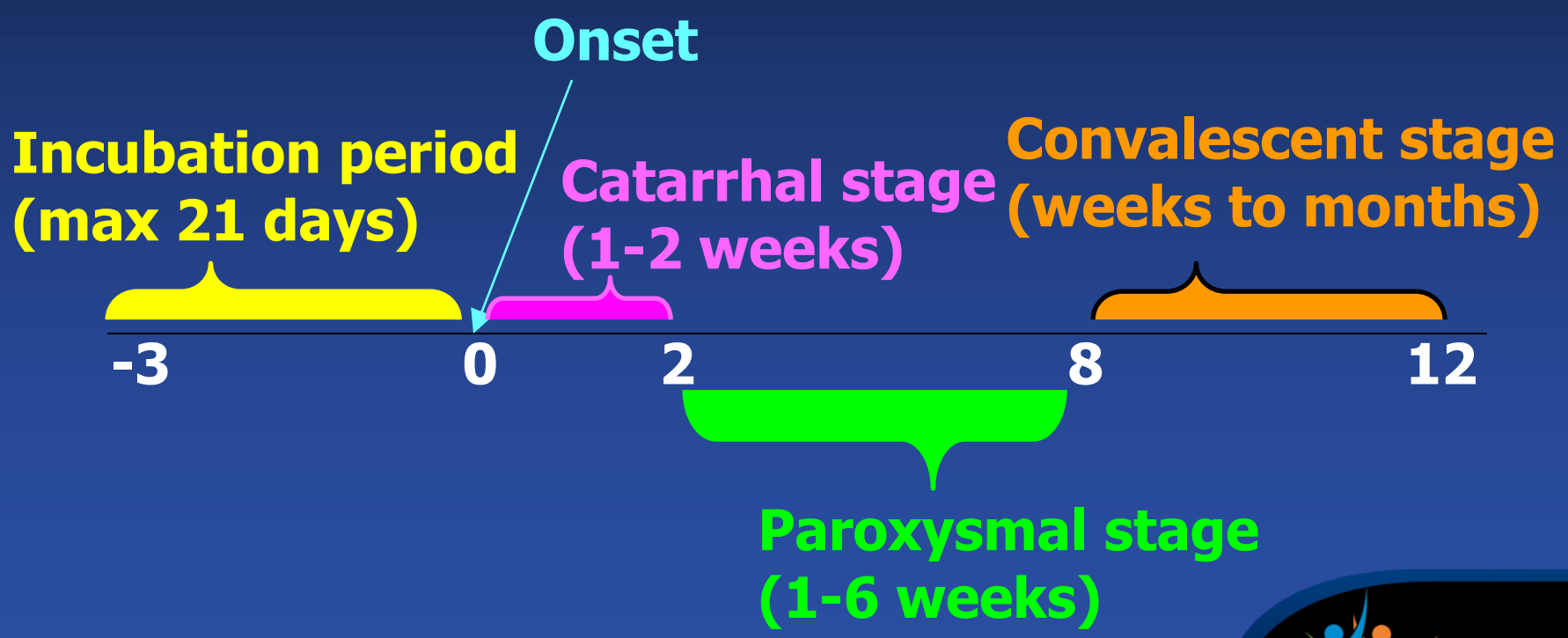
- 3-stage illness (catarrhal, paroxysmal, convalescent) lasts 4-12 weeks

- Typical symptoms
  - **paroxysmal cough**
  - **lack of fever**
  - **no systemic illness**
  - **coryza; no pharyngitis**
  - **Post-tussive vomiting**
  - **Post-tussive whoop**

- Adults
  - **choking sensation, sweating episodes**

Clinical Course (in weeks)

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



Adolescent and Adult Morbidity

Morbidity

- Cough: 97% ≥ 3 weeks, 52% ≥ 9 weeks;
- Paroxysms: ≥ 3 weeks in 73%
- Whoop; Post-tussive emesis not all
- Disrupted sleep 14 days avg
- Complications: pneumonia, cyanosis

Average missed days

- School 5 days ; Work 9 days

Pertussis in Infants

- Initially infant looks deceptively well; coryza, no fever, mild cough
- Leukocytosis with lymphocytosis
- Apneic episodes
- Seizures
- Respiratory distress
- Pneumonia
- Adenovirus or RSV co-infection can confuse picture

Pertussis: Sounds of the Cough

One place to hear the cough:

SoundsOfPertussis.com

Common pertussis misdiagnoses

- Bronchitis
- Asthma
- Gastroesophageal reflux
- Postviral bronchospasm
- Chronic sinusitis
- Tuberculosis
- Chlamydia/mycoplasma infection

