

# June 2010 California Pertussis Update



# Pertussis Background

- Pertussis is the most poorly controlled vaccine-preventable disease
  - Incidence increasing since the 1990s
  - Cyclical: peaks every 2-5 years as numbers of susceptible people increase enough to allow sustained transmission; last peak year 2005 with 25,616 U.S. cases, a 45 year high
- Adults are vulnerable to pertussis
  - 27% of reported cases are among adults
  - Pertussis immunity wanes 5 to 10 years after DTaP\* series (immunity from disease wanes in 15 years)
  - ~25% of cough illness lasting >2 weeks is pertussis
- First pertussis vaccines (Tdap)<sup>†</sup> for adolescents and adults licensed in 2005; uptake suboptimal

\*Diphtheria and tetanus toxoids and acellular pertussis vaccine

†Tetanus toxoid, reduced diphtheria toxoid and acellular pertussis vaccine



# Typical Symptoms of Pertussis

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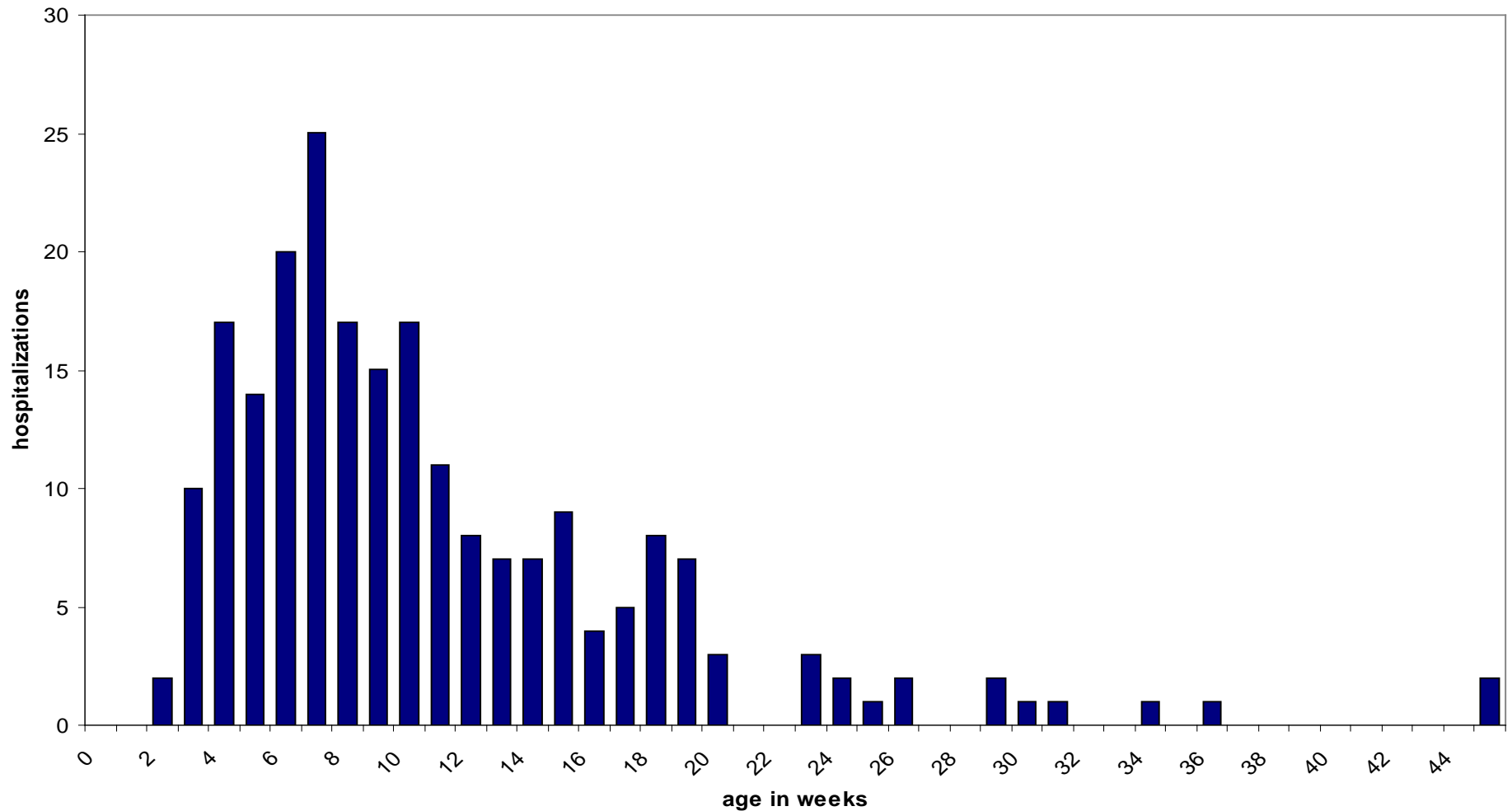
- Three-stage bacterial illness (catarrhal, paroxysmal and convalescent) that lasts 4-12 weeks
- Typical symptoms
  - paroxysmal cough
  - lack of fever
  - no systemic illness
  - coryza; no pharyngitis
  - posttussive vomiting
  - posttussive whoop
  - absolute lymphocytosis
- Adults with pertussis often report feeling as if they're choking on something, sweating episodes

