Arizona Vaccine Preventable Disease Update

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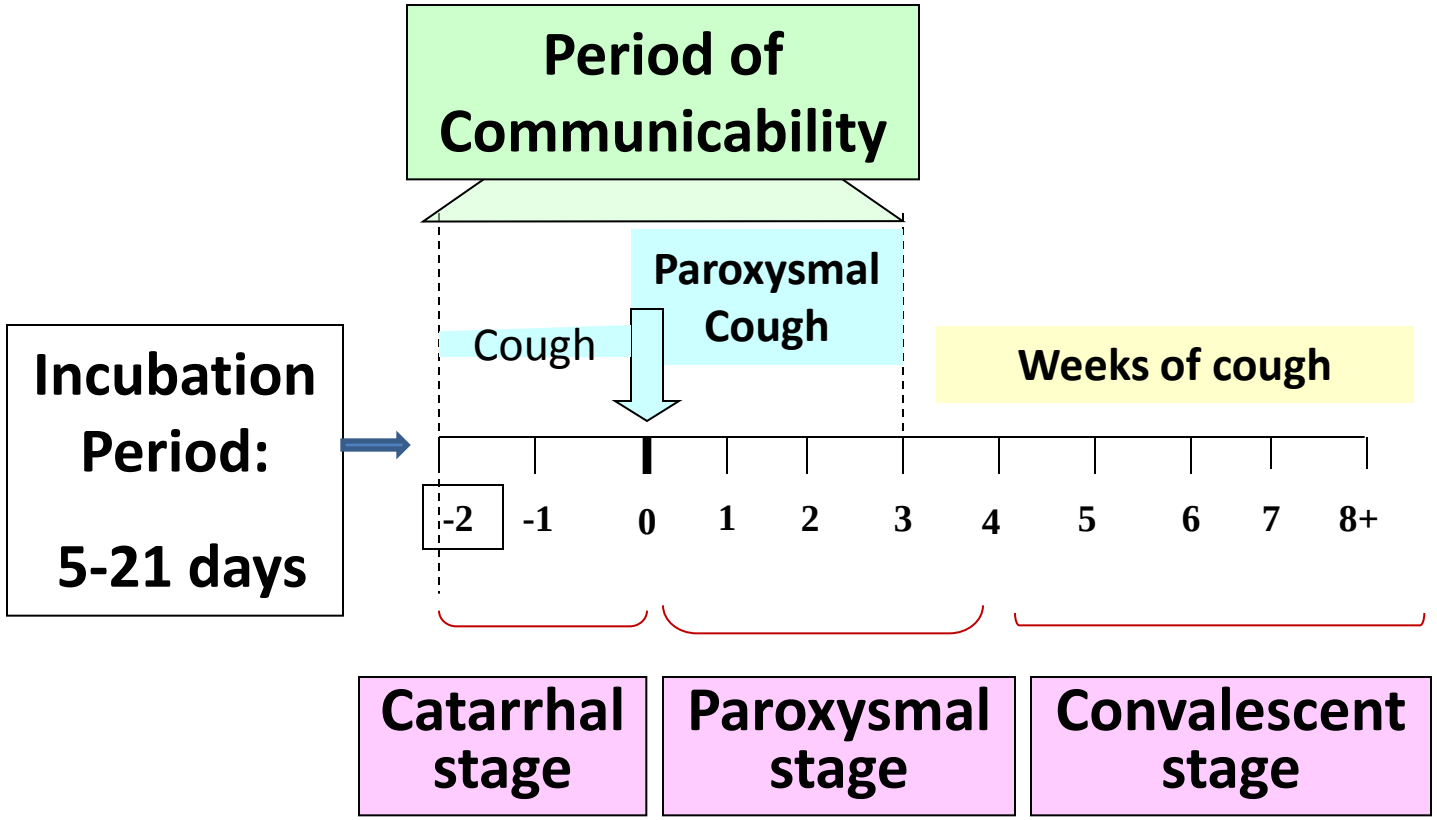
Office of Infectious Disease Services

Selected Reportable Vaccine Preventable Diseases in Arizona

- Pertussis
- *Neisseria meningitidis* (Invasive)
- *Haemophilus influenzae*, type B (Invasive)
- Mumps
- Measles
- Hepatitis B
- Influenza

Pertussis

Clinical Course of Pertussis



Pertussis Epidemiologic Features

- Highly contagious, respiratory transmission
- Secondary transmission is common, secondary attack rates up to 80% among susceptible household contacts
- Patient is most infectious during catarrhal period and the first two weeks after cough onset

Unlikely to be Pertussis

- Fever
- Ill in between coughing
- Lots of nasal congestion
- Cough gets better over time
- Purulent secretions
- Cold symptoms but no known contact with pertussis

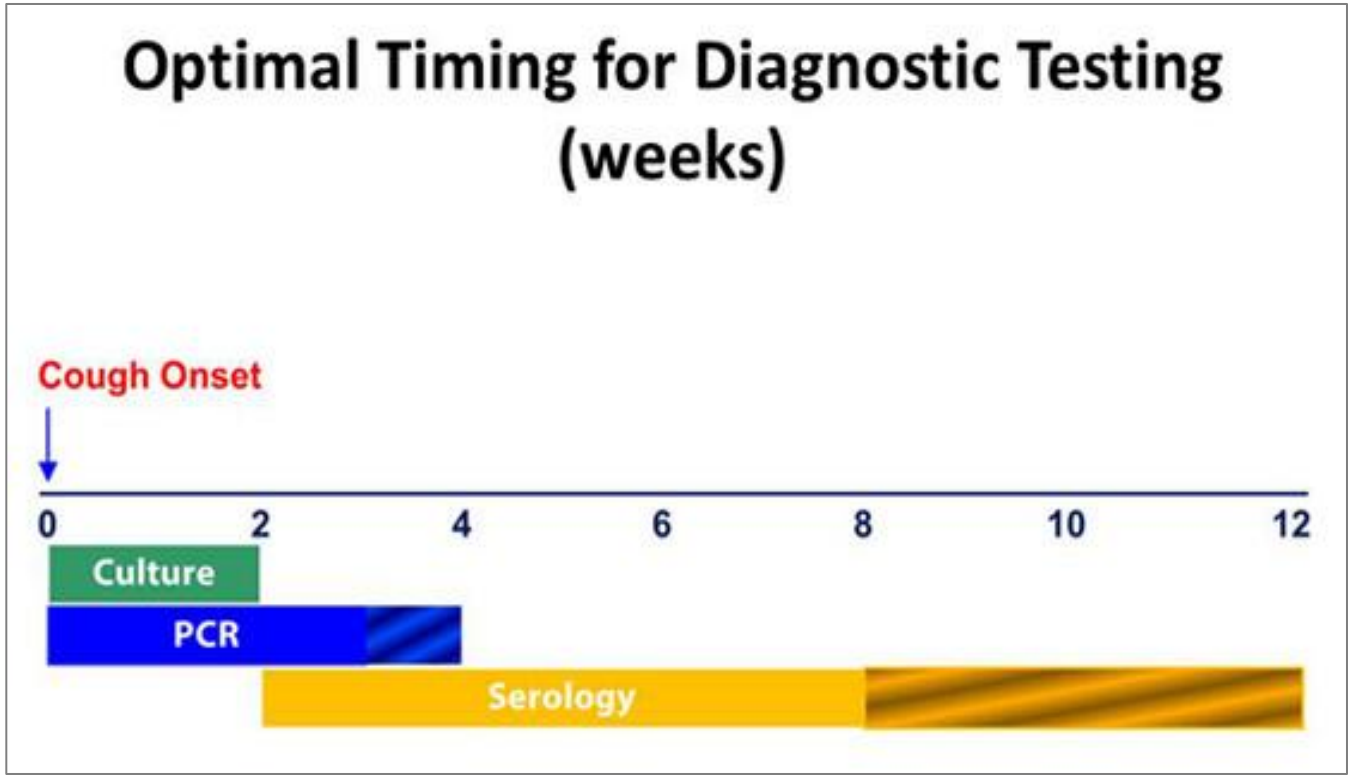
Suspect Pertussis

- Coughing
  - Worsens after mild “cold”
  - Increasingly severe
- Fine in between coughing
- No fever
- Normal physical examination
- Catching a “cold” after being around someone with pertussis

