

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**

**Joint Sponsorship provided by:
PAC/LAC**



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:

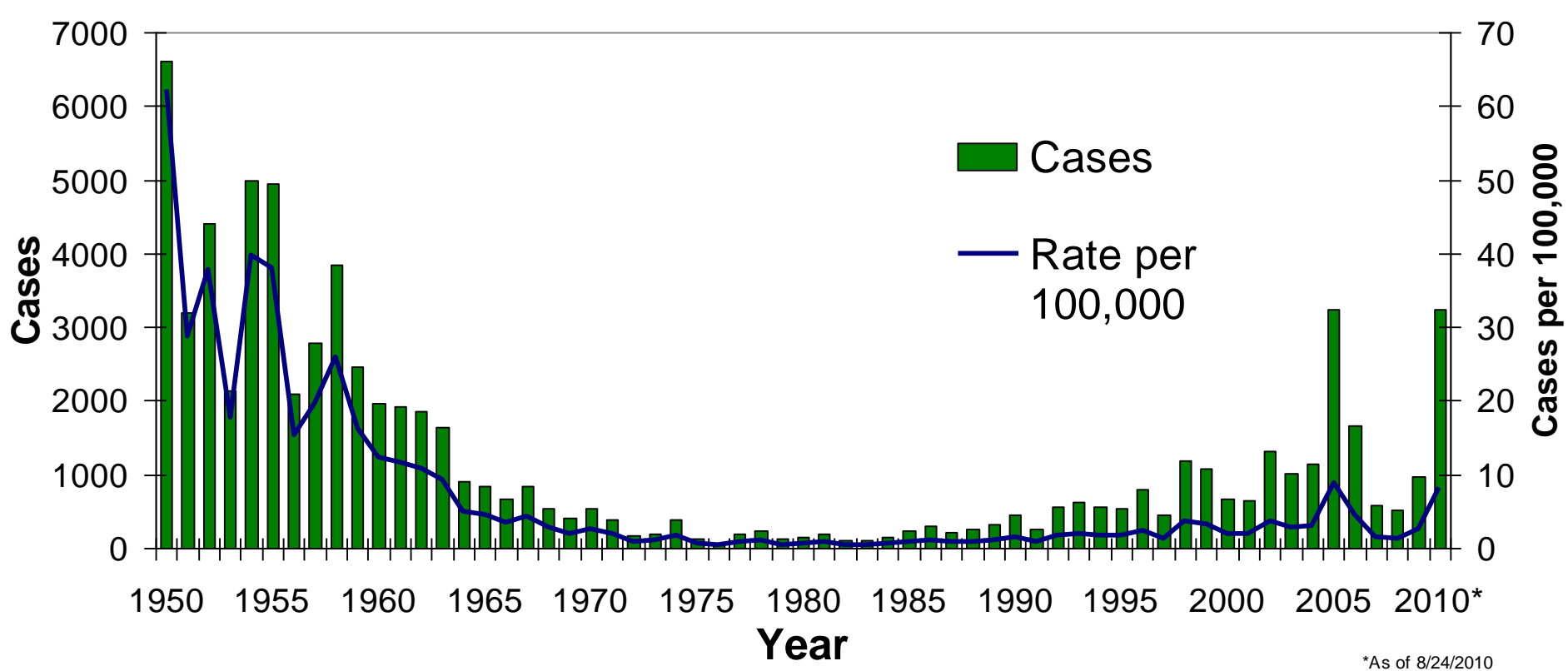
www.cdc.gov/mmwr/preview/mmwrhtml/mm5932a3.htm