# Pertussis in Young Infants

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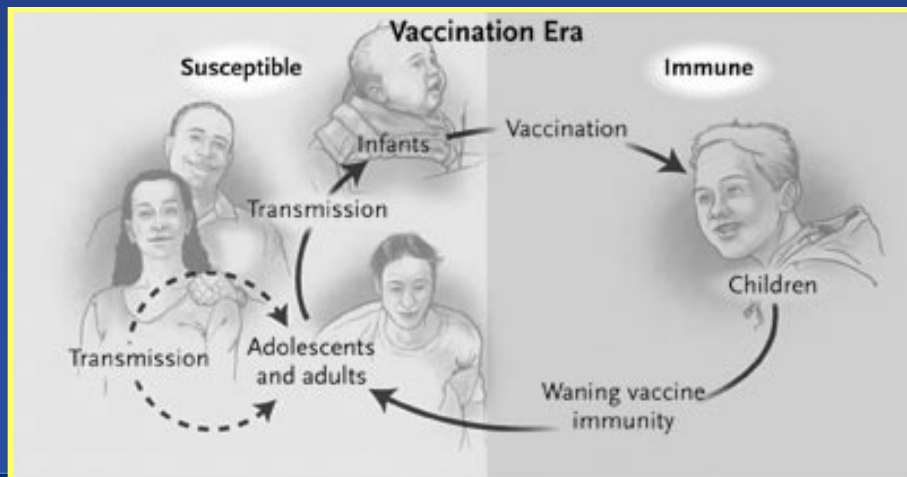
- Initially infant looks deceptively well; coryza, no fever, mild cough
- Leukocytosis with lymphocytosis
- Apneic episodes
- Seizures
- Respiratory distress
- Pneumonia
- Adenovirus or RSV coinfection can confuse picture