Precautions

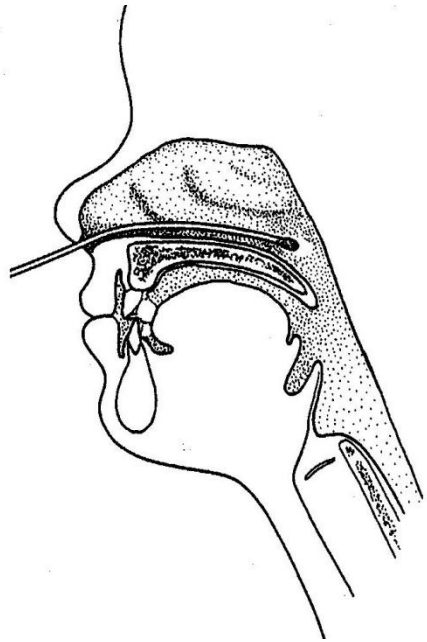
- Droplet Isolation
  - 5 days with correct antibiotics
  - 21 days without antibiotics

Pertussis Testing



http://www.cdc.gov/pertussis/clinical/diagnostic-testing/diagnosis-confirmation.html

Pertussis Laboratory Confirmation



Pertussis Treatment and Prophylaxis

- **Azithromycin once a day for 5 days**
- Clarithromycin twice a day for 7 days
- Erythromycin 4 times a day for 14 days
  - Avoid in infants→risk of pyloric stenosis

- Alternate: Trimethoprim-sulfamethoxazole

Pertussis Postexposure Antibiotic Prophylaxis

- Same antibiotics as for treatment
- Focus on high risk contacts
  - Health care personnel in contact with patients
  - < 1 years old
  - Pregnant women
  - Household members and caretakers of infants
  - Child care workers
  - Children in day care where there are infants

Pertussis Clinical Case Definition

- Clinical Case Definition
  - A cough illness lasting at least 2 weeks with at least one of the following: paroxysms of coughing, inspiratory “whoop,”, or post-tussive vomiting, without other apparent cause) as reported by a health professional
- Laboratory Criteria
  - Isolation of *Bordetella pertussis* from clinical specimen
  - Polymerase chain reaction (PCR) positive result for *B. pertussis*

Pertussis Clinical Case Definition

- Probable:
  - Case meets clinical case definition with no laboratory confirmation or epidemiologic linkage to a laboratory-confirmed case
- Confirmed:
  - Acute cough illness of any duration with isolation of *B. pertussis* from clinical specimen
  - Case meets clinical case definition and is positive on Pertussis PCR or has contact with a laboratory-confirmed case of pertussis

CSTE Pertussis Case Definition Change

- Purpose: To more accurately capture the burden of disease among infants
- Changes:
  - Apnea added to the list of case-defining clinical signs and symptoms for infants
  - PCR positive or epi-linked cases occurring among infants with cough of any duration and one other clinical symptom to be classified as “probable”

Vaccination: DTaP

Routine DTaP Primary Vaccination Schedule

Dose	Age	Minimum Interval
Primary 1	2 months	---
Primary 2	4 months	4 weeks
Primary 3	6 months	4 weeks
Primary 4	15-18 months	6 months

5th dose: for all children who received all 4 primary doses before their 4th birthday, a 5th dose should be given before school entry

Vaccination: Tdap

- Adolescents 11-18 years
- Adults 19-64 years
- Children 7-10 years of age who are not fully vaccinated against pertussis
- Adults 65 years and older who may have close contact with an infant

Vaccination: Tdap

- Women during each pregnancy, even if they have received it before
    - Third or late second trimester (after 20 weeks gestation)

http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6041a4.htm

Pertussis Control Measures

- Exclusion of cases and symptomatic contacts from school/work settings through 5th day of antibiotic course
- If case is unwilling/unable to take antibiotics, they must be excluded for 21 days
- Assuring vaccinations are up-to-date (DtaP and Tdap)

Reporting

Notify your local health department (or ADHS) as soon as pertussis is suspected and especially if testing is ordered

Arizona Department of Health Services

Send or Fax to:
ADHS Infectious Disease Epidemiology
150 North 18th Ave, Suite 140
Phoenix, Arizona 85007-3237
(602) 364-3199 Fax

ADHS Use Only:

PERTUSSIS

MEDSIS Case No: _____

County: _____

☐Suspected ☐LTFU ☐Confirmed
☐Ruled Out ☐Probable

REPORT SOURCE

Initial Report Date: _____

Reporter Name: _____

Reporter Org.: _____

Reporter Phone: _____

Provider Name: _____

Provider Org.: _____

Provider Phone: _____

PATIENT INFORMATION

NAME (Last, First) _____

Street Address _____

City _____ State _____ Zip _____

Mailing Address _____

Phone _____ Alt. Phone _____

Occupation/School Grade: _____

Employer/School/Other: _____

Alt. Contact _____ Phone _____

☐Parent/Guardian ☐Spouse ☐Other _____

Birthdate ____ / ____ / ____ or Age _____ Sex: ☐Male ☐Female ☐Unknown/Other

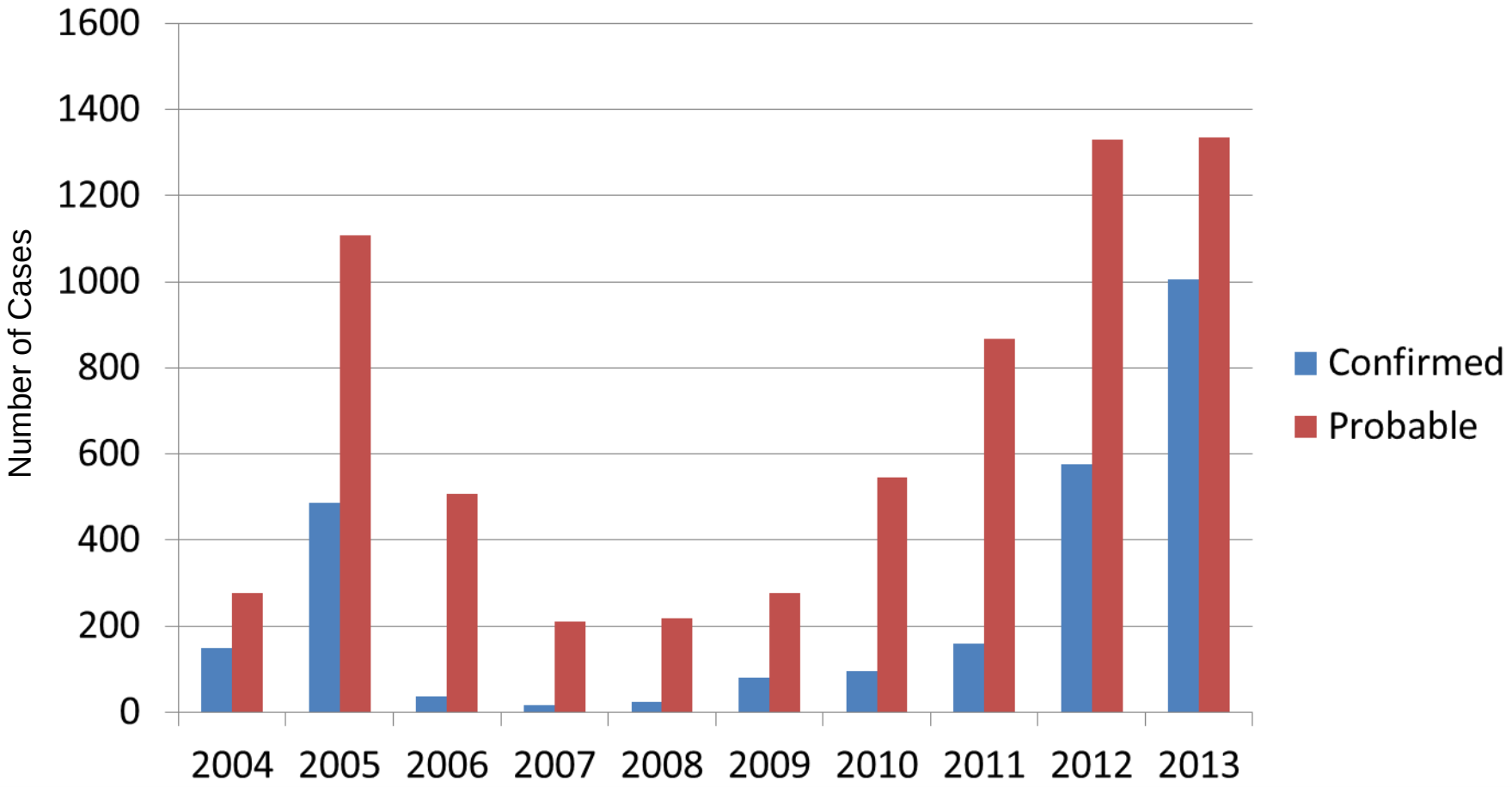
Ethnicity: ☐Hispanic ☐Non-Hispanic ☐Unknown