²cdc.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



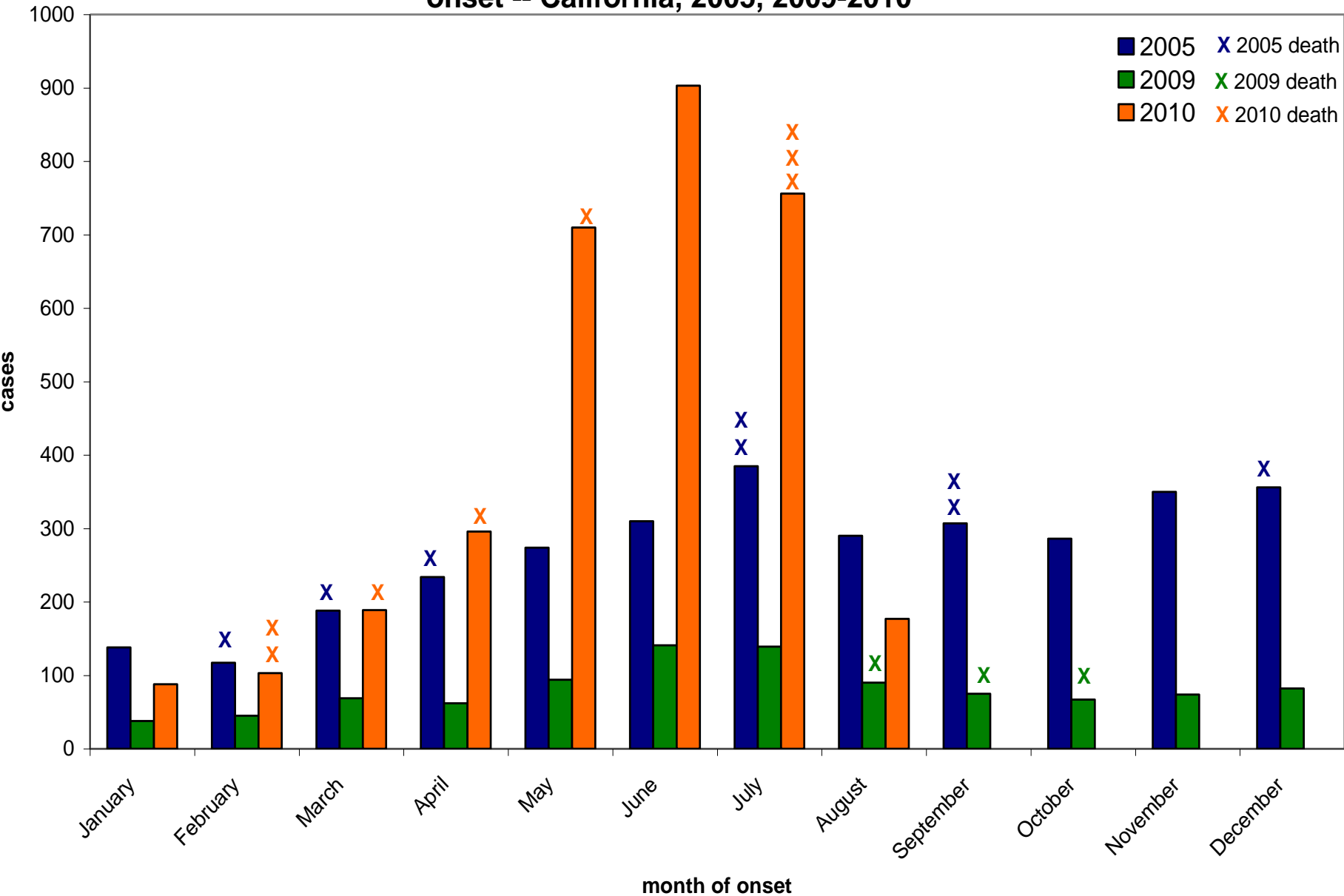
*As of 8/24/2010



CA Pertussis Cases (August 2010)