Pertussis Diagnosis

Test method	Sensitivity	Specificity
Culture	36%	100%
PCR	95%	98%
DFA (polyclonal)	11%	94%
DFA (monoclonal)	8%	98%

Tilley PAG, Diag Micro and Infect Dis 2000; 17-23

Pertussis Diagnostic Tests

- **Culture**
  - **Still important to send**
  - **Requires special handling, lab notification**
  - **Most likely positive in first weeks of cough**
- **PCR**
  - **More sensitive**
  - **Available in more labs**

- **DFA-*not* recommended**

Culture Sensitivity

- < 50% sensitive

- Factors effecting sensitivity:
  - **Type and quality of specimen**
  - **Time specimen obtained in the course of illness**
  - **Appropriate transport**
  - **Choice of culture media**
  - **Length of time cultures incubate**

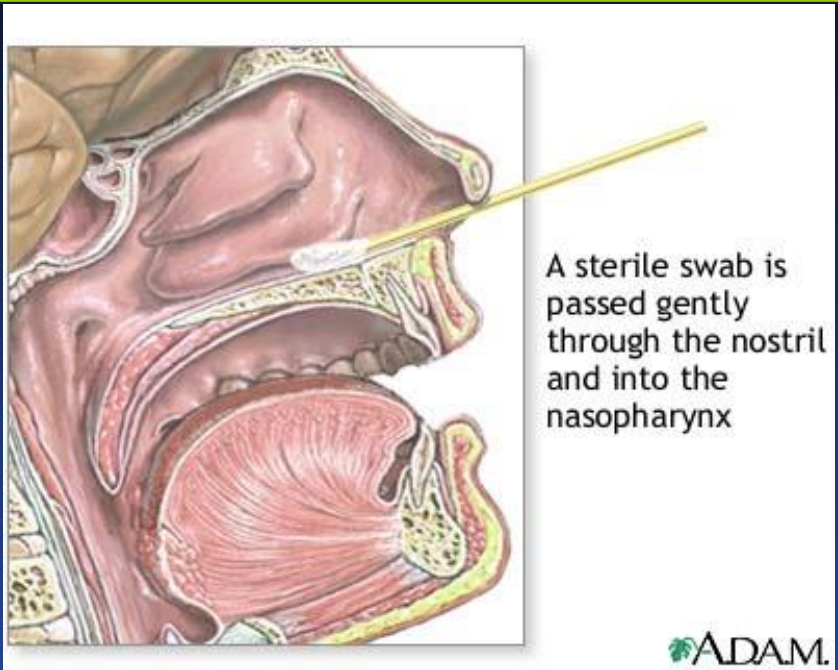
Pertussis PCR

- No commercial FDA-approved kits
- No universal quality assurance criteria
- Potential for false positives
- Still affected by disease phase and antibiotic treatment
- More expensive than culture
- Labs often have not had opportunity to do adequate clinical validation of their test

Specimen Collection

- **Nasopharyngeal specimen**
  - ciliated epithelial cells
  - **NO throat, sputum, or mouth specimens**
  - Normal flora overgrow B. pertussis
- **NP aspirates, washes, or swabs**
  - Commercial syringe/bulb aspiration/wash kit
- **Dacron or rayon swabs**
  - NO cotton or calcium alginate swabs