Race: ☐White ☐African American ☐Native Hawaiian/Pacific Islander
☐ Asian ☐ Am Indian/AK Native ☐ Other _____

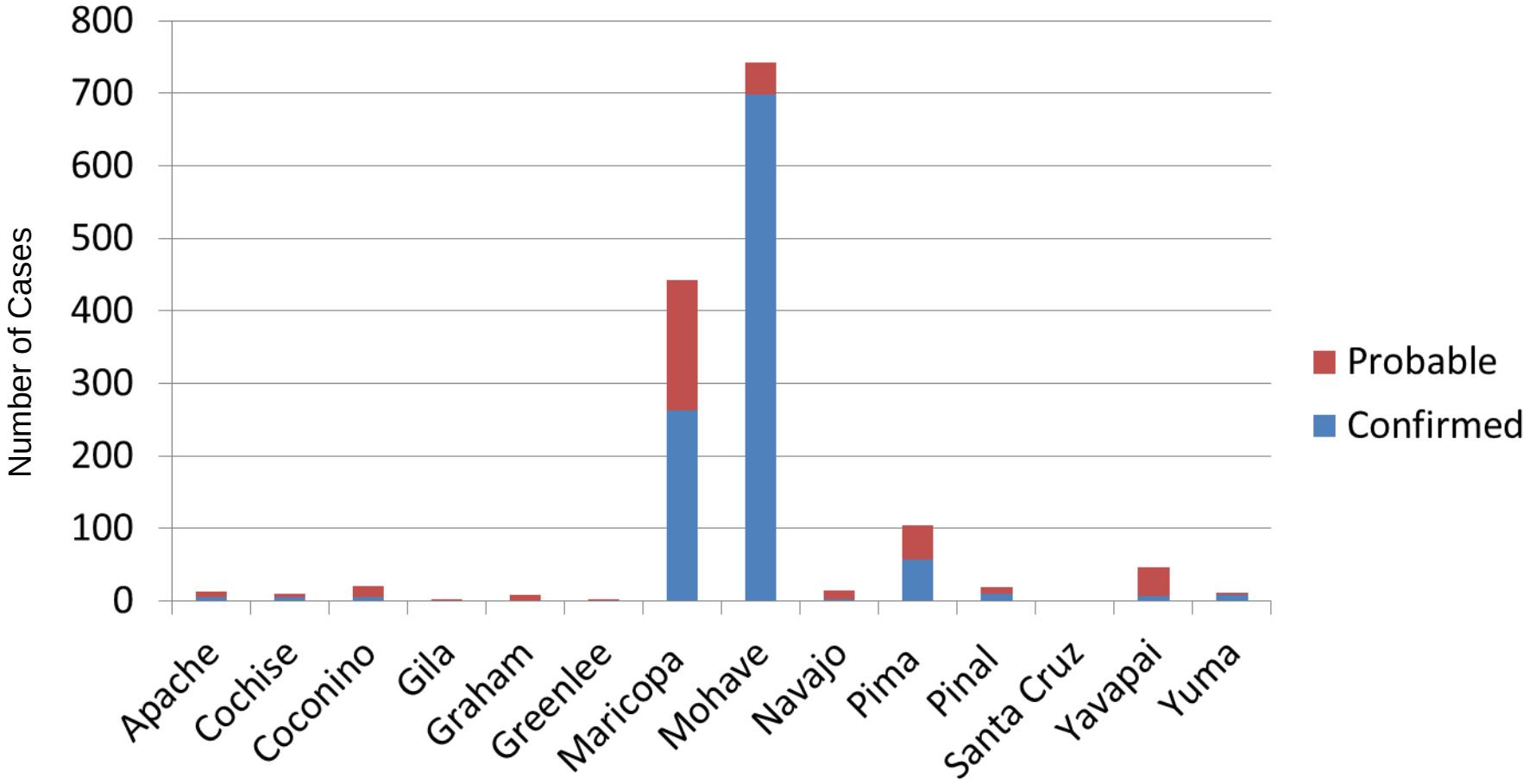
CLINICAL

Onset Date: ____ / ____ / ____ ☐Unknown Diagnosis Date: ____ / ____ / ____ Illness Duration: _____ days ☐Ongoing

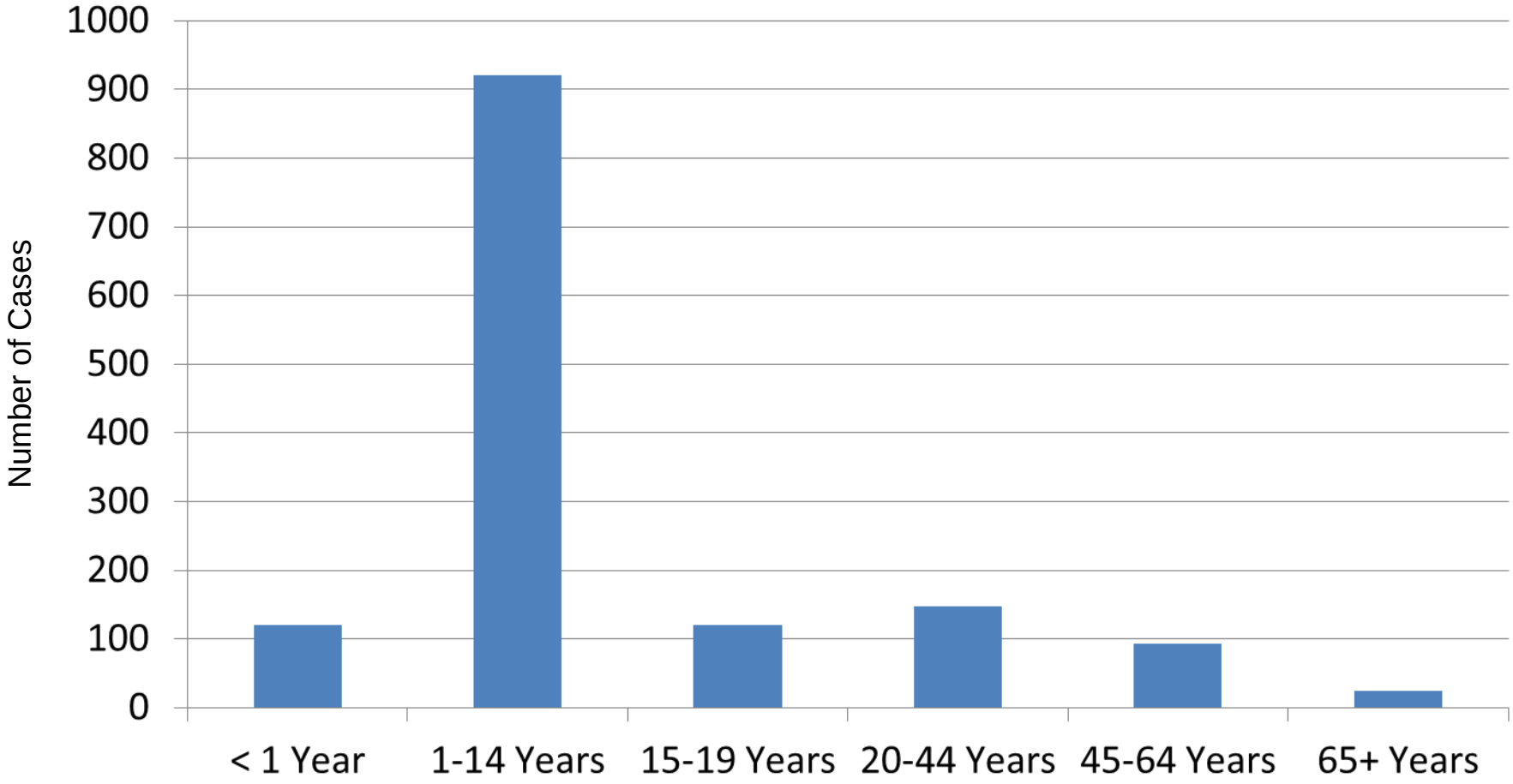
Pertussis in Arizona (2004-2013)



