
Welcome!

Addressing an Epidemic: The Clinicians' Role in Preventing Pertussis

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Presented by:
California Department of Public Health

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% teens¹, ~6% in adults²

¹ NIS data for CA, 2009:

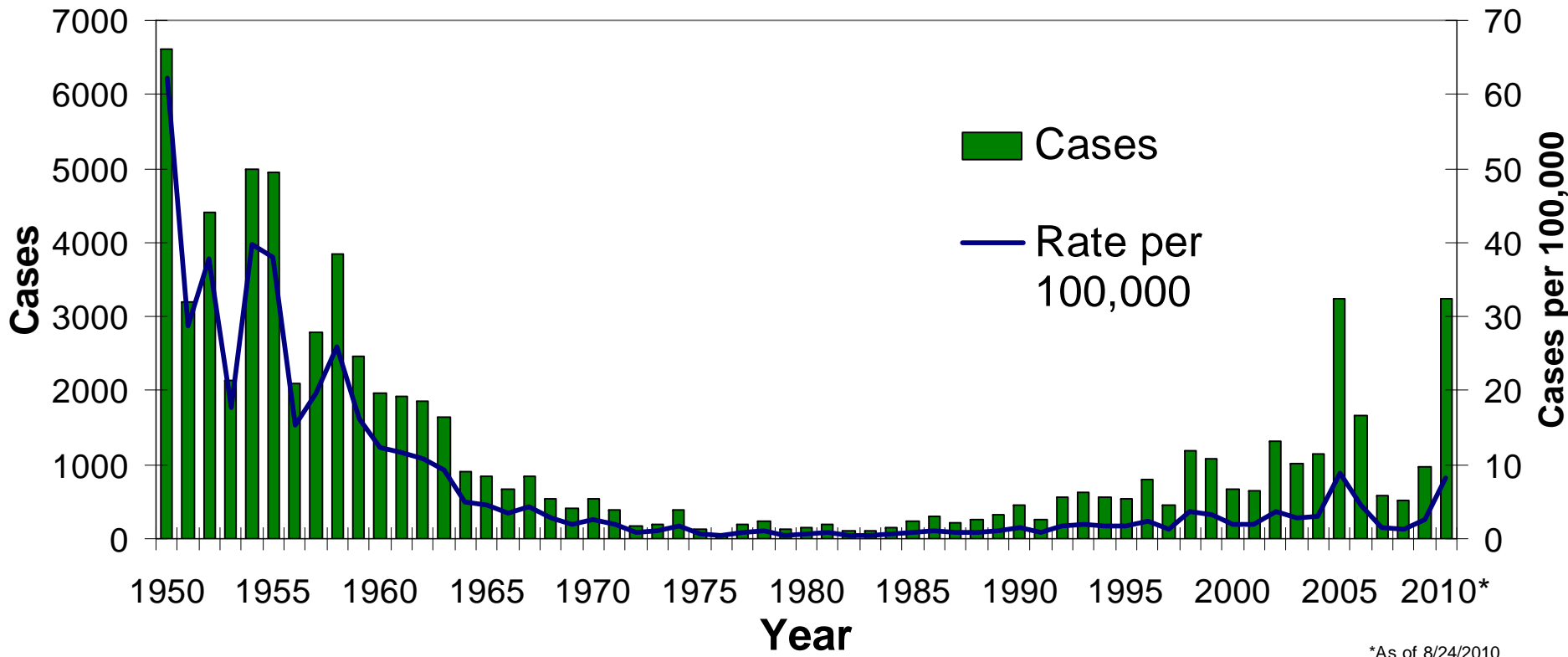
www.cdc.gov/mmwr/preview/mmwrhtml/mm5932a3.htm