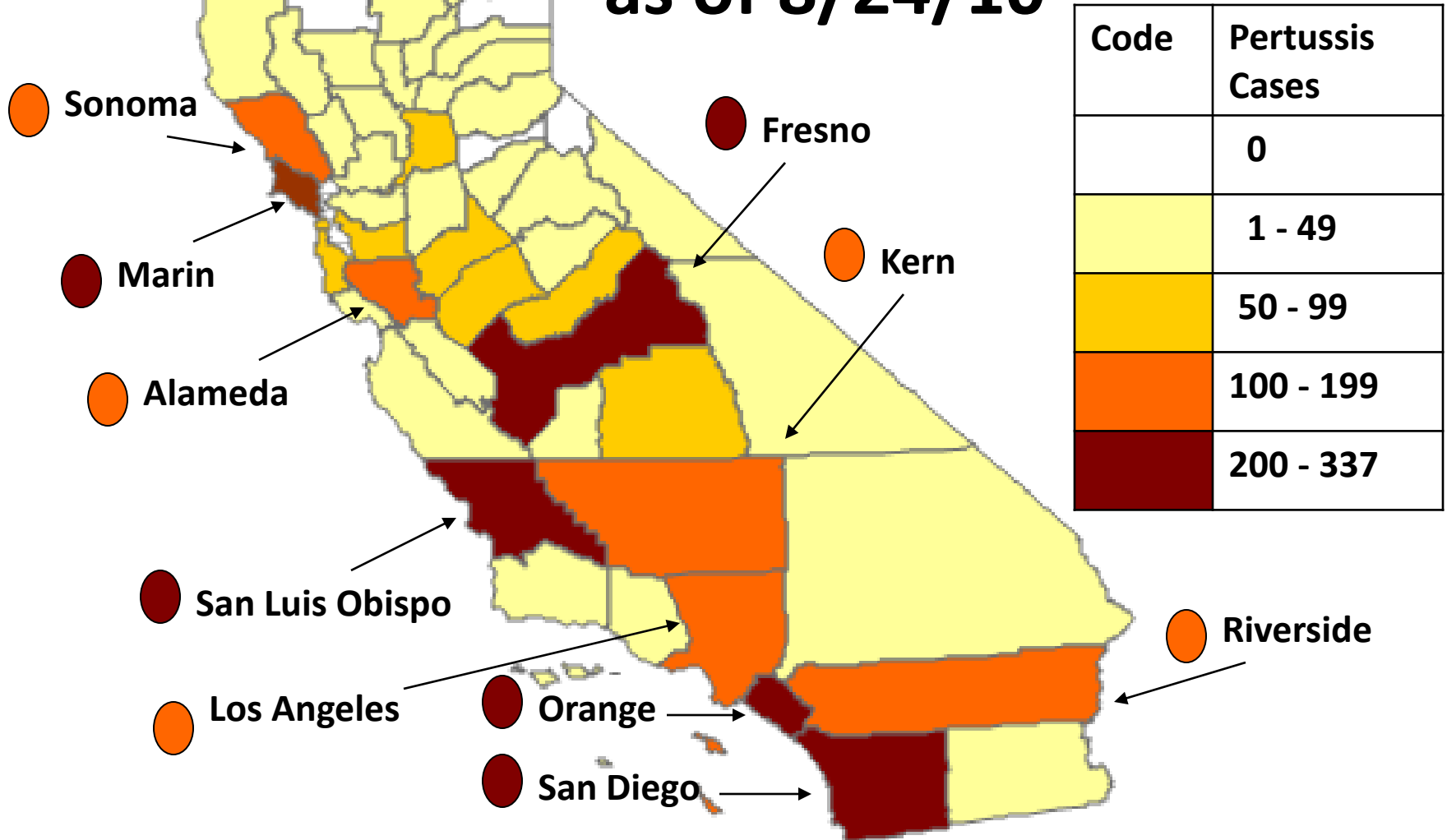
- **3,311** confirmed, probable and suspect cases, **8.5 cases/100,000**
- **7-fold increase** from reported cases during the same time period in 2009 (**434** cases)
- **8 deaths to date**
 - **7 infants <3 months; no DTaP doses**
 - **1 premature infant, age 2 months: 1 DTaP**
 - **Cough illness common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



CA Pertussis Rates (8/24/2010)