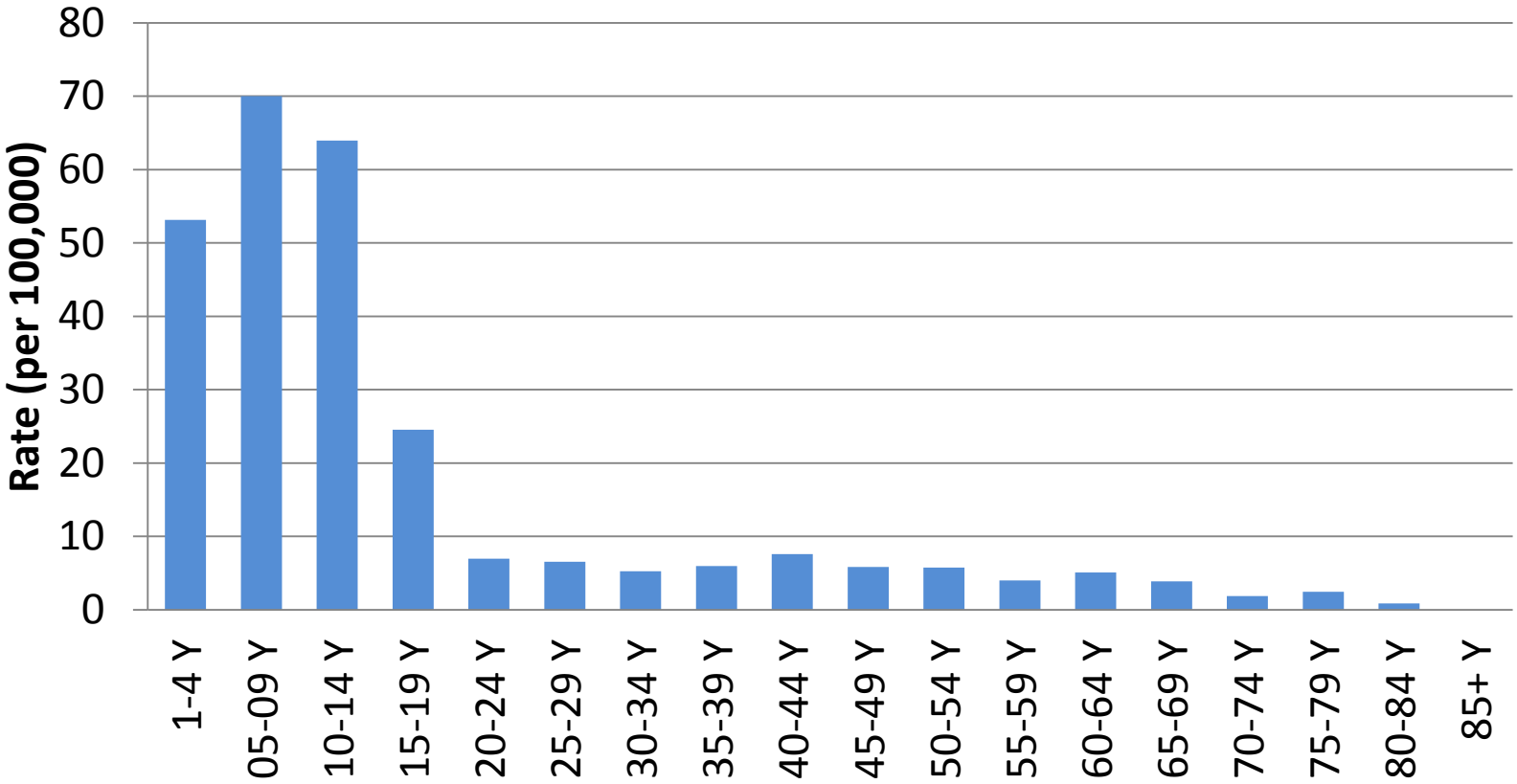
Confirmed and Probable Pertussis by County, Arizona, 2013