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



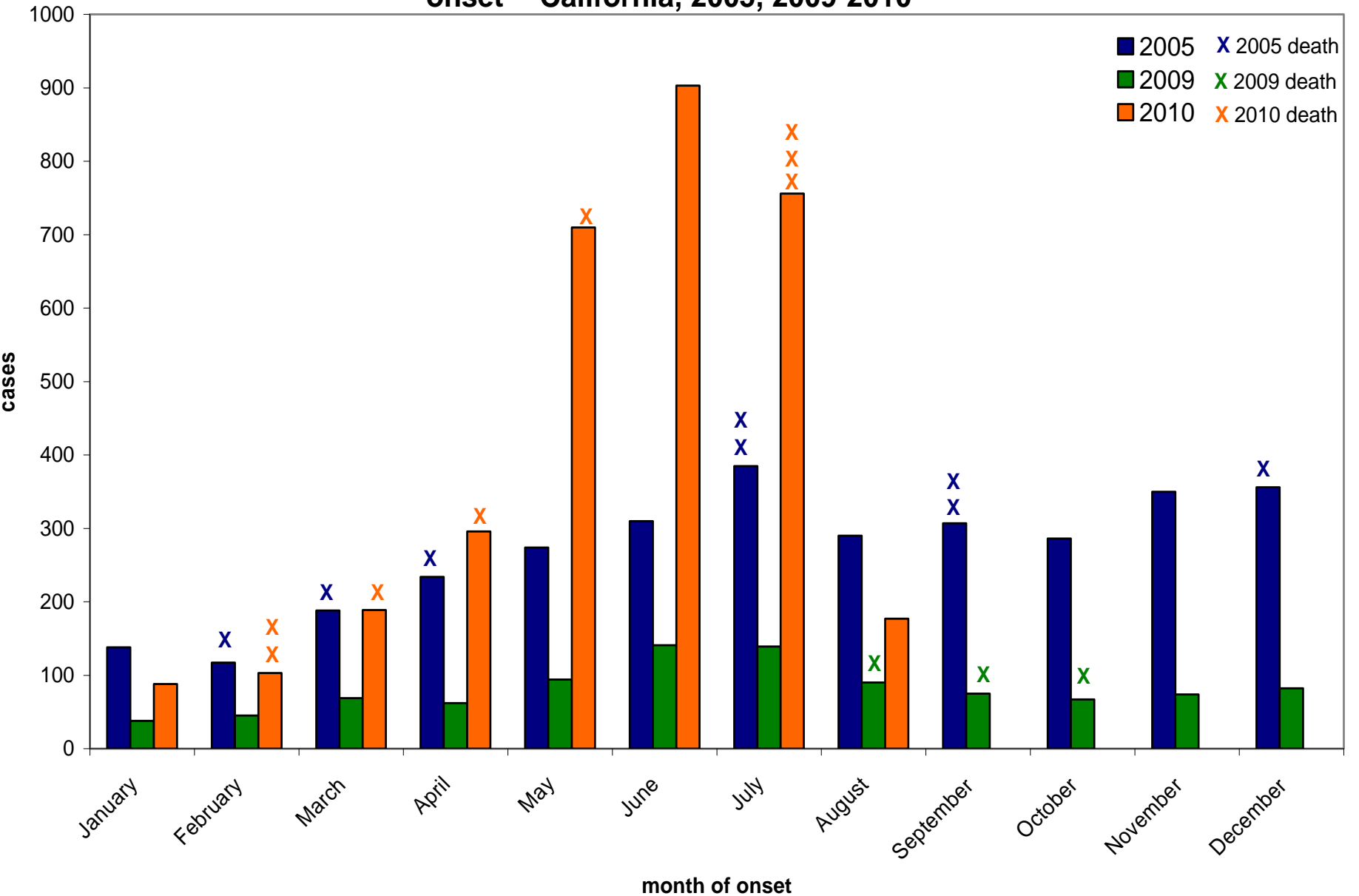
*As of 8/24/2010



CA Pertussis Cases (August 2010)