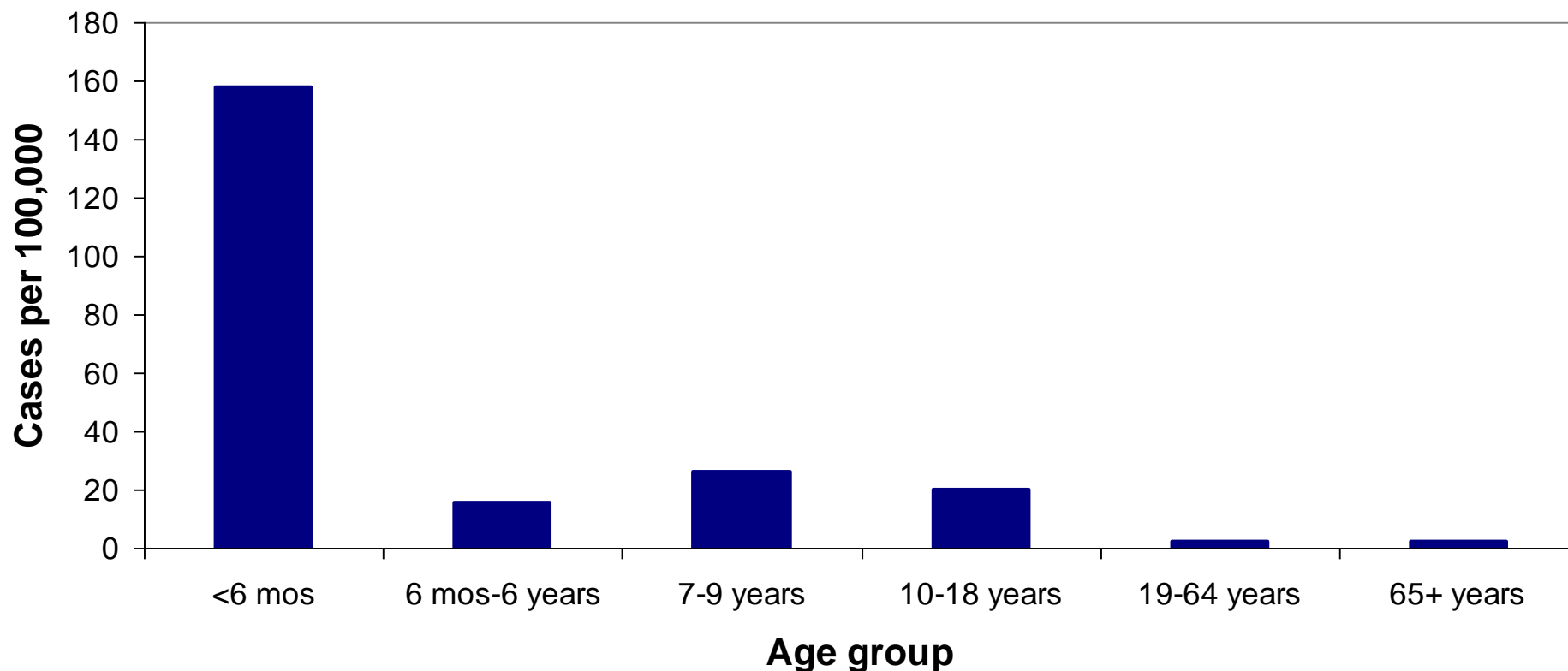
Age

- **<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**