# Pertussis hospitalizations in infants <1 year, by age in weeks – California, 2008

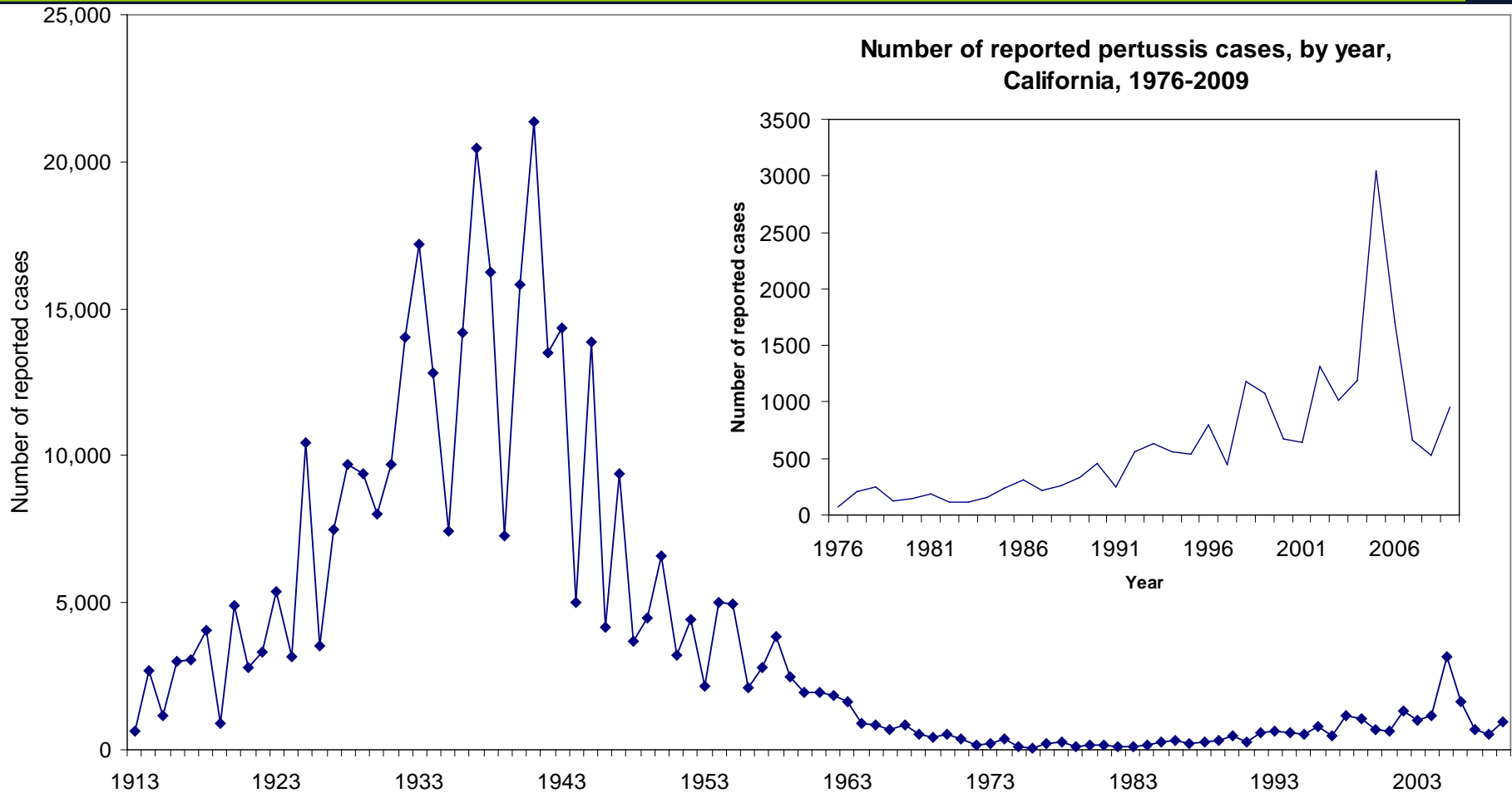


# Pertussis resurgence since the 1990s

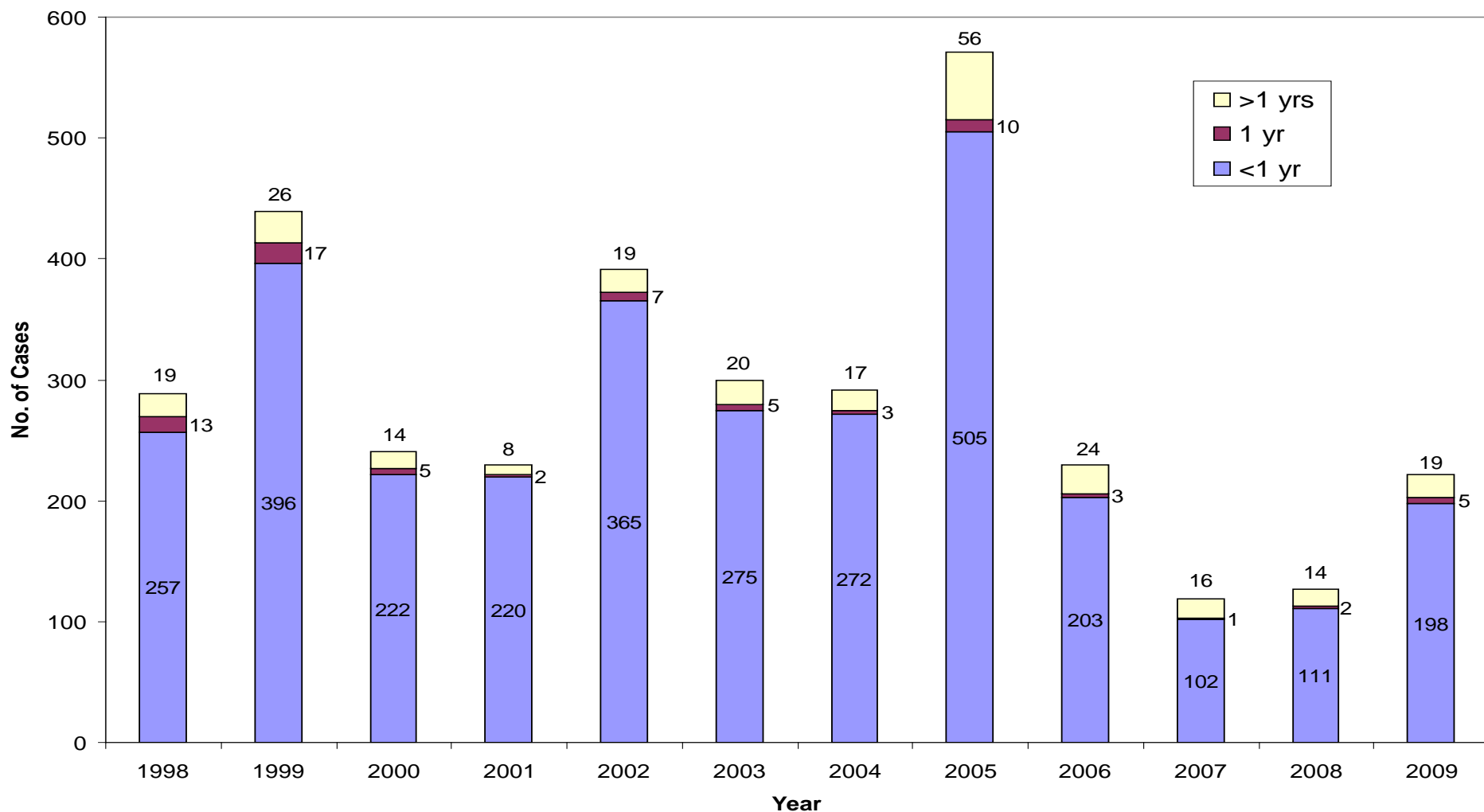
- Genetic changes in *B. pertussis*; greater virulence?
- Variable vaccine efficacy (acellular pertussis vaccines licensed in 1991 for 4<sup>th</sup>/5<sup>th</sup> doses; entire series in 1996)
- Waning of vaccine-induced immunity and lack of natural booster events
- General availability of better laboratory tests
- Greater awareness of pertussis by clinicians



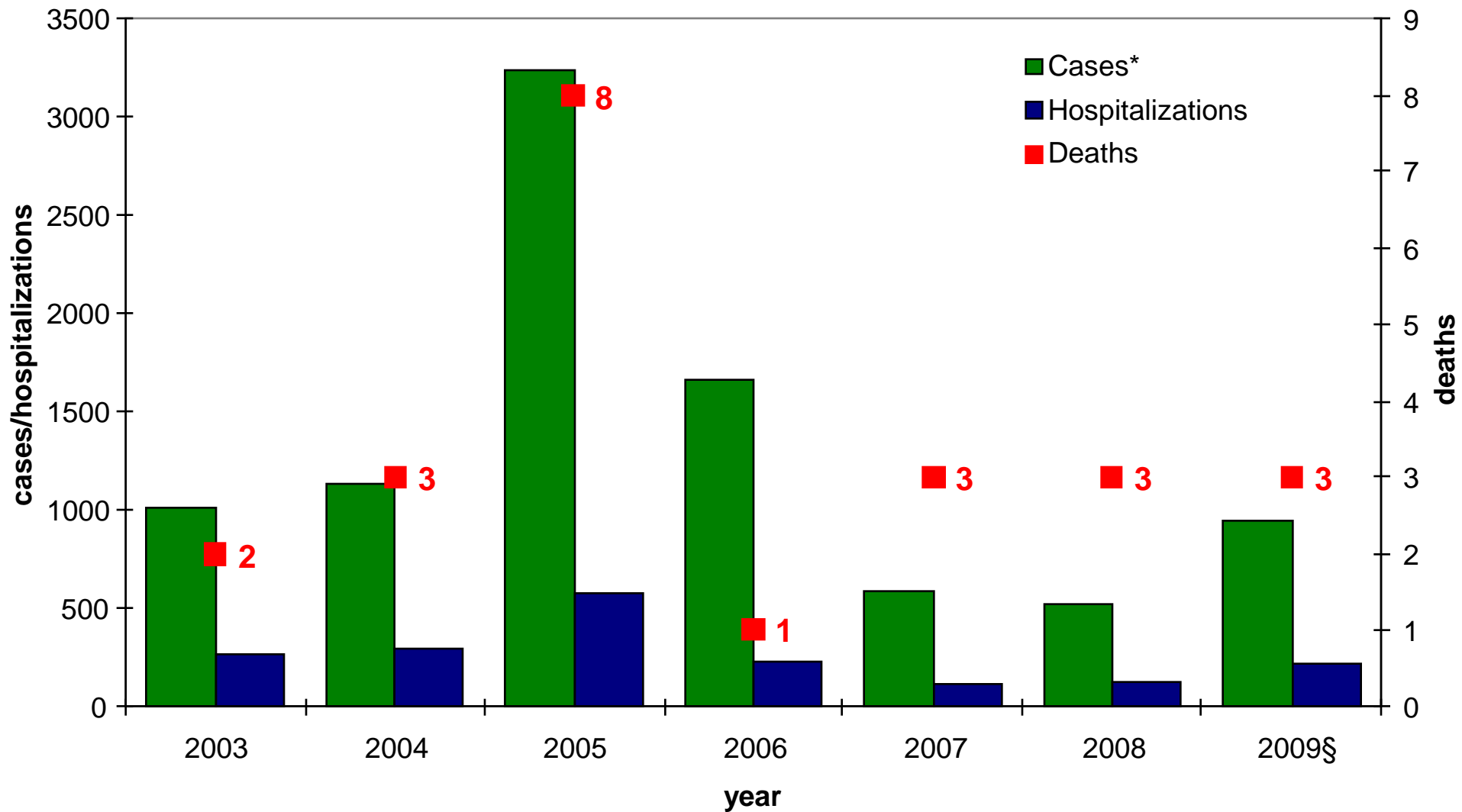
# Number of reported pertussis cases by onset year — California, 1913-2009