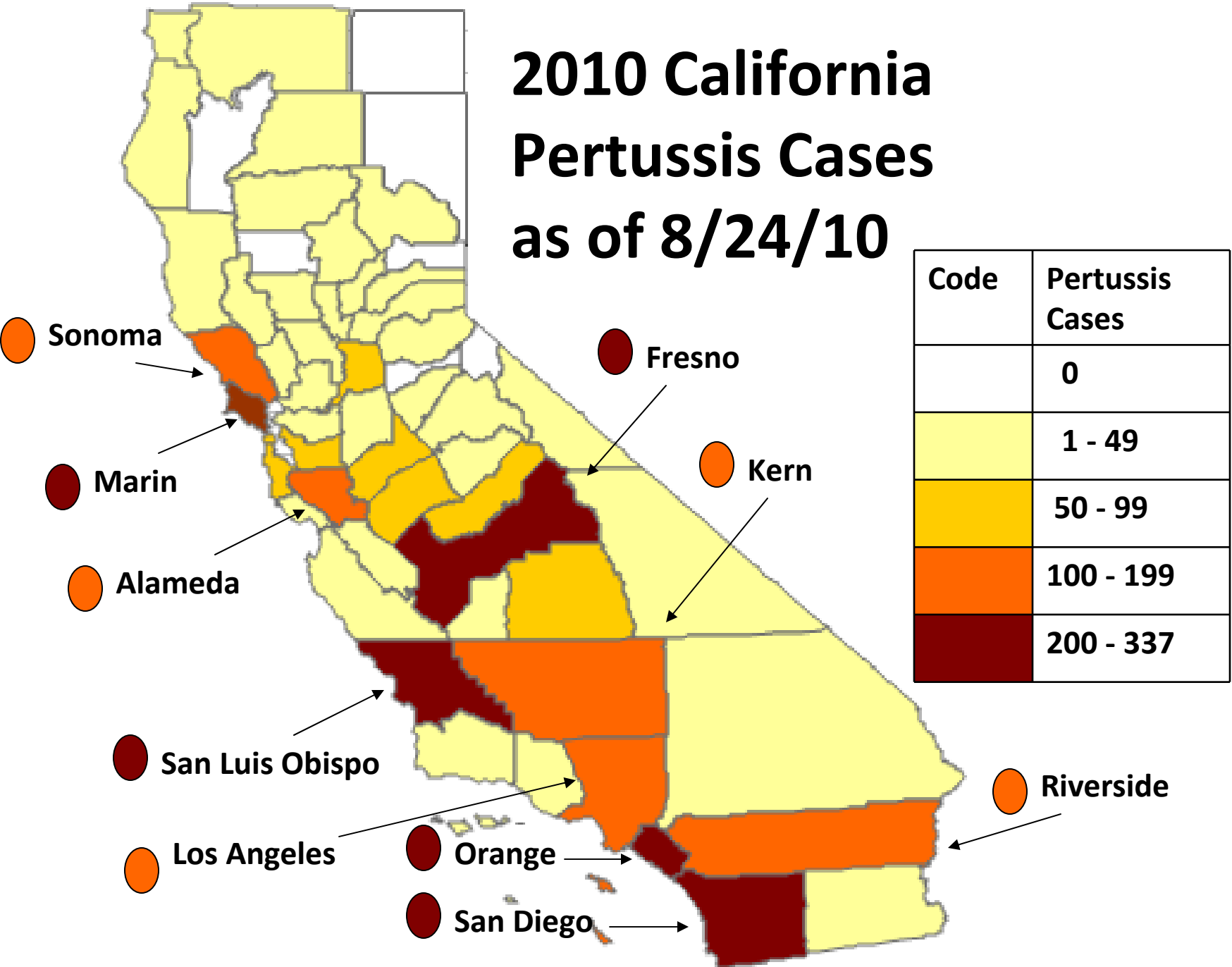
- **3,311** confirmed, probable and suspect cases, 8.5 cases/100,000
- **7-fold increase** from reported cases during the same time period in 2009 (434 cases)
- **8 deaths to date**
 - 7 infants <3 months; no DTaP doses
 - 1 premature infant, age 2 months: 1 DTaP
 - Cough illness common in parents or 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