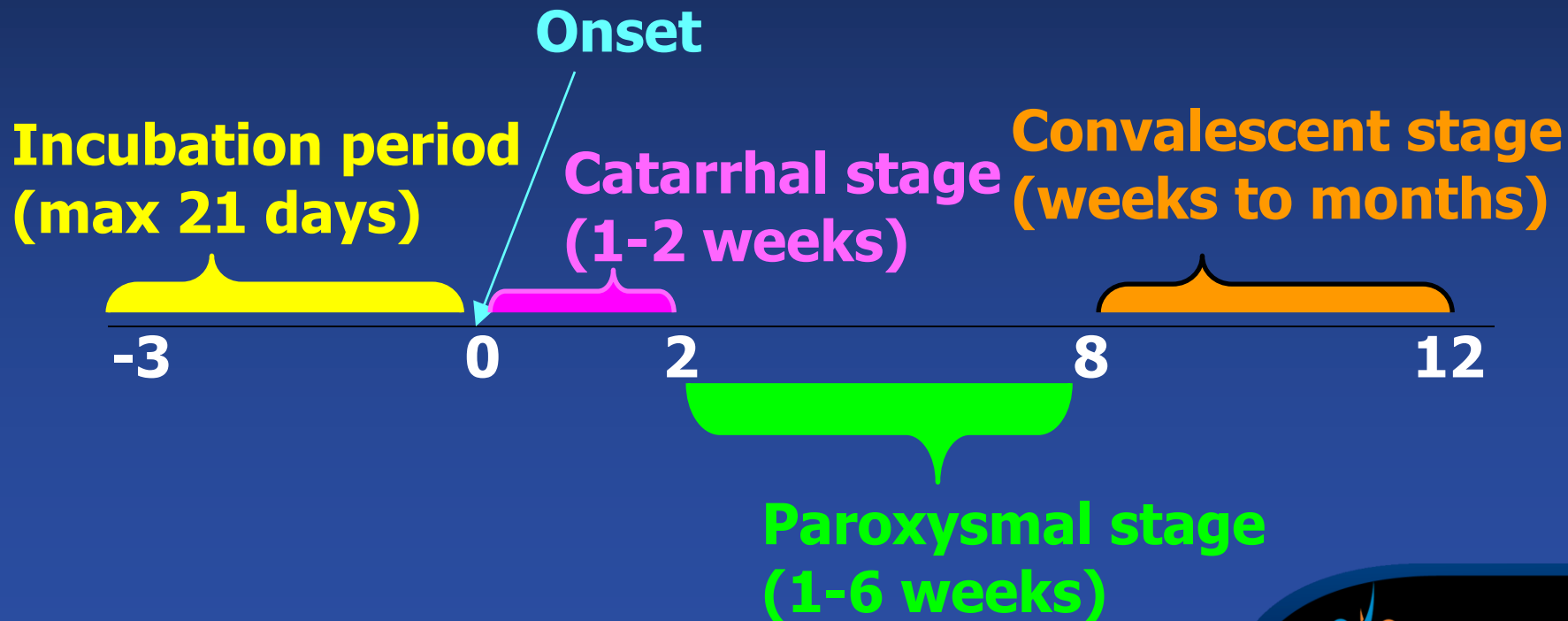
¹OSPHD hosp. discharge data

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:

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**

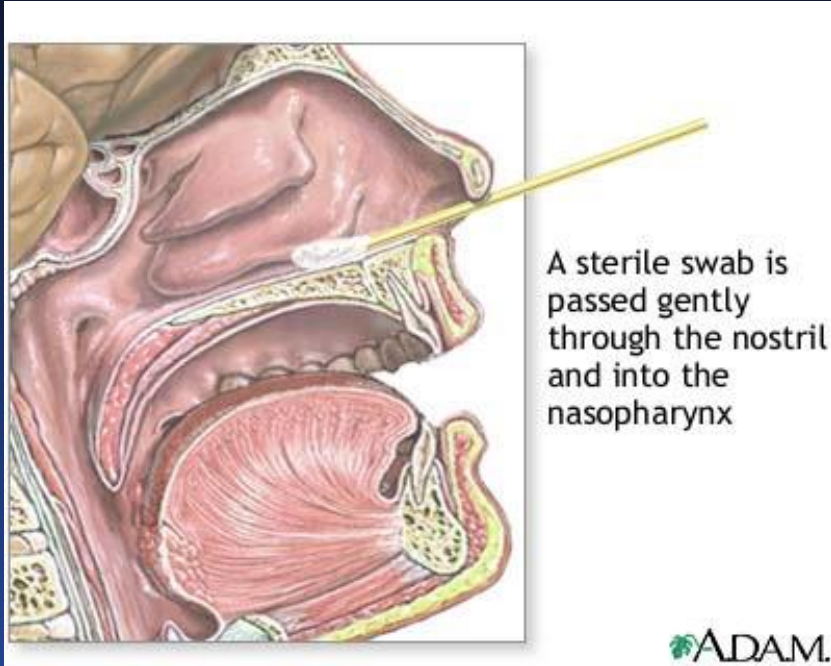
Pertussis PCR

- **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



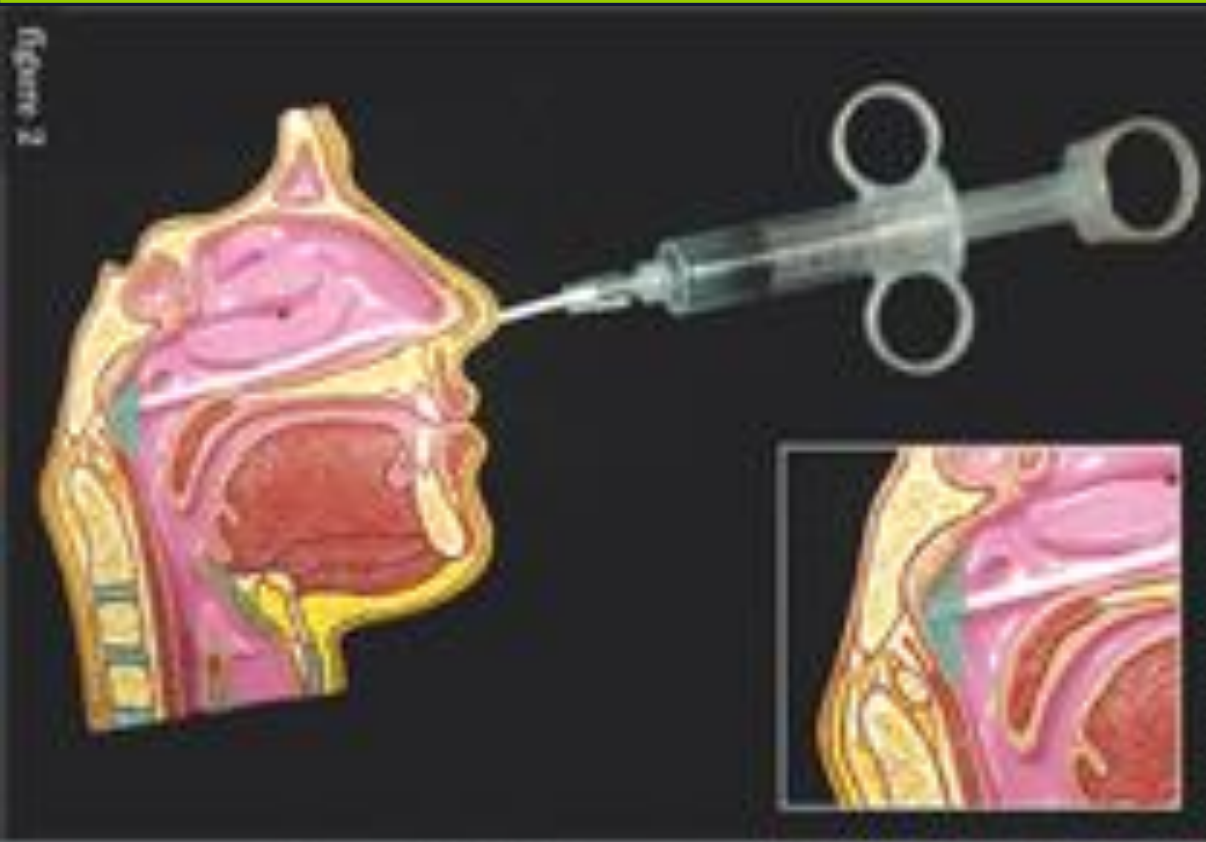
- **Nasopharyngeal swab**
 - Leave it in 30 seconds
- **NP aspirate**
 - Use 0.5-1 cc sterile saline & bulb or syringe w/butterfly tubing