Specimen Collection

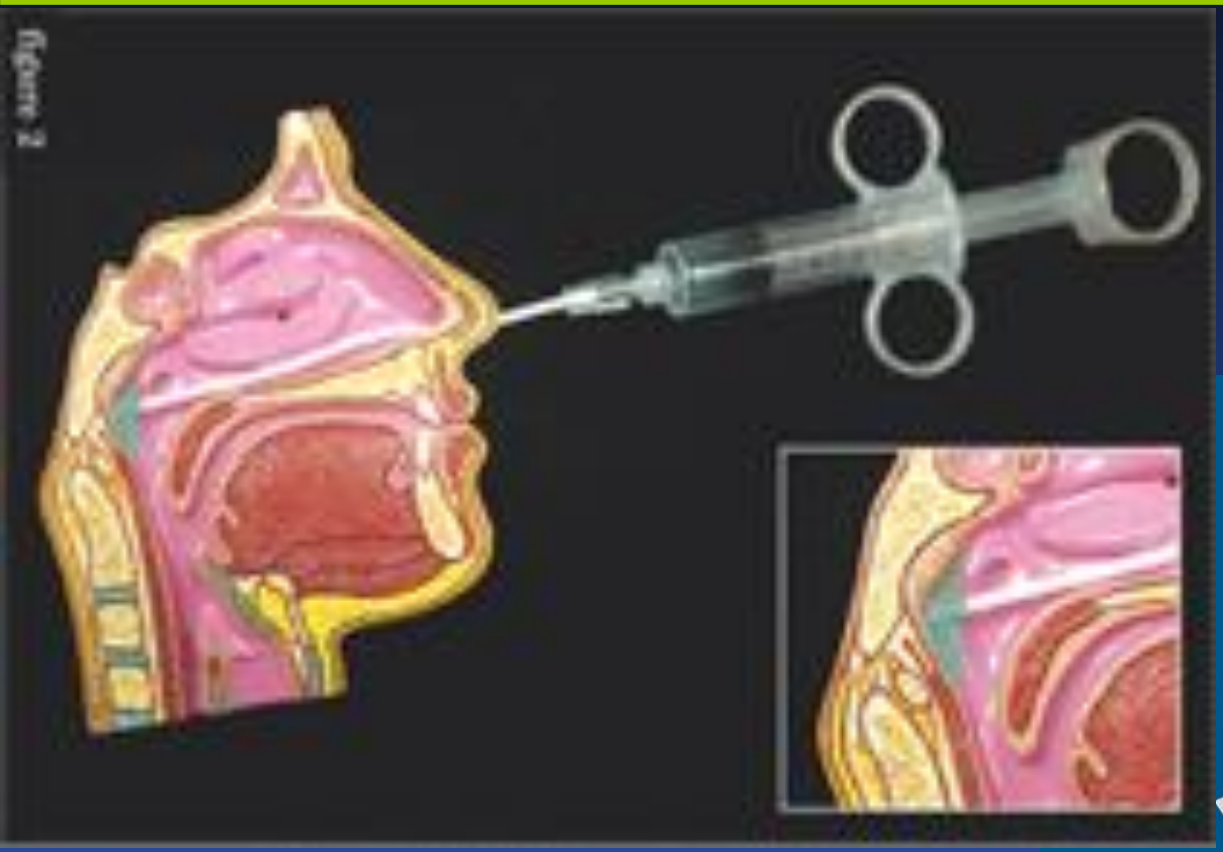


- Nasopharyngeal swab
  - Leave it in 30 seconds
- NP aspirate
  - Use 0.5-1 cc sterile saline & bulb or syringe w/butterfly tubing

Can be used for:

- Culture
- Nucleic acid detection (PCR)

Nasopharyngeal aspirate
Syringe or bulb kits



Limited Role for Pertussis Serology

- Not used for Public Health reporting
- No universal serologic correlate for protection
- Vaccination confounds serology testing
- Serology often unhelpful in making diagnosis
- 4-fold rise in IgG titer can be diagnostic

Where can I send samples for diagnostic testing?

- Commercial labs
- Large hospital labs
- Public Health labs

Conclusions on Diagnostic Tests

- No one test is adequate
- PCR and culture are 2 best available
- The longer you wait after onset of symptoms, the harder to diagnose

- Lack of good diagnostic tests and specific clinical presentation leads one to conclude that immunization is the best strategy to control pertussis in adults.

Pertussis Treatment

- **Macrolide drugs, first choice**
  - Azithromycin for 5 days
  - Erythromycin for 14 days
  - Clarithromycin for 7 days
  - (TMP-SMX for 14 days for macrolide-allergic patients)
- Limited impact on illness but decreases transmission
- Therapy not useful after 21 days of cough

Post-exposure prophylaxis

- **Same drugs and doses as for treatment**
- **Recommended for**
  - **Household contacts**
  - **Daycare contacts**
  - **Other close exposures (health care workers, sports teams)**
  - **Not recommended for most school contacts**

Pertussis Prevention

- Cover coughs, sneezes
- Wash hands often and thoroughly with soap and warm water
- Protect newborns, restrict contacts
- Seek medical care for prolonged cough illness
- IMMUNIZE

Tdap vaccines

- Two FDA-licensed vaccines
  - Boostrix (GlaxoSmithKline) - 10-64 years
  - Adacel (Sanofi Pasteur) for 11-64 years
- Replacement for Td
  - **= Td + reduced dose of acellular pertussis**
- Available through the VFC program

Tdap Recommendations CDC/AAP/AAFP/ACOG/ACP

- Routine use at 11-12 years of age
- Replace Td for all ages 11-64
- Special focus on adults in contact with young infants
  - Health care workers
  - Parents and siblings
  - Grandparents
- No defined minimum interval