Sonoma

Fresno

Marin

Kern

Alameda

San Luis Obispo

Riverside

Los Angeles

Orange

San Diego

CA Pertussis Rates (8/24/2010)

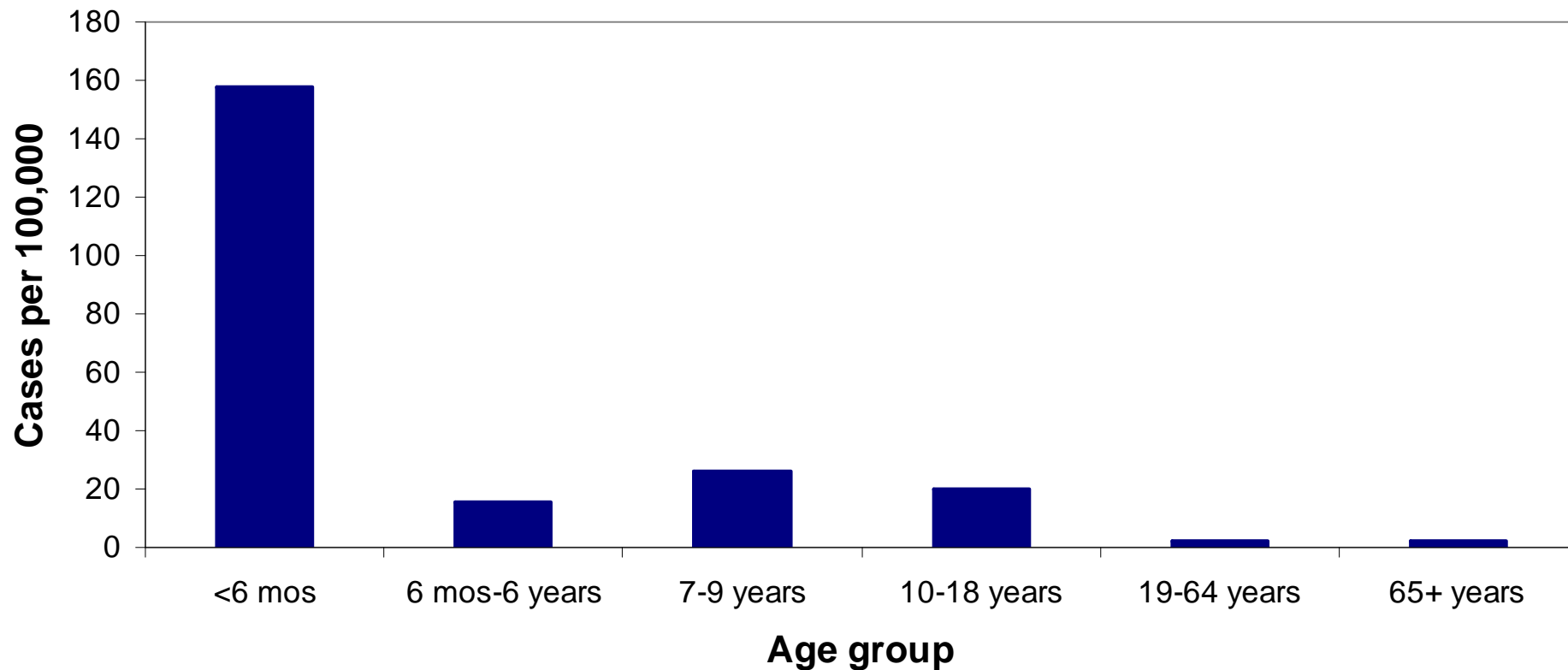
Age

- <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