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

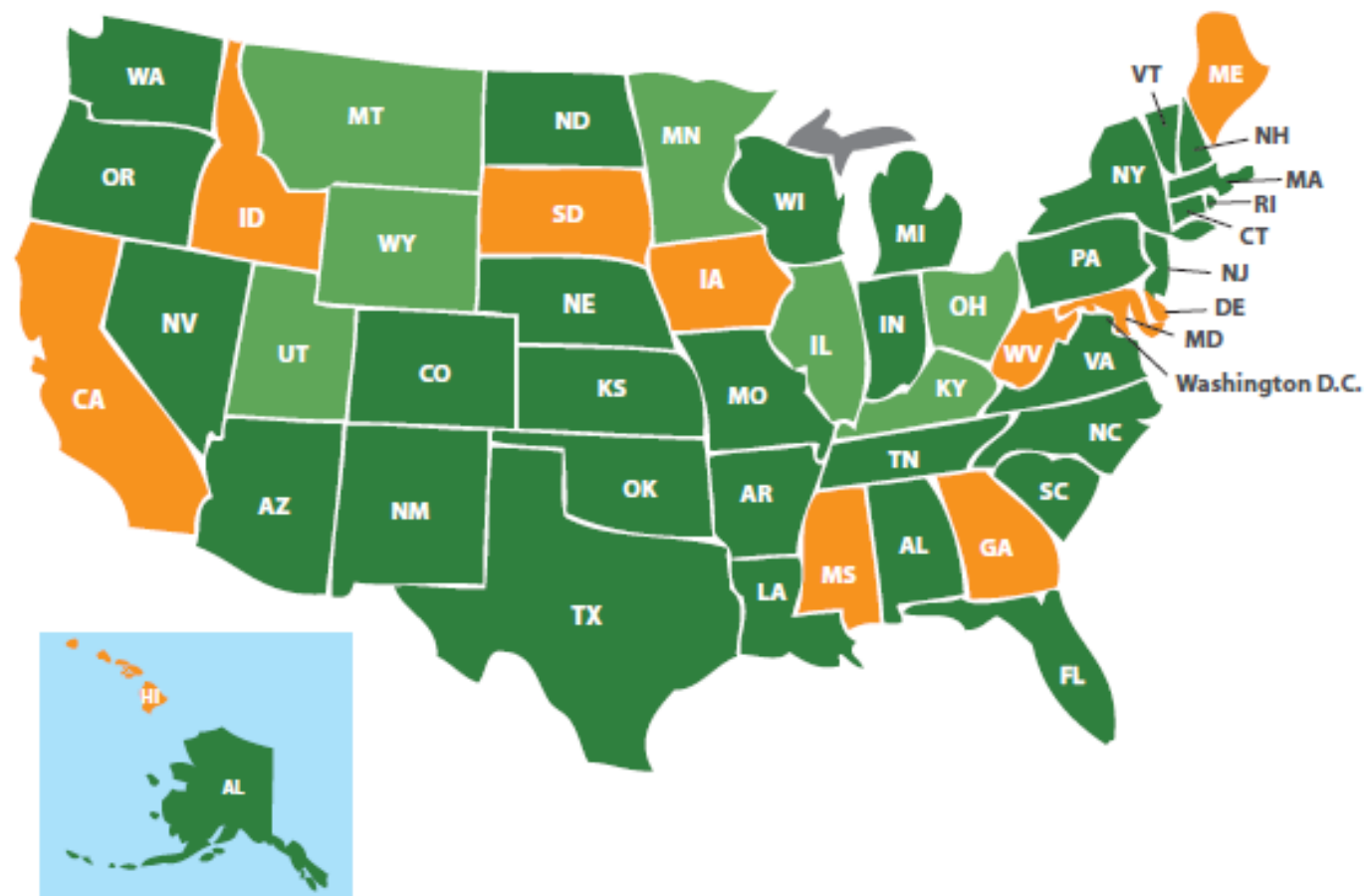
Alabama
Alaska
Arizona
Arkansas
Colorado
Connecticut (2011)
District of Columbia
Florida
Indiana
Kansas
Louisiana
Massachusetts (2011)
Michigan
Missouri
Nebraska
Nevada
New Hampshire
New Jersey
New Mexico
New York
North Carolina
North Dakota
Oldahoma (2011)
Oregon
Pennsylvania
Rhode Island
South Carolina (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

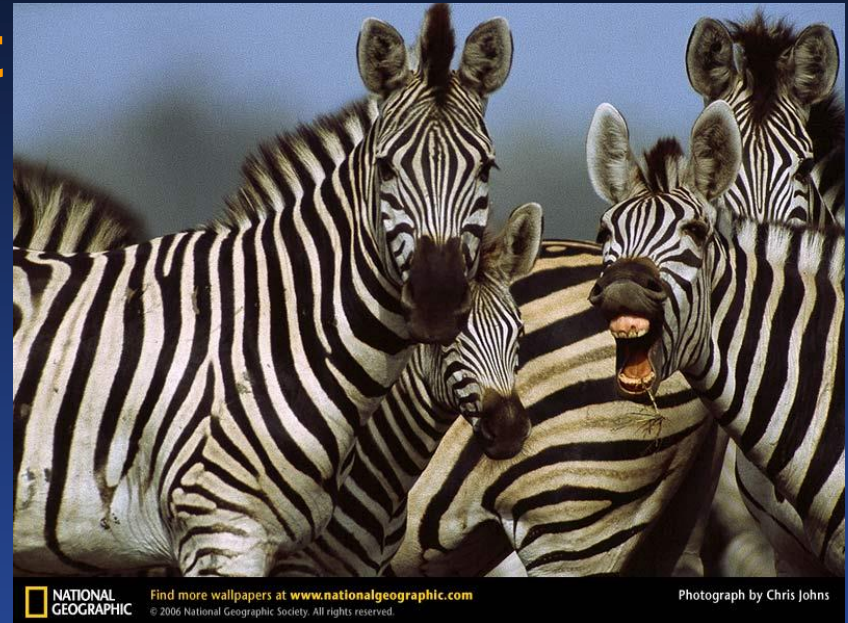
Illinois
Kentucky
Minnesota
Montana
Ohio
Utah
Wyoming



Vaccines: A Community Endeavor

Herd immunity important

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



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**