New CDPH Tdap Recommendations July 2010

- Immunize pre-teens, teens & adults with Tdap
  - **7-9 year olds who are underimmunized**
  - **≥10 years who have not yet received Tdap, especially**
    - ✓**women of childbearing age, preferably before, or else during or immediately after pregnancy**
    - ✓**others with close contact with young infants**
    - ✓**includes persons >64 years of age**
- No minimum interval between Td and Tdap
- Reminder to promptly immunize young children with DTaP – can start as early as 6 weeks

Tdap in Pregnant Women

- No reports of problems with Td or Tdap during pregnancy
- Immunization during pregnancy with a preference for the 2nd and 3rd trimester recommended by AAP and ACOG

Tdap in the Elderly

- Not currently FDA-approved above age 64 because of lack of large studies
- Main concern would be decreased efficacy, not increased adverse events

Tdap Coverage Rates

- **Adolescents 13-17 years** **53%[1]**
- **Adults 18-64 years** **6%[2]**
- **Proportion of tetanus vaccines given to adults as Tdap** **20.7%**

1) 2009 NIS Data for CA:
www.cdc.gov/mmwr/preview/mmwrhtml/mm5932a3.htm

2) 2008 data: cdc.confex.com/cdc/nic2010/webprogram/Paper22766.html

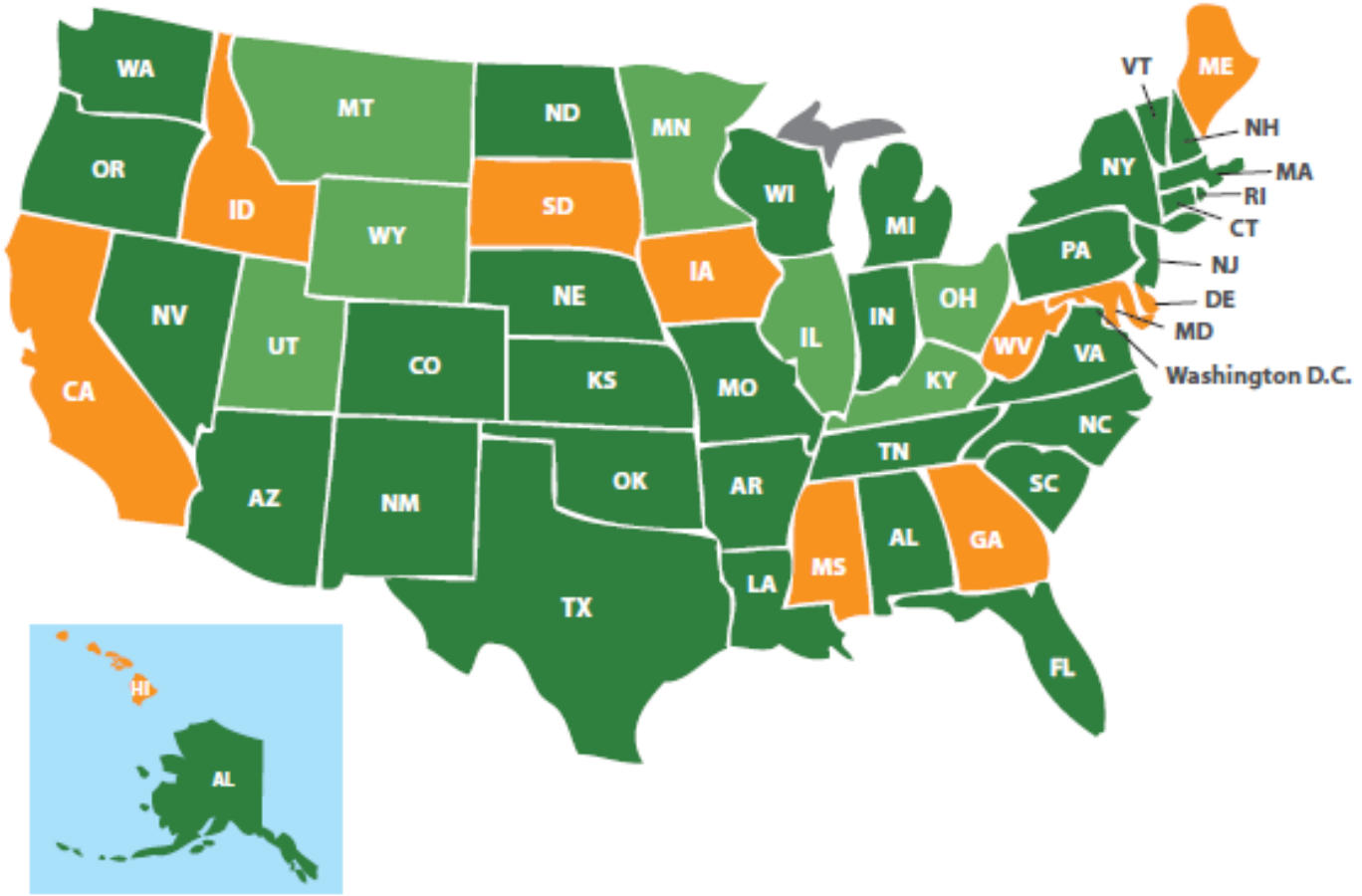
States Requiring a Pertussis Booster Shot for Middle School Students