# Hospitalized Pertussis cases by age – California, 1998-2009



# Number of pertussis cases, hospitalizations and deaths, by onset year – California, 2003-2009



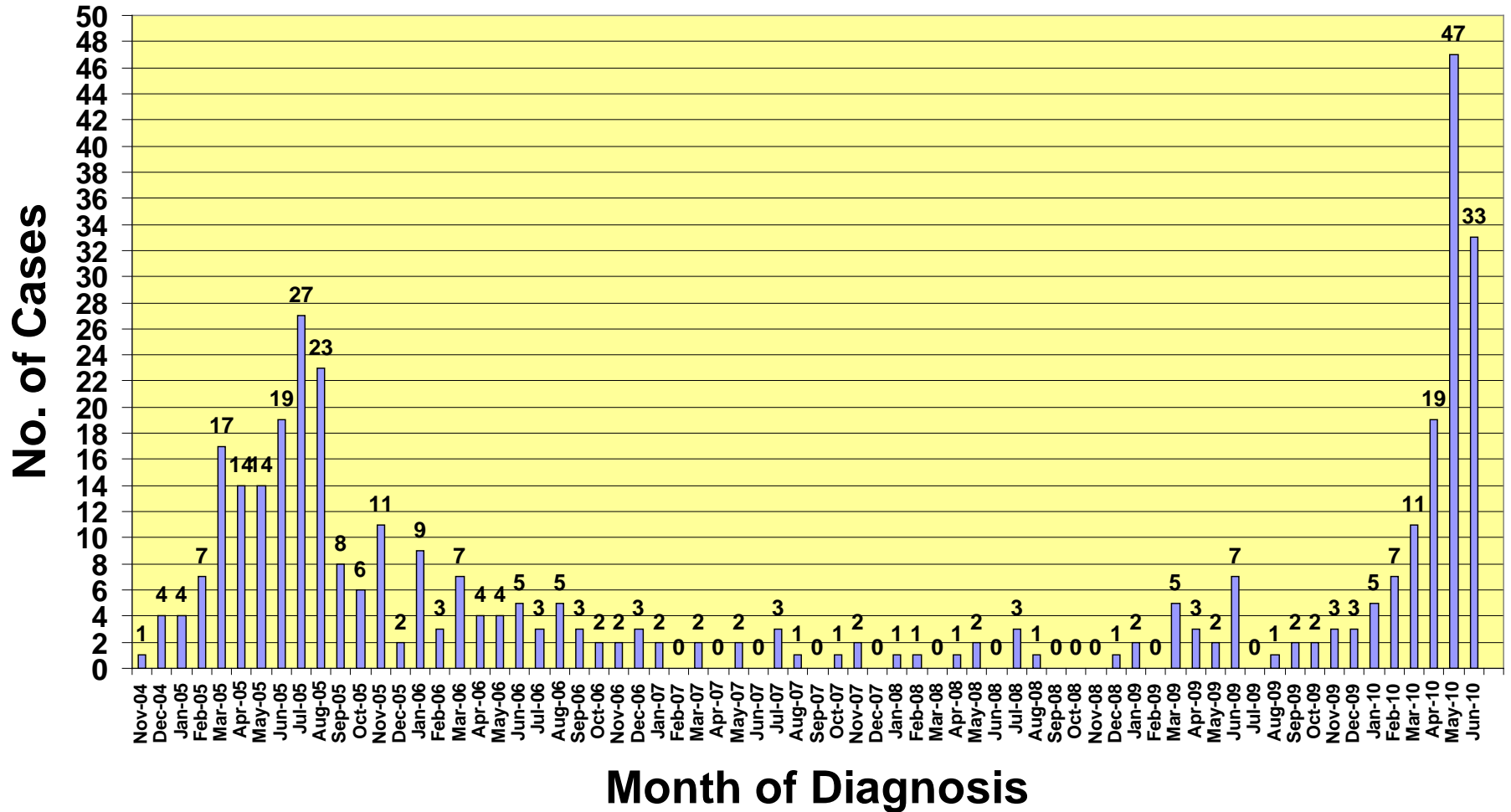
# California Pertussis Cases - 2010

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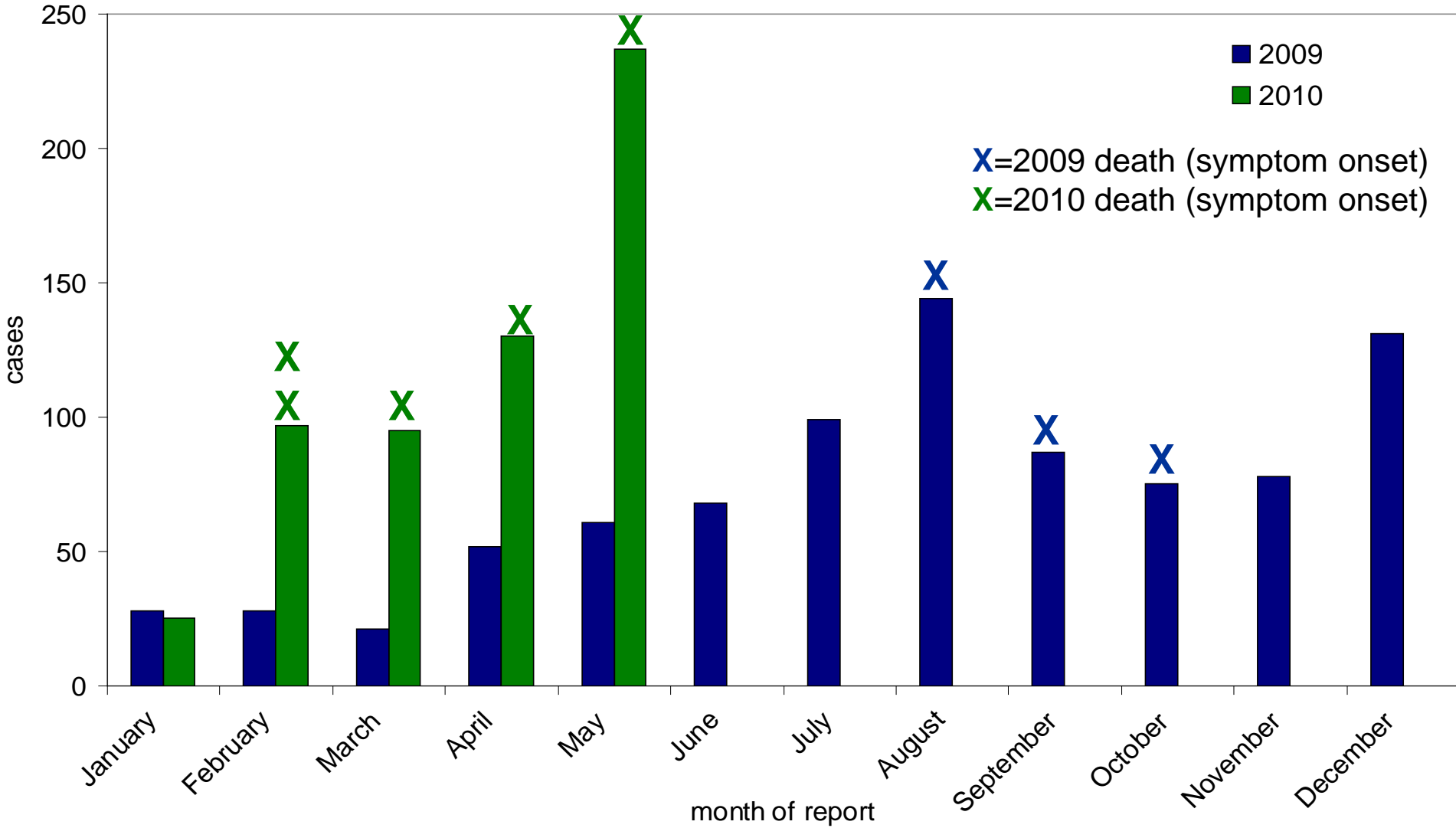
- As of 6/15/2010, there have been **910** pertussis cases reported in 2010, a **4-fold increase** from the number of reported cases during the same time period in 2009; an additional 600 cases are under investigation