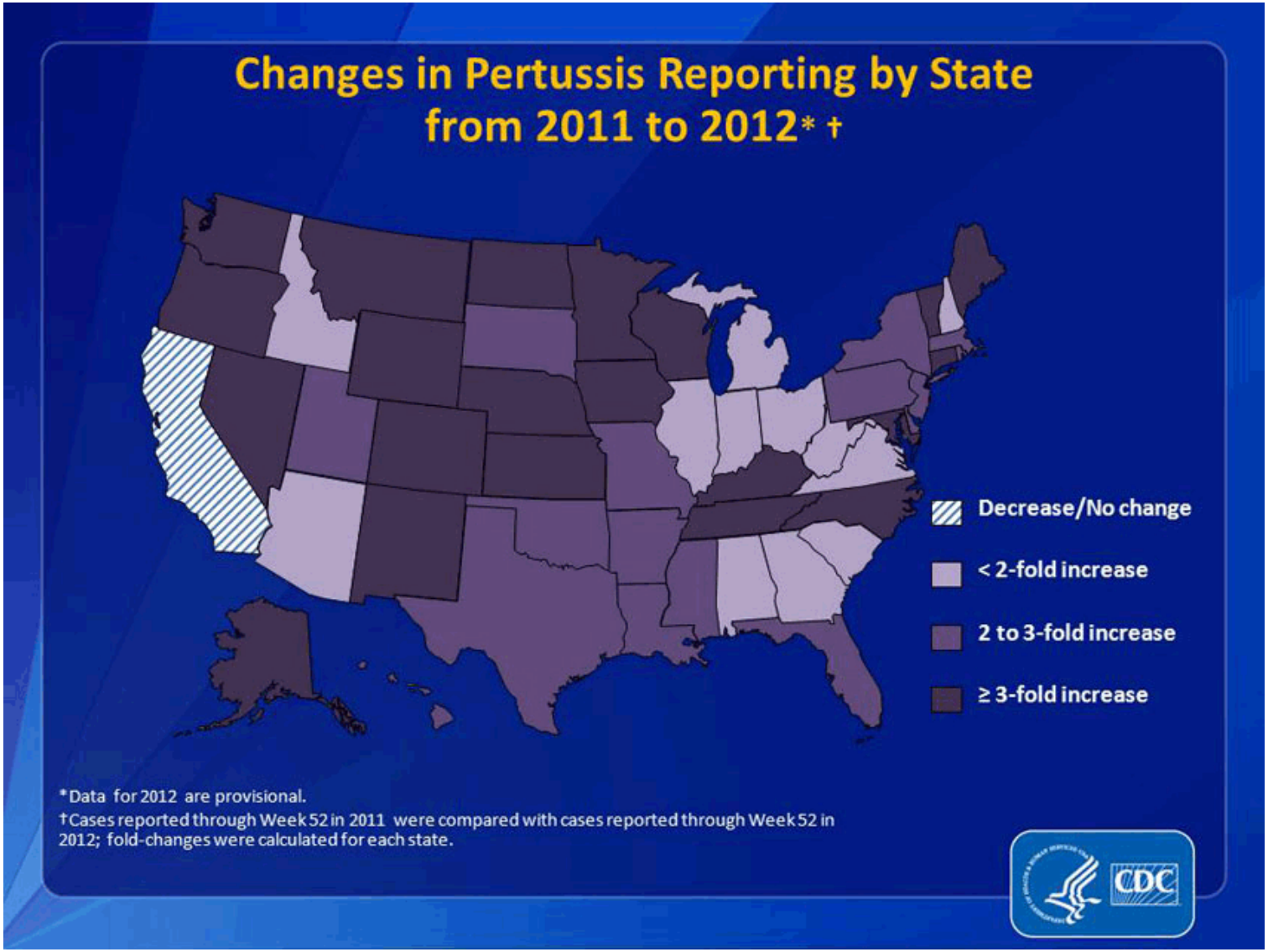


Confirmed and Probable Pertussis by Age Group, Arizona, 2013

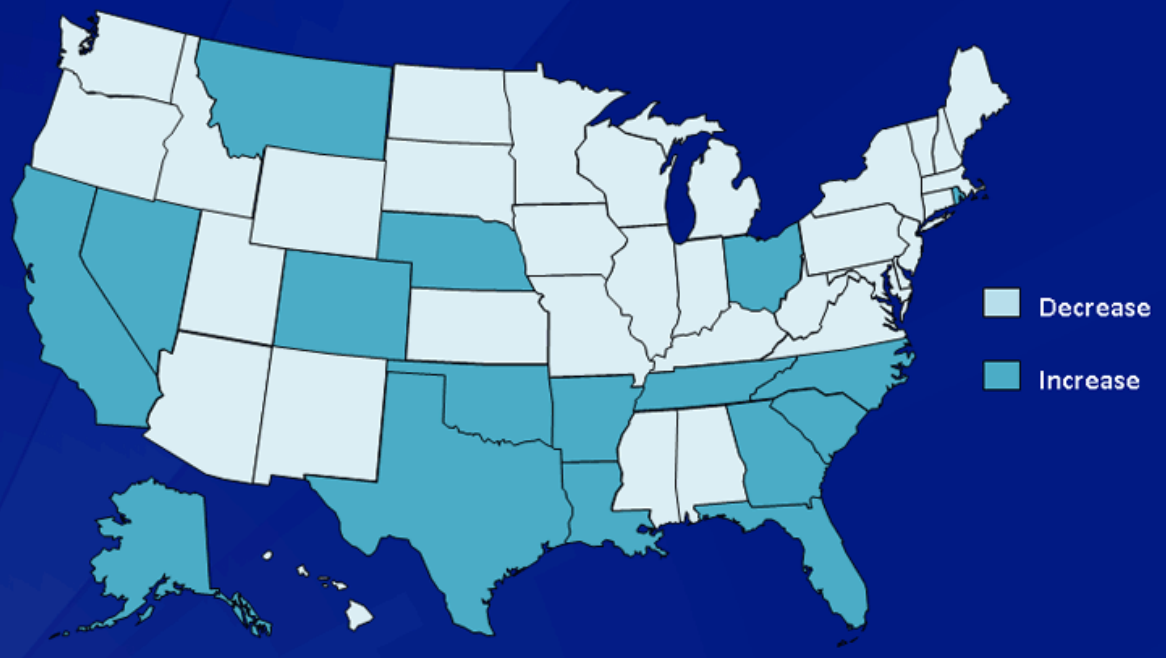


Confirmed and Probable Pertussis Cases by Five Year Age Group, Arizona, 2013




Changes in Pertussis Reporting by State from 2011 to 2012* †
Decrease/No change
< 2-fold increase
2 to 3-fold increase
≥ 3-fold increase
*Data for 2012 are provisional.
†Cases reported through Week 52 in 2011 were compared with cases reported through Week 52 in 2012; fold-changes were calculated for each state.
CDC

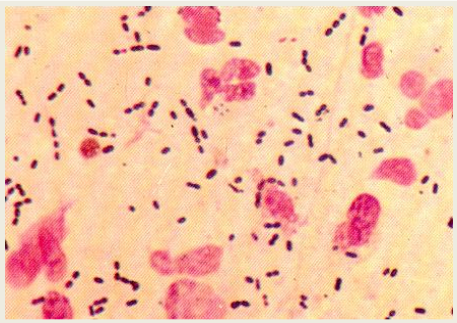
Changes in Pertussis Reporting by State from 2012 to 2013* †



*Data for 2012 and 2013 are provisional and subject to change.
†Cases reported through Week 30 in 2012 were compared with cases reported through Week 30 in 2013; fold-changes were calculated for each state.

Invasive Meningococcal Disease

Neisseria meningitidis



- Gram-negative diplococcus
- Serogroups A, B, C, Y, & W-135 are those most commonly associated with systemic disease
  - Serogroup B is not in the US vaccine, but is licensed for use in Europe, Canada, and Australia
- Transmission
  - person-to-person; direct contact with nasopharyngeal secretions or through droplets/saliva
- Incubation period: 1-10 days (usually 2-4)

Invasive Meningococcal Disease

- Symptoms of meningitis
  - Sudden onset of a stiff neck, high fever, and headache
  - Nausea, vomiting, and mental confusion often present
  - Petechial rash may be present
- Symptoms of meningococcemia
  - Abrupt onset of fever, chills, malaise, prostration, and rash

Meningococcal Vaccines

- 2 Conjugate and 1 Polysaccharide Vaccines
  - 1st conjugate vaccine licensed in 2005, currently two conjugate vacccines available (Menactra and Menveo)
    - Both conjugate vaccines licensed for use in persons 2-55 years of age.
    - Menactra also licensed for use in children 9-23 months of age.
  - Polysaccharide vaccine licensed for ages 2 and older
    - Immune response not as strong as conjugate vaccine
- Protect against serogroups A, C, Y, and W-135
  - No protection for Group B

Vaccination Recommendations

- Recommended for 11-18 year olds
    - First dose: 11-12 years old
    - Booster at 16 years
- Other risk groups (i.e. military recruits, underlying medical conditions, microbiologists, travelers to high risk areas)
- School requirement:
    - 2012-2013: 6-10th graders
    - Additional grade with every school year
- College freshmen living in dormitories

Meningococcal Postexposure Antibiotic Prophylaxis

- For contacts exposed directly to patient's oral secretions (i.e., kissing, sharing toothbrushes or eating utensils, preschool or childcare contacts, household members)
- Antibiotics used for chemoprophylaxis:
  - Rifampin (two day course)
  - Ceftriaxone (single dose IM)
  - Ciprofloxacin (single dose)
  - Azithromycin (single dose, not recommended routinely)

Meningococcal Case Definition

- Suspected
  - Clinical purpura fulminans in the absence of a positive blood culture; or
  - Gram-negative diplococci, not yet identified, isolated from a normally sterile body site (e.g., blood or cerebrospinal fluid (CSF)) *
- Probable
  - Detection of *N. meningitidis*-specific nucleic acid in a specimen obtained from a normally sterile body site (e.g., blood or CSF) using a validated PCR assay; or
  - Detection of *N. meningitidis* antigen
    - In formalin-fixed tissues by immunohistochemistry (IHC) OR
    - In CSF by latex agglutination