In 2005 combined tetanus, diphtheria and pertussis (Tdap) booster vaccines first became available in the United States. Since then most states have implemented a pertussis booster shot requirement for at least middle school students.

Tdap mandate
- Alabama
- Alaska
- Arizona
- Arkansas
- Colorado
- Connecticut (2011)
- District of Columbia
- Florida
- Indiana
- Kansas
- Louisiana
- Massachusetts (2011)
- Michigan
- Missouri
- Nebraska
- Nevada
- New Hampshire
- New Jersey
- New Mexico
- New York
- North Carolina
- North Dakota
- Oklahoma (2011)
- Oregon
- Pennsylvania
- Rhode Island
- South Carolina (2011)
- Tennessee
- Texas
- Vermont
- Virginia
- Washington
- Wisconsin

Td or Tdap mandate
- Illinois
- Kentucky
- Minnesota
- Montana
- Ohio
- Utah
- Wyoming

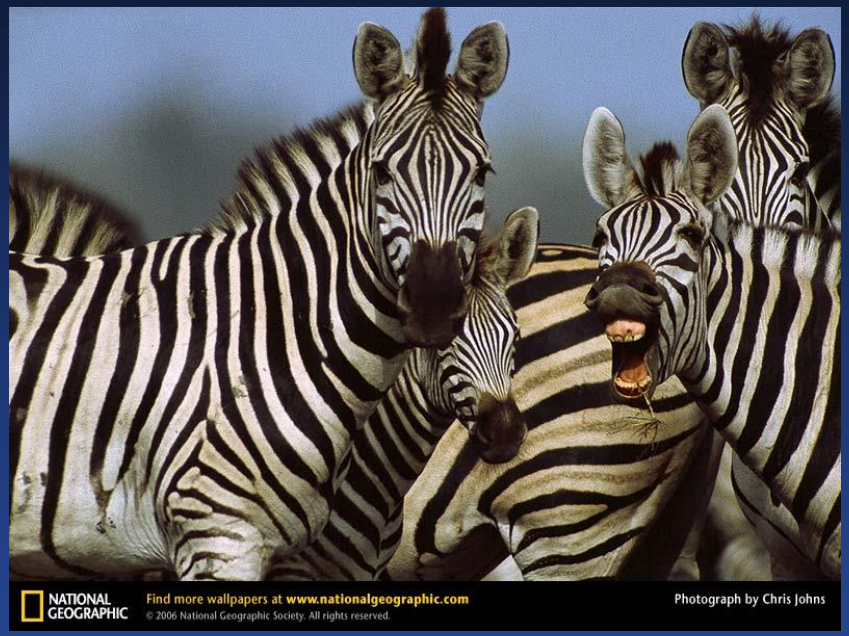
No booster required
- California
- Delaware
- Georgia
- Hawaii
- Idaho
- Iowa
- Maine
- Maryland
- Mississippi
- South Dakota
- West Virginia



Vaccines: A Community Endeavor

Herd immunity important

- Pertussis is very contagious
- Newborns can't be protected by vaccines
- Immunize those around newborns "cocooning"



Effect of Postpartum Tdap Policy?

- Preliminary CDPH data suggest - a lower incidence of pertussis in infants born at hospitals that offer Tdap to their close contacts.

CA Tdap Expansion Program

- Free Tdap to birth hospitals to immunize women post-partum AND their family members
- Extended! Order vaccine by December 31
- Requires a plan for sustaining the program once State supplied vaccine runs out

Summary

- Record pertussis cases in 2010
- Physicians need to raise their awareness of pertussis clinical presentation
- Immunization is the most important intervention to prevent pertussis
- Immunization rates poor for adolescents and adults
- Household contacts of young infants a prime target for immunization

Educate Yourselves, Your Patients

- **EZIZ.org** up-to-date pertussis materials for clinical practice
- **ShotByShot.org** video stories of people touched by vaccine-preventable diseases
- **Vaccine Safety Fact Sheets** on **ImmunizeCA.org** for providers, MAs, and patients.
- **CDPH Immunization Branch**, Pertussis page **GetImmunizedCA.org**