- From January through June of 2005 there were 1,261 pertussis cases; these data suggest the disease burden is at or above the levels seen in 2005, which was a 45 year high in cases
- Other states are reporting 2010 increases to CDC, but none reporting increases similar to those in California
- Possible differences in states with and without middle school Tdap vaccination requirement



# Children's Hospital Central California Laboratory Confirmed Cases of Pertussis (6/17/10)



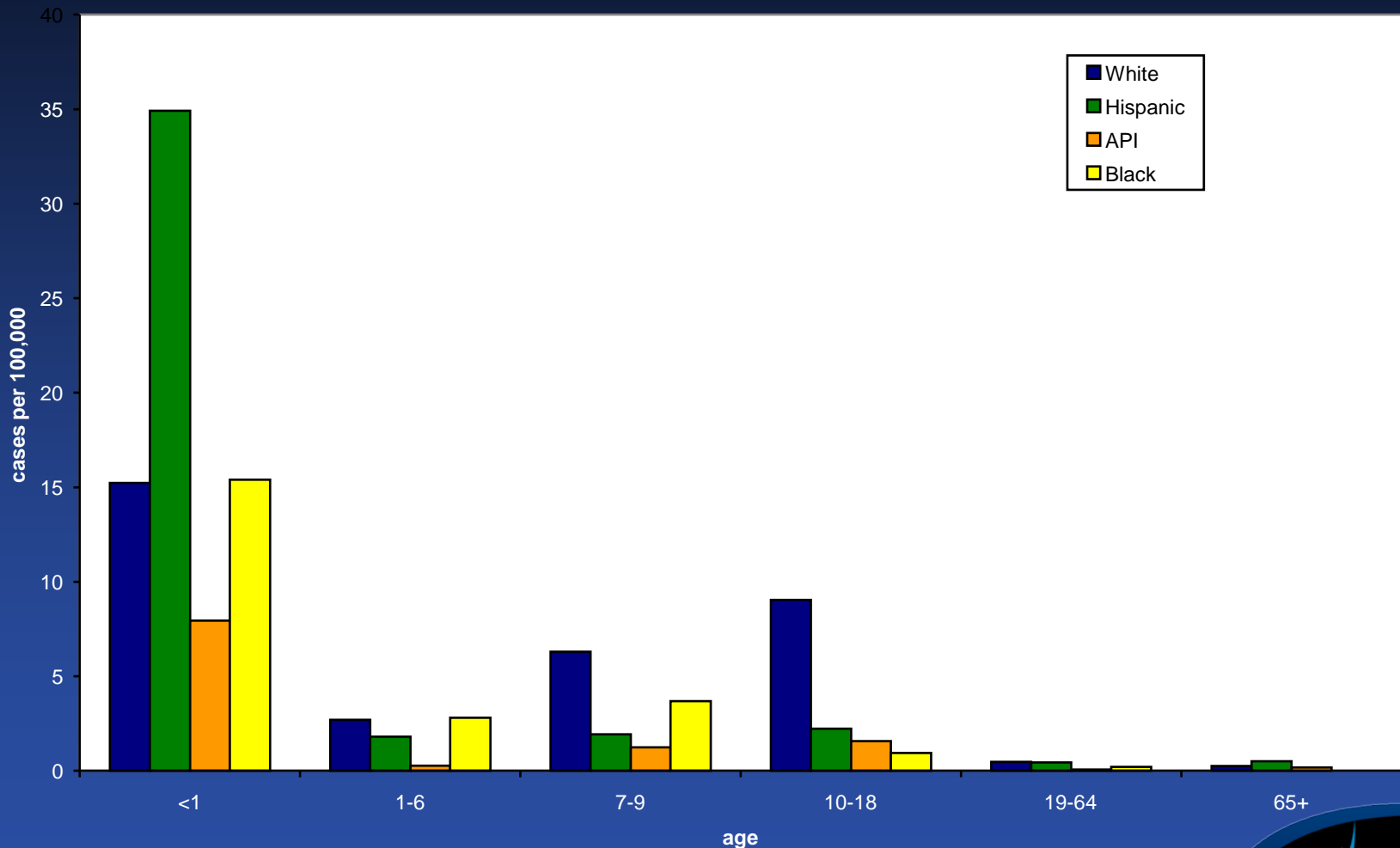
# Epidemic curve of pertussis cases by month of report and deaths by month of onset— California, 2009-2010