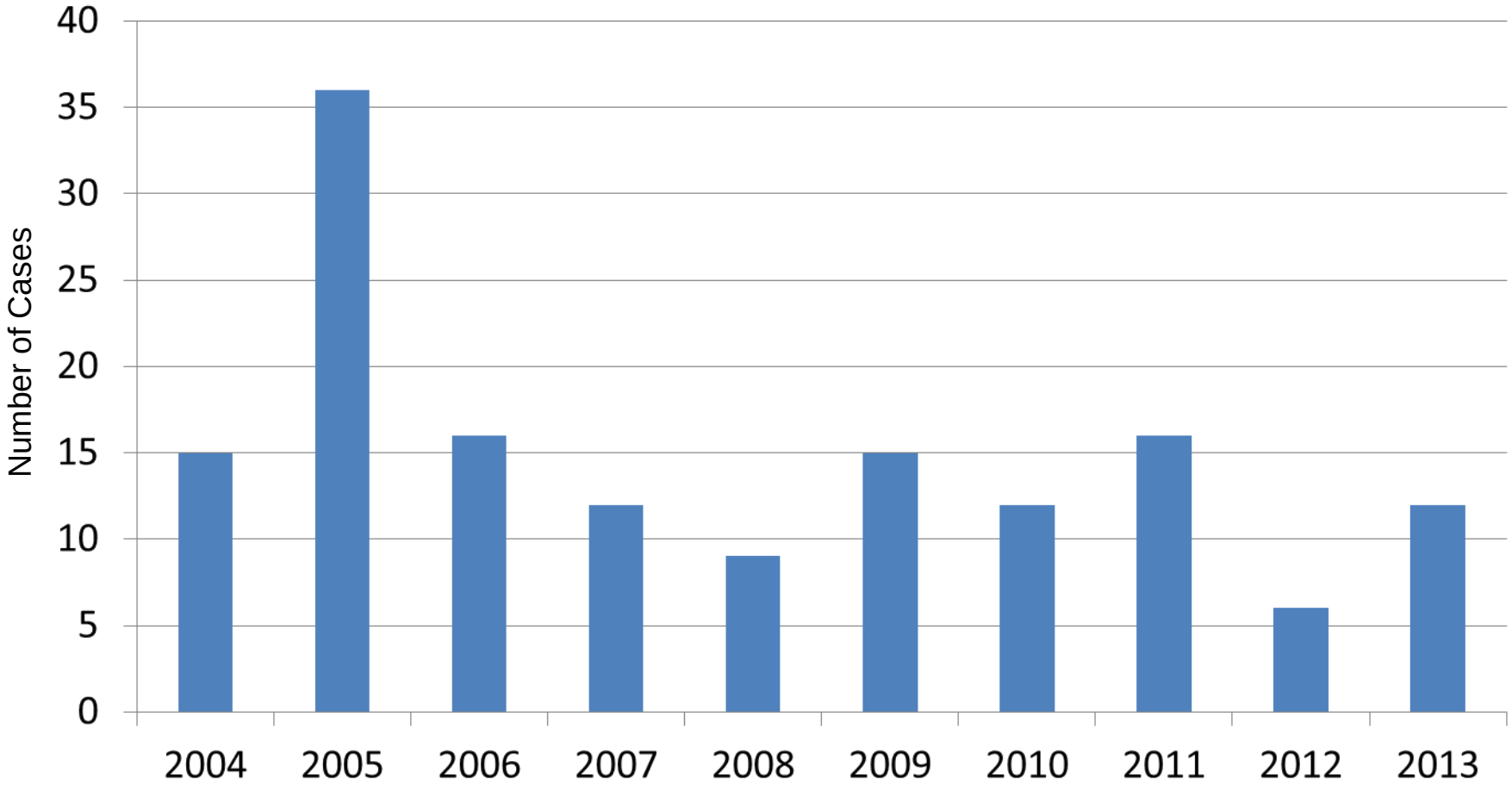
Meningococcal Case Definition

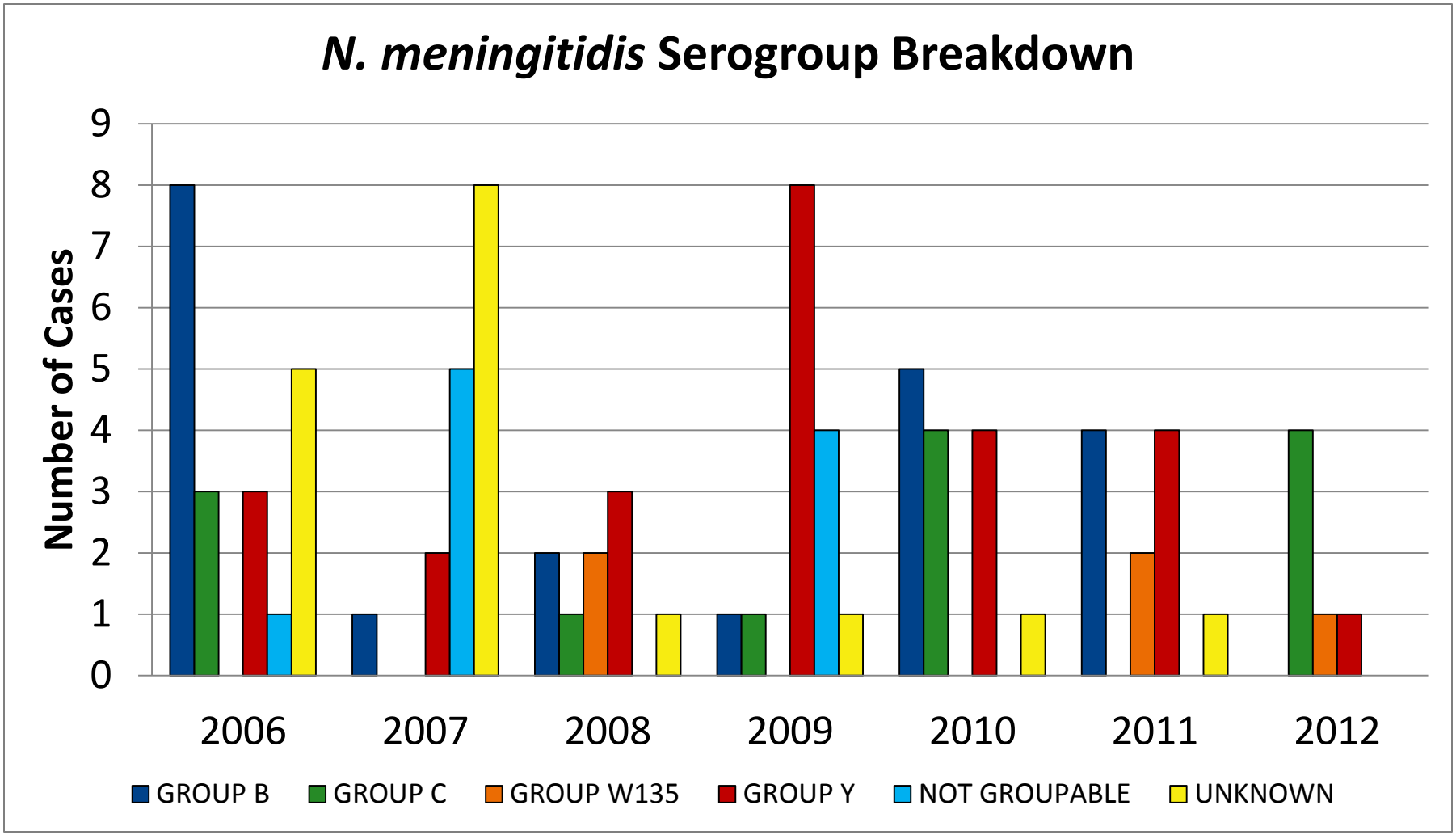
- Confirmed
  - Isolation of *N. meningitidis*
    - From a normally sterile body site (e.g., blood or CSF, or, less commonly, synovial, pleural, or pericardial fluid), OR
    - From purpuric lesions

Suspected Invasive Meningococcal Disease

- For suspected cases with gram stain showing presence of gram-negative diplococci from sterile site:
  - Treat as meningococcal case in regards to patient and contact investigation/chemoprophylaxis
  - Forward isolate to Arizona State Laboratory for PCR testing at CDC, coordinate through local health department.

Invasive Meningococcal Disease in Arizona (2004-2013)




N. meningitidis Serogroup Breakdown
Number of Cases
0
1
2
3
4
5
6
7
8
9
2006
2007
2008
2009
2010
2011
2012
GROUP B
GROUP C
GROUP W135
GROUP Y
NOT GROUPABLE
UNKNOWN

Meningococcal Invasive Disease

2013	2012
12 confirmed cases	6 confirmed cases

3 serogroup B

4 serogroup C

3 serogroup Y

2 serogroup W-135

3 deaths:

- 55 y.o. (serogroup B)
- 42 y.o. (serogroup W135)
- 93 y.o. (serogroup C)

Meninogoccal Serogroup B Outbreak Princeton University

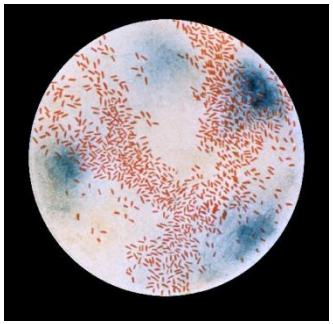
- Eight cases of Serogroup B Disease reported since March 2013
- Serogroup B vaccine (currently licensed in Europe, Canada, and Australia) was administered to more than 5,000 students in December through FDA Investigational New Drug application
- More than 4,700 students received second dose in February 2014
- To date, no unusual or serious vaccine reactions reported
- For further information, visit:
  - http://www.cdc.gov/meningococcal/outbreaks/princeton.html

Meninogoccal Serogroup B Outbreak University of California, Santa Barbara

- Four confirmed cases Serogroup B disease since November 2013
- Serogroup B vaccine (currently licensed in Europe, Canada, and Australia) was administered to more than 9,000 students in February/March 2014 through FDA Investigational New Drug application
- To date, no unusual or serious vaccine reactions reported
- For further information, visit:
  - http://www.cdc.gov/meningococcal/outbreaks/ucsb.html

Invasive *Haemophilus influenzae* type b

Haemophilus influenzae (invasive)



- Gram negative coccobacillus
  - Two types
    - Encapsulated (6 types designated ‘A’ through ‘F’)
    - Not encapsulated (‘non-typable’)
  - Type b the most likely to cause severe disease in children < 5
- All invasive infections are reportable to ADHS
  - Labs required to submit isolates for serotyping at the state laboratory

Invasive *Haemophilus influenzae, type b*

- Prior to vaccine availability, was a major cause of bacterial meningitis in children under 5 years of age
- Mode of transmission thought to be through respiratory droplets
  - Humans are main reservoir for the organism
  - Hib does not survive in the environment on inanimate surfaces
  - Secondary infections are rare
    - Secondary attack rates estimated between 0-2.7%
- Non-encapsulated (non-typable) disease typically less virulent
  - No recommended public health intervention for non-type b infections