million¹

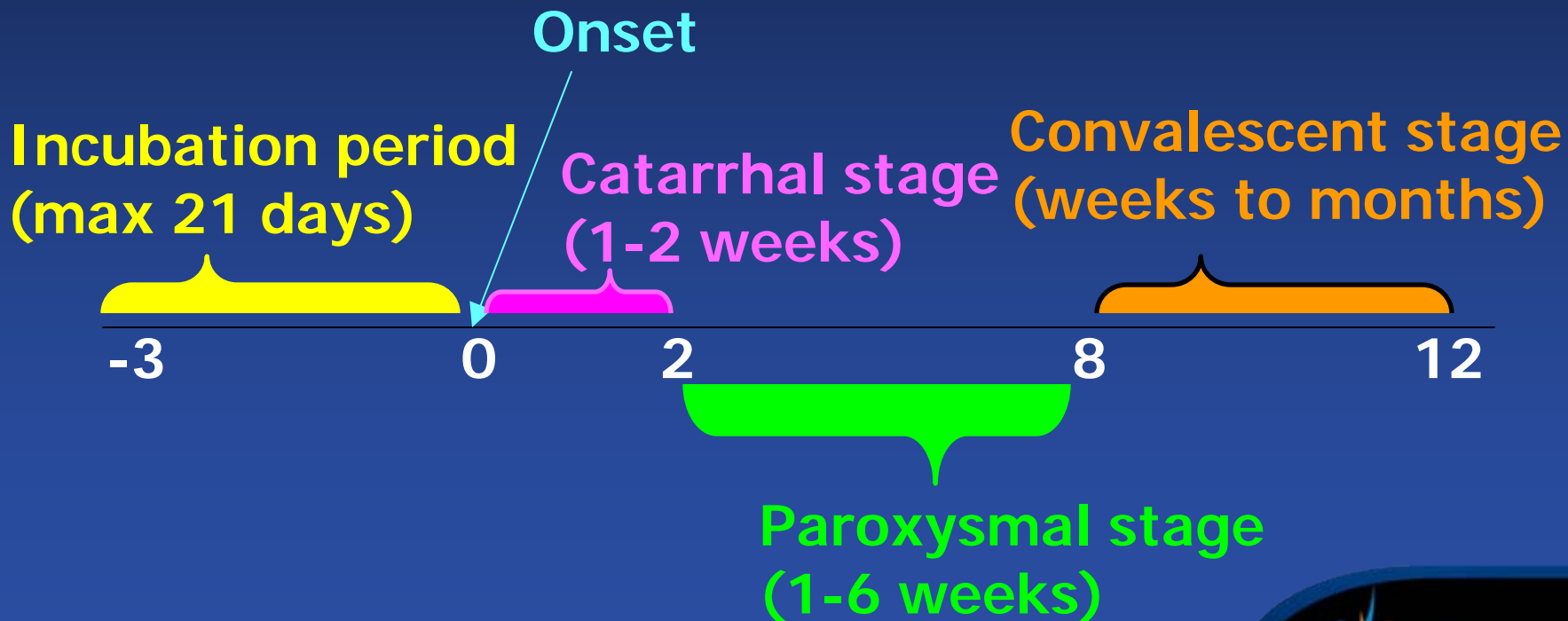
¹ OSPHD hosp. discharge data

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% \geq 3 weeks, 52% \geq 9 weeks;
- Paroxysms: \geq 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:

www.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

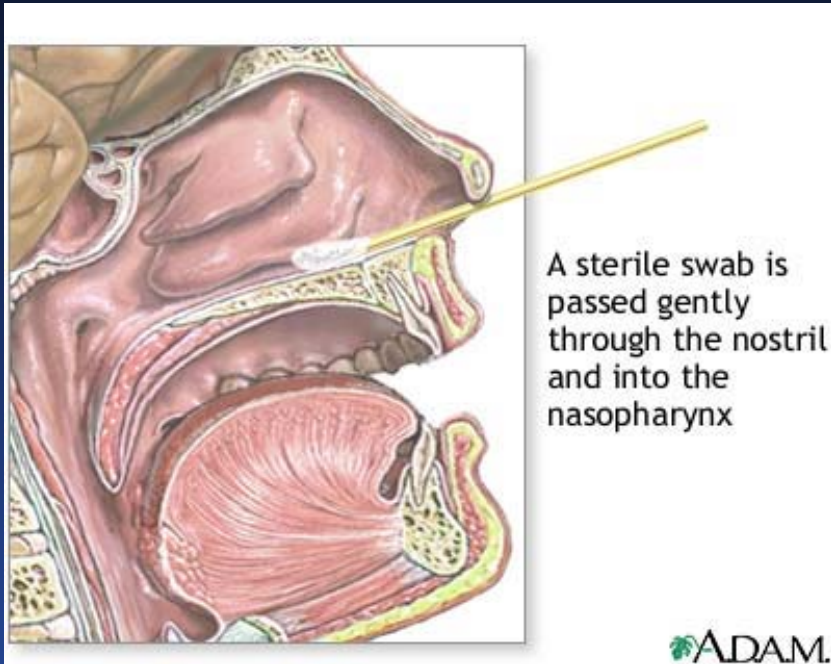
Pertussis PCR

- 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

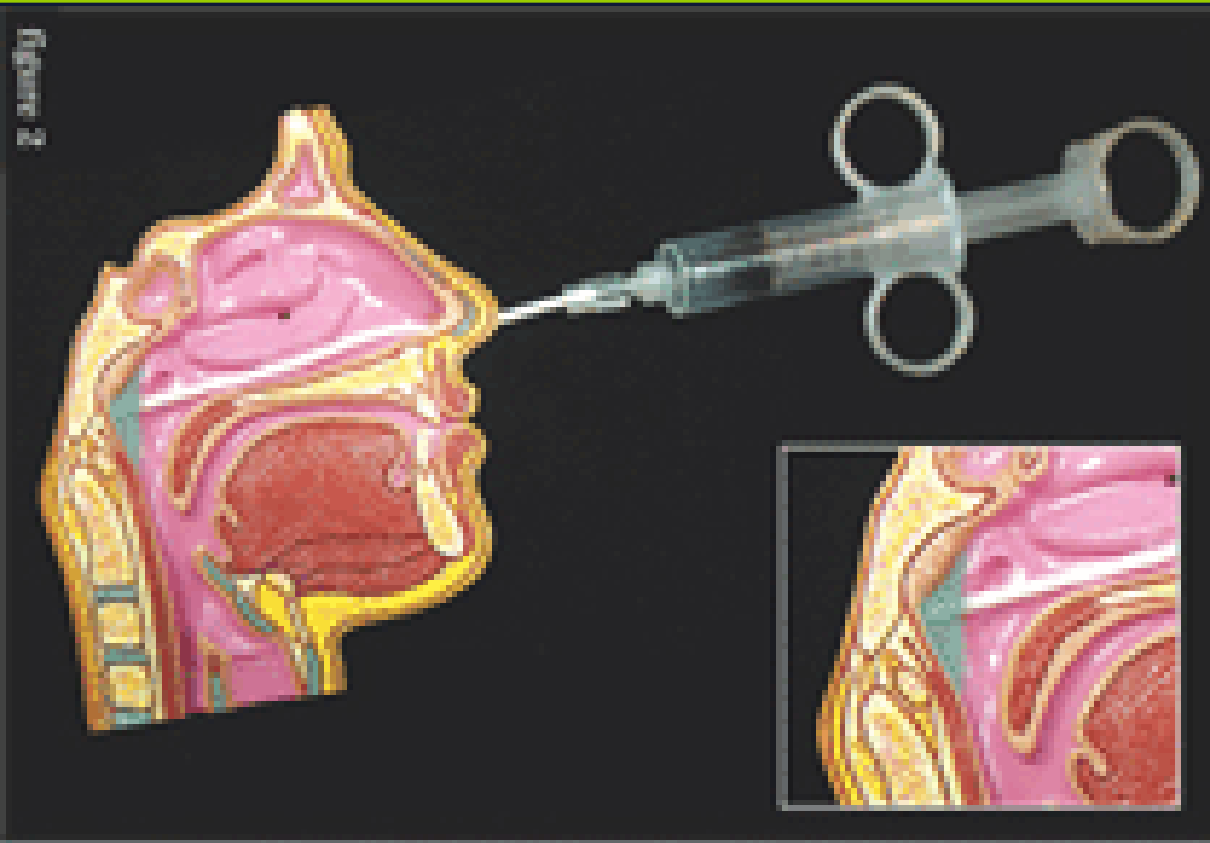


- **Nasopharyngeal swab**
 - Leave it in 30 seconds
- **NP aspirate**
 - Use 0.5-1 cc sterile saline & bulb or syringe w/butterfly tubing

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