# California Pertussis Deaths

- Five deaths in 2010 to date
- All CA pertussis deaths (~3/year) since 1996, except one, have been in infants <3 months of age; age at symptom onset ranged from 5 days – 8 weeks
- 80% Hispanic (50% of birth cohort Hispanic)
- The mean WBC of fatal cases in 1998-2009 was 75,000 (range 15,000-148,000)
  - Pertussis toxin elicits a dose-dependent leukocytosis
- Of those with known status, all had pulmonary HTN
  - Increases in leukocyte mass can diminish blood flow by increasing vascular resistance; however, pulmonary HTN is generally initiated and maintained by many factors
- Risk factor study being conducted

# Age-specific pertussis rates by race/ethnicity -- California, 2010



# 2008 Infant Pertussis Hospitalization Costs in California

- In 2008, there were 222 hospitalizations in infants <1 year of age with the diagnosis code for pertussis
  - 96% were <4 months of age at admission
  - Median length of stay 3.5 days (range 1—52 days)
  - 2 deaths
  - 73% Medi-Cal payer
  - 63% Hispanic
  - 22% White
  - 5% Black
  - 3% API
- Charge data is listed for 202 hospitalizations, of these:
  - Mean total charge: \$46,328
  - Median total charge: \$18,966
  - Range \$2,876--\$798,748

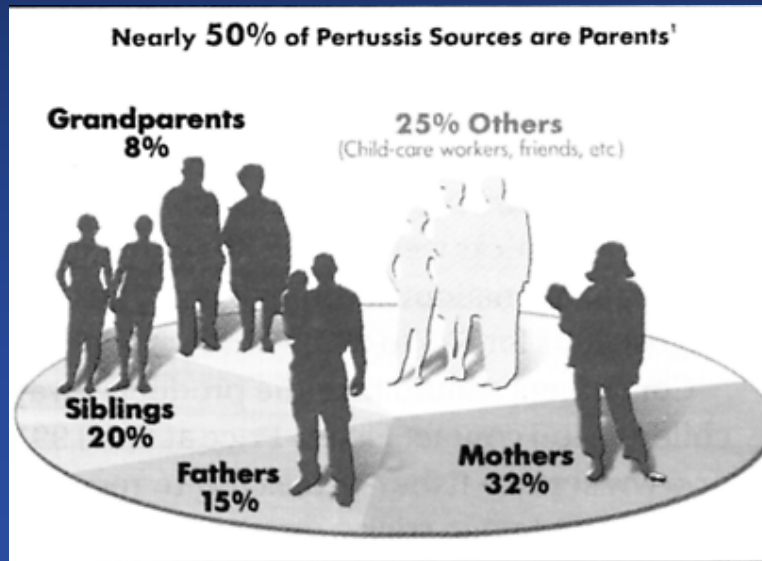
# Pertussis Mitigation

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- Promote the use of Tdap - particularly in those who have contact with infants
  - Free vaccine through 9/30/2010 for birth hospitals with postpartum Tdap policies; encourage ED use of Tdap
  - Work with payers re: Tdap reimbursement
- Clinician education
  - CDPH Tdap recommendations
  - Pertussis signs and symptoms
  - Treatment recommendations for infants with severe pertussis
  - Accelerated DTaP schedule for infants
- Public education
  - Vaccination/cocooning
  - Pertussis signs and symptoms
  - Keep ill people away from infants