Vaccination: Hib

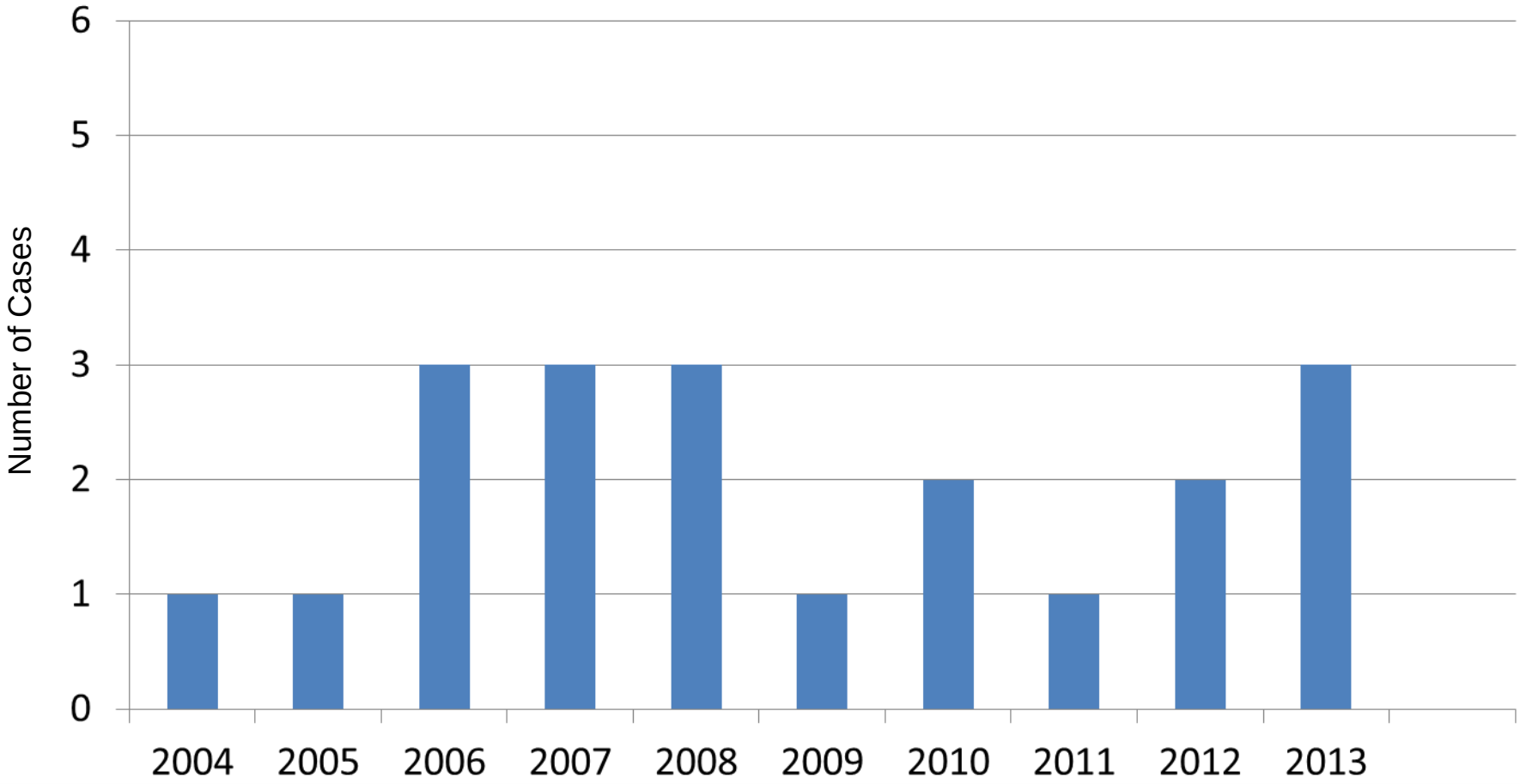
Vaccine	2 Months	4 Months	6 Months	12-15 Months
PRP-T*	Dose 1	Dose 2	Dose 3	Booster
PRP-OMP	Dose 1	Dose 2		Booster

Haemophilus influenzae Clinical Case Definition

- Probable
  - Meningitis with detection of *Haemophilus influenzae* type b antigen in CSF

- Confirmed
  - Isolation of *Haemophilus influenzae* from a normally sterile body site (e.g., blood or CSF, or less commonly, joint, pleural, or pericardial fluid)

Invasive *Haemophilus influenzae* type b in < 5 years, Arizona, 2004-2013



H. flu type B (Hib) in children <5 years

2013	2012
3 confirmed cases - 1 death in an unvaccinated 1 year old (bacteremia and meningitis)	2 confirmed case

Measles

Measles

- Highly infectious viral disease
- Airborne transmission
- Virus can remain in air for hours
- Communicability: 4 days before rash onset and 4 days after
- Incubation Period: 7–21 days
- Clinical features
  - Prodrome of fever (up to 103°F or higher) and “Three C’s” (coryza, conjunctivitis, cough)
  - Maculopapular rash

Measles Rash

- Maculopapular, appears 2-4 days after prodrome
- Begins on face and head and moves down body
- Becomes confluent
- Fades in order of appearance
- Lasts 5-6 days

Measles Laboratory Testing

- Specimens to collect are serum, nasopharyngeal swab, and urine
  - Serum for Measles IgM antibody testing
  - NP and Urine for PCR testing
- NP and urine are best obtained within 7 days of rash onset (closer to onset is always better for PCR)
- Serum best at least 3 days after onset
- PCR testing most important
  - Allows for confirmation of the presence of measles virus
  - Genotyping available at CDC to confirm virus origin