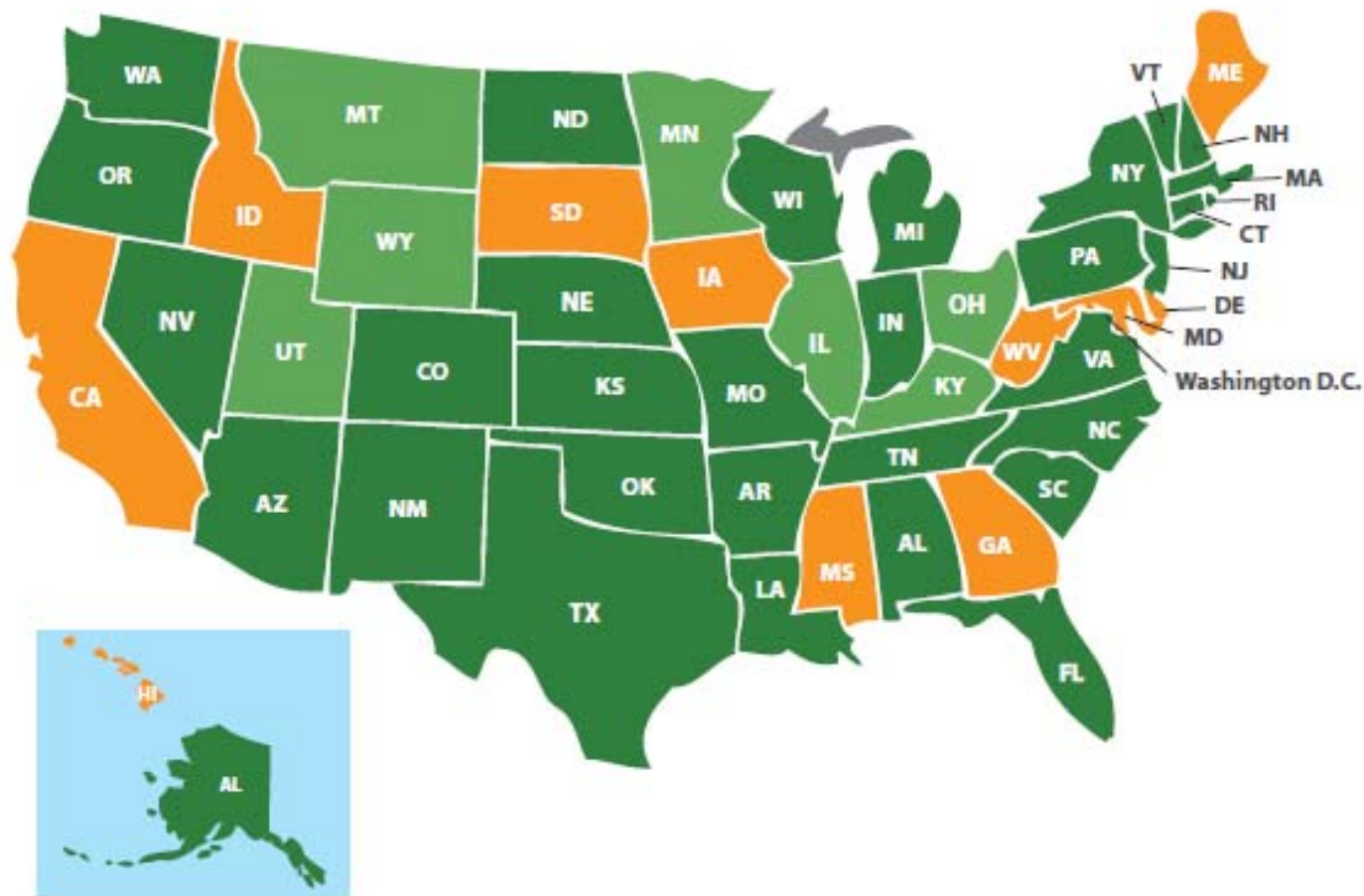
- Alabama
- Alaska
- Arizona
- Arkansas
- Colorado
- Connecticut (2011)
- District of Columbia
- Florida
- Indiana
- Kansas
- Louisiana
- Massachusetts (2011)
- Michigan
- Missouri
- Nebraska
- Nevada
- New Hampshire
- New Jersey
- New Mexico
- New York
- North Carolina
- North Dakota
- Oklahoma (2011)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