# Pertussis Transmission to Infants

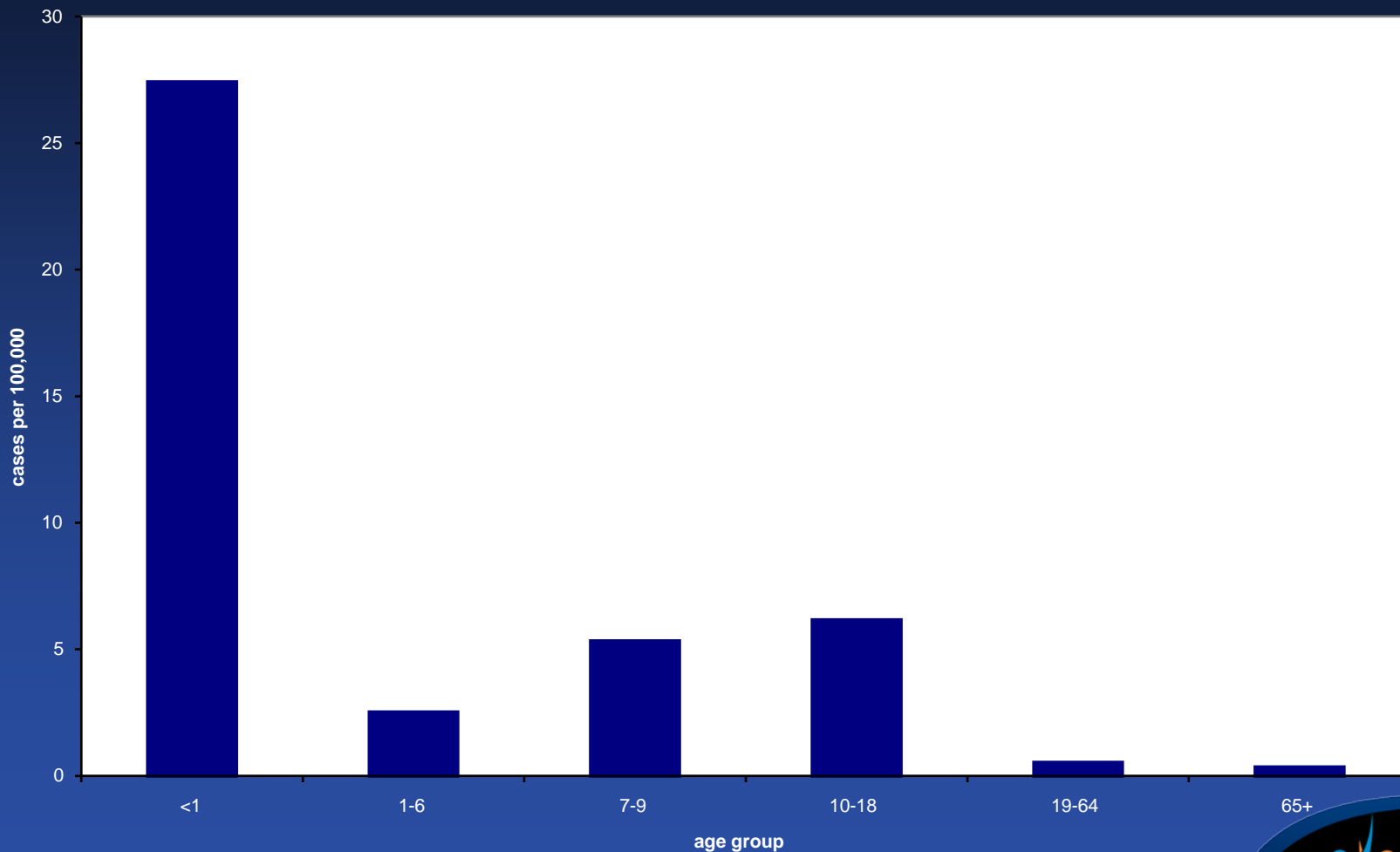
- Adults transmit pertussis to infants
  - Among 264 known source-cases:
    - ✓ Almost 50% were parents, most often mothers
    - ✓ 51% were adults >19 years of age



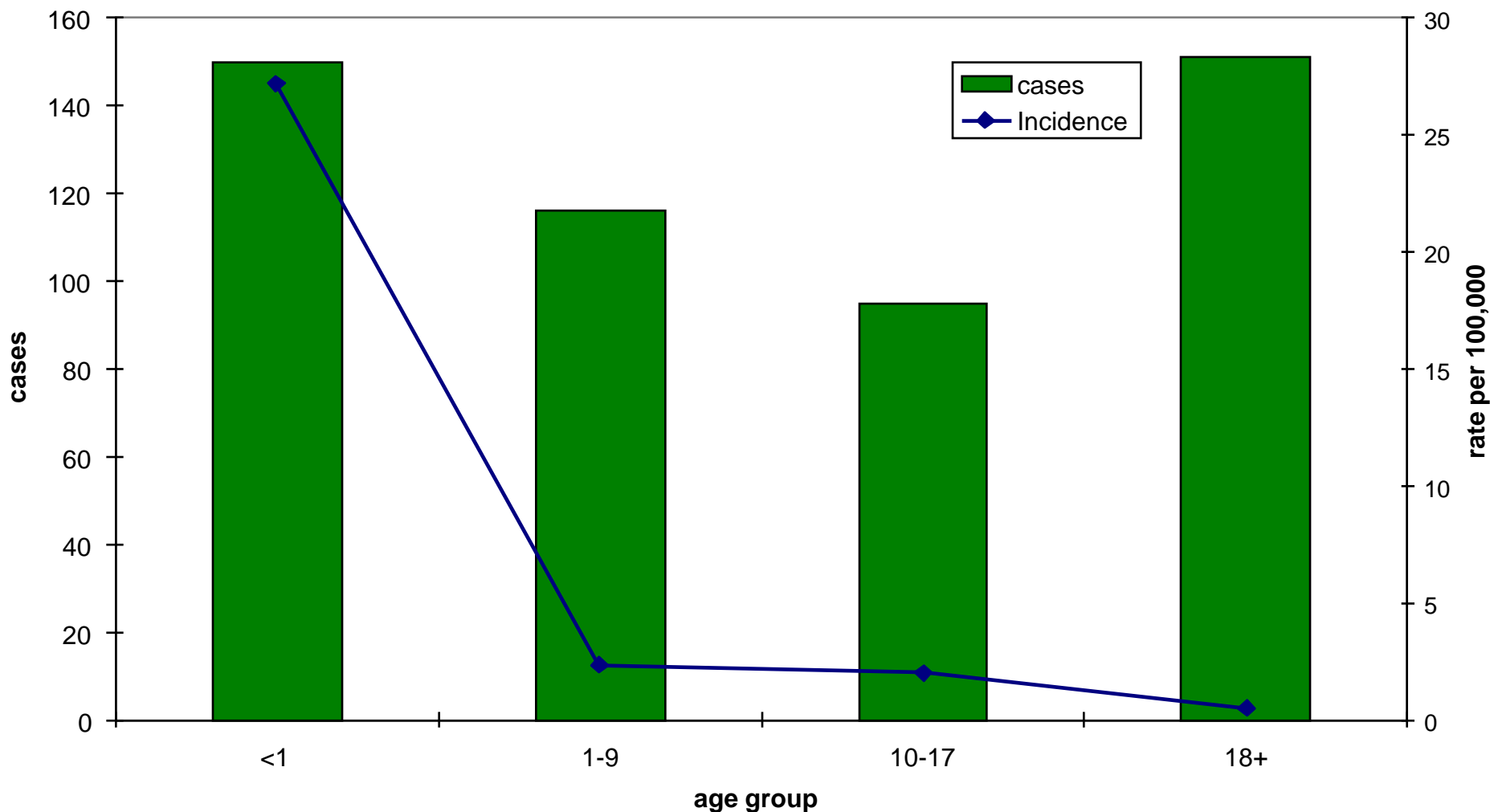
Bisgard KM, et al. Infant pertussis: who was the source? *Pediatr Infect Dis J* 2004; 23(11):985-989.