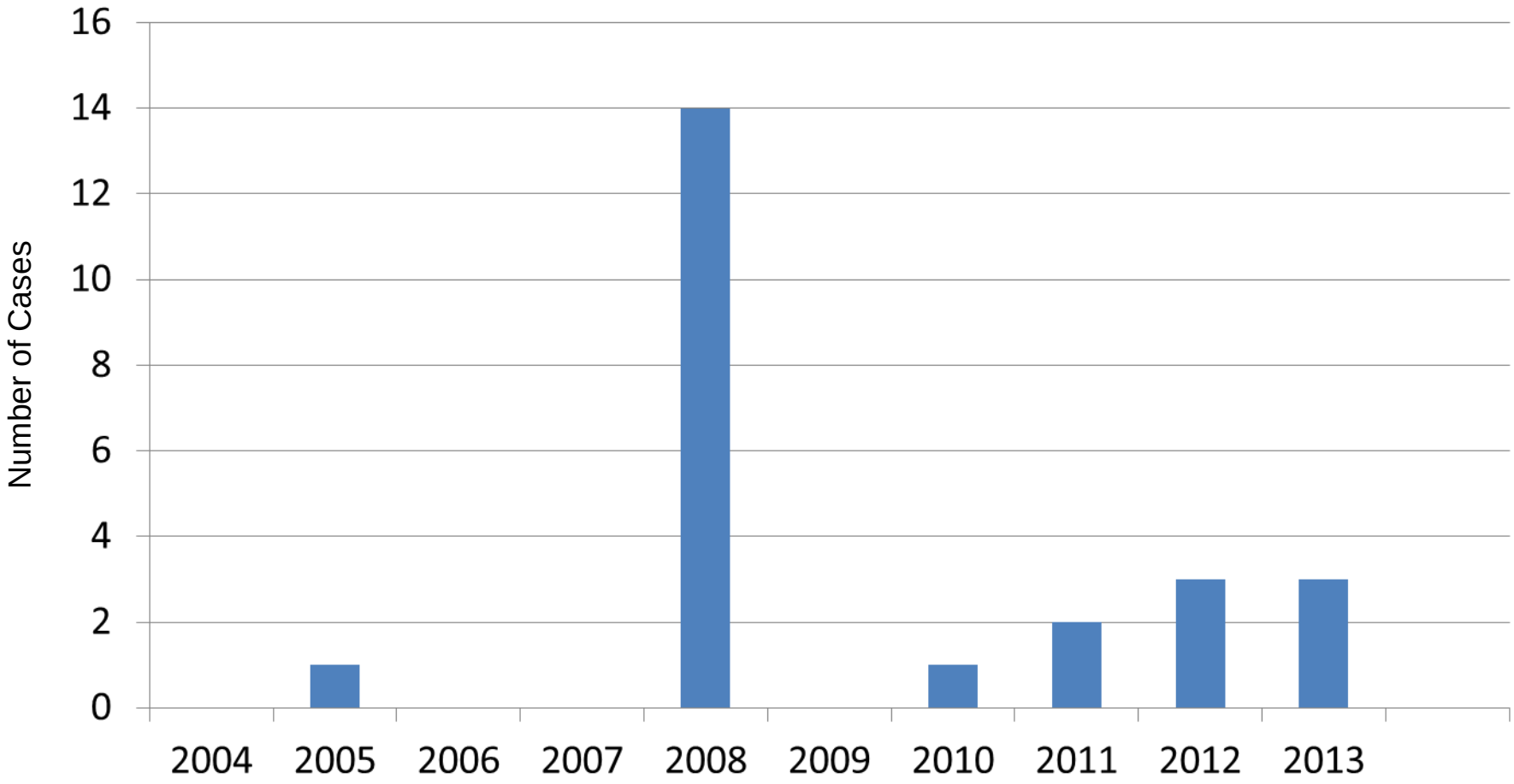
Measles Clinical Case Definition

- An illness characterized by:
  - A generalized rash lasting greater or equal to 3 days
  - A temperature greater or equal to 101.0° F
  - Cough, coryza, or conjunctivitis
- Laboratory criteria for diagnosis
  - Isolation of measles virus from a clinical specimen
  - Detection of measles virus-specific nucleic acid by PCR
  - Significant rise in serum measles immunoglobulin G antibody level between acute- and convalescent-phase specimens, by any standard serologic assay
  - Positive serologic test for measles immunoglobulin M antibody

Measles Case Classification

- Suspected
  - Any febrile illness accompanied by rash
- Probable
  - A case that meets the clinical case definition, has noncontributory or no serologic or virologic testing, and is not epidemiologically linked to a confirmed case
- Confirmed
  - A case that is laboratory confirmed or that meets the clinical case definition and is epi-linked to a confirmed case

Measles, Confirmed Cases, Arizona, 2004-2013



2013 Imported Measles Pima County

- Unvaccinated 13 month old with travel history to endemic area
- Symptoms included rash, fever, cough, coryza and conjunctivitis
- Case was infectious while flying back to the US
- Diagnosed by a Pima County pediatrician
- IgM positive for measles at both LabCorp and Arizona State Public Health Laboratory
- Potential exposure sites included flight, hotel, pediatrician's office
- **No spread!**

2014 Measles Exposure Maricopa County

- Confirmed measles case in unvaccinated traveler who visited Maricopa County during infectious period
- Case had recent travel history to Europe
- Case was confirmed as measles by PCR
- Potential exposures sites included an airport, a church, and a bakery/restaurant
- Maricopa County issued a press release and notified providers of potential exposures

Measles MMWR, September 24, 2013

- Measles elimination declared in US in 2000; however, importations continue
- The median number of cases reported in the US from 2001-2012 was 60 cases (range: 37-220 cases); median annual number of reported outbreaks was 4 (range: 2-16)
- In 2013, 159 cases and 8 outbreaks were reported to CDC as of August 24, 2013
- In 2013, the source of importations was most often the WHO European region, an area where measles continues to circulate
- The majority of cases reported in 2012 were unvaccinated (82%) or had unknown vaccination status (9%)
- In 2011, 220 cases were reported in the US, the largest number of reported cases since elimination in 2000. In 2008, 140 cases were reported nationwide
- In 2013, the largest outbreak since 1996 was reported in New York City, with 58 cases

Mumps

Mumps

- Viral illness
- Respiratory transmission
- Communicability thought to be similar to that of influenza and rubella
- Infective period from 2-3 days before onset of parotitis to 4-5 days after onset
- Nonspecific prodrome of myalgia, anorexia, malaise, headache, low-grade fever
- Parotitis occurs in 30-40% of infected persons, may be unilateral or bilateral
- Symptoms tend to decrease after one week

Mumps Laboratory Testing

- Specimens for laboratory testing important
  - Buccal and oropharyngeal swabs
    - For PCR and viral culture
      - CDC particularly interested in testing isolated cases
    - Ideally collected within 1-3 days after the onset of symptoms
  - Serum
    - IgM testing
    - Collected at same time as viral specimens
      - IgM rise may be delayed in vaccinated populations

Laboratory Criteria for Mumps Diagnosis

- Isolation of mumps virus from clinical specimen
- Detection of mumps nucleic acid on mumps PCR
- Detection of mumps IgM antibody
- Significant rise in serum mumps IgG antibody level between acute- and convalescent-phase specimens, by any standard serologic assay

Mumps Clinical Case Definition

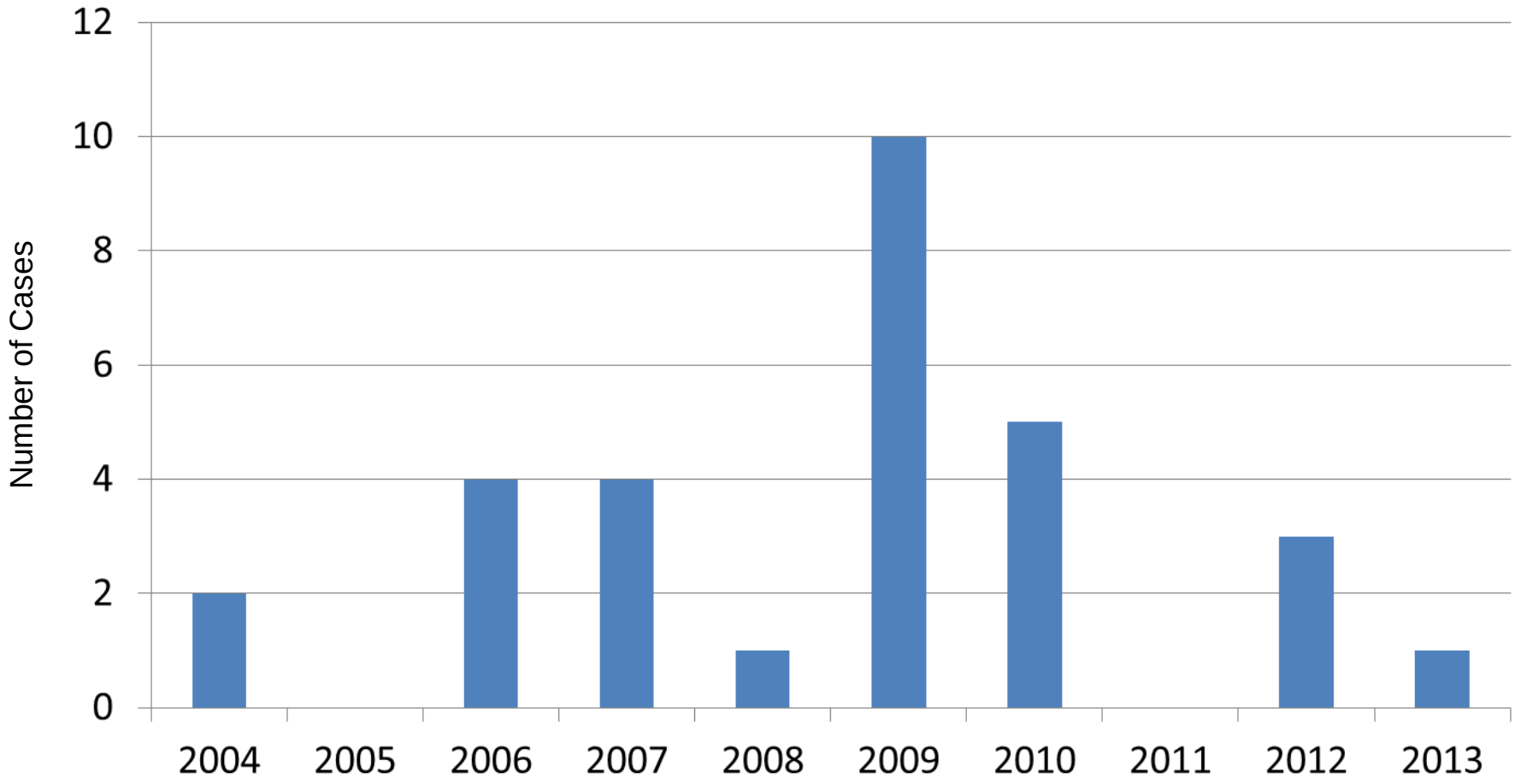
- An illness with acute onset of unilateral or bilateral tender, self-limited swelling of the parotid and/or other salivary gland(s), lasting at least 2 days, without other apparent cause.

- Infection may present as aseptic meningitis, encephalitis, hearing loss, orchitis, oophoritis, parotitis, or other salivary gland swelling, mastitis, or pancreatitis

Mumps Surveillance Case Definition