No booster required

- California
- Delaware
- Georgia
- Hawaii
- Idaho
- Iowa
- Maine
- Maryland
- Mississippi
- South Dakota
- West Virginia

Td or Tdap mandate

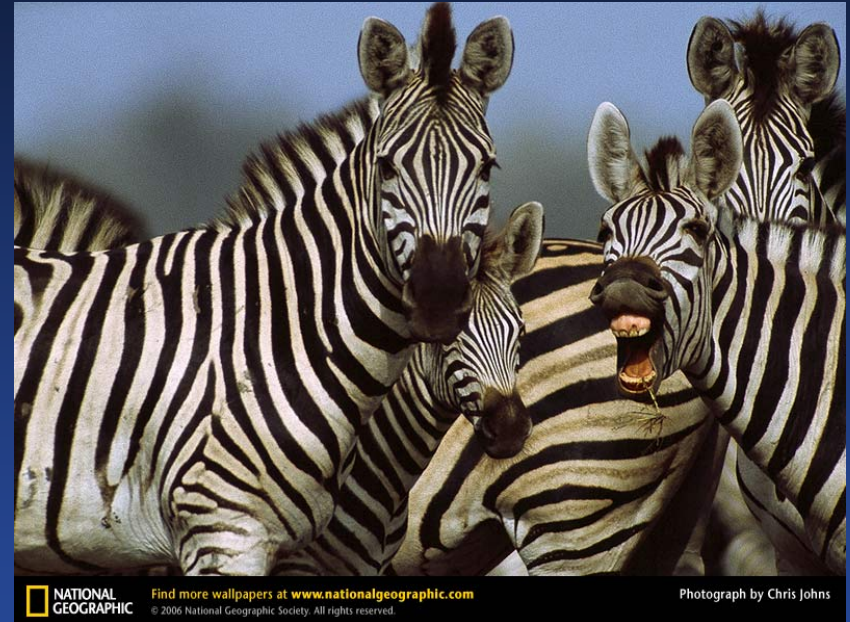
- Illinois
- Kentucky
- Minnesota
- Montana
- Ohio
- Utah
- Wyoming



Vaccines: A Community Endeavor

Herd immunity important

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



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Photograph by Chris Johns

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 Yourself, 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**

Q & A