Wendelboe AM, et al. Transmission of *Bordetella pertussis* to young infants. *Pediatr Infect Dis J* 2007; 26(4):293-299.

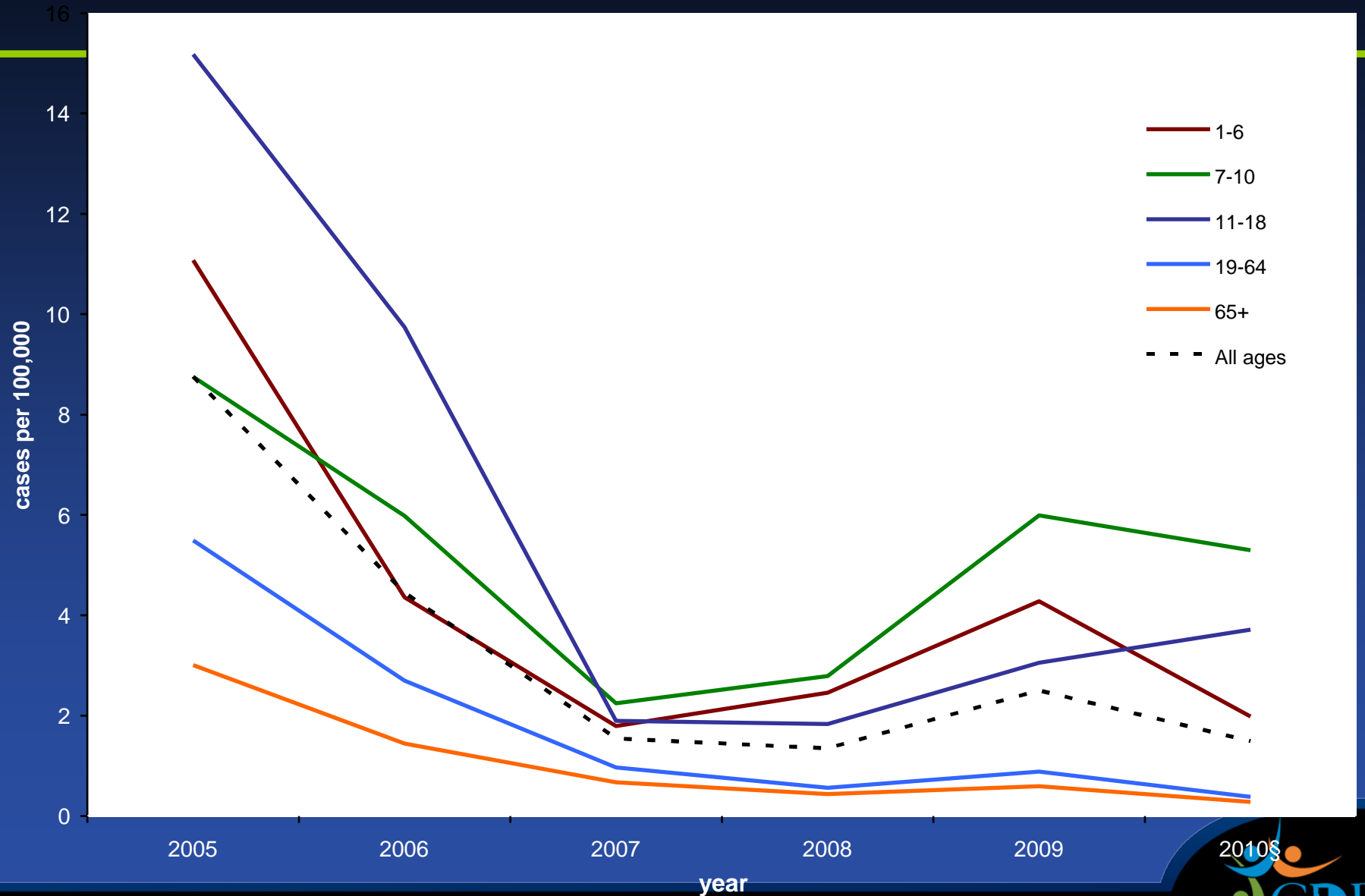
# Pertussis incidence by age -- California, 2010



# Cases and incidence of laboratory confirmed pertussis cases by age – California, 2008



# Pertussis incidence by age group (excluding infants) -- California, 2005-2010



# Pertussis incidence by age group (excluding infants) – U.S. 2004-2008

Reported pertussis incidence by age group (excluding infants) 2004-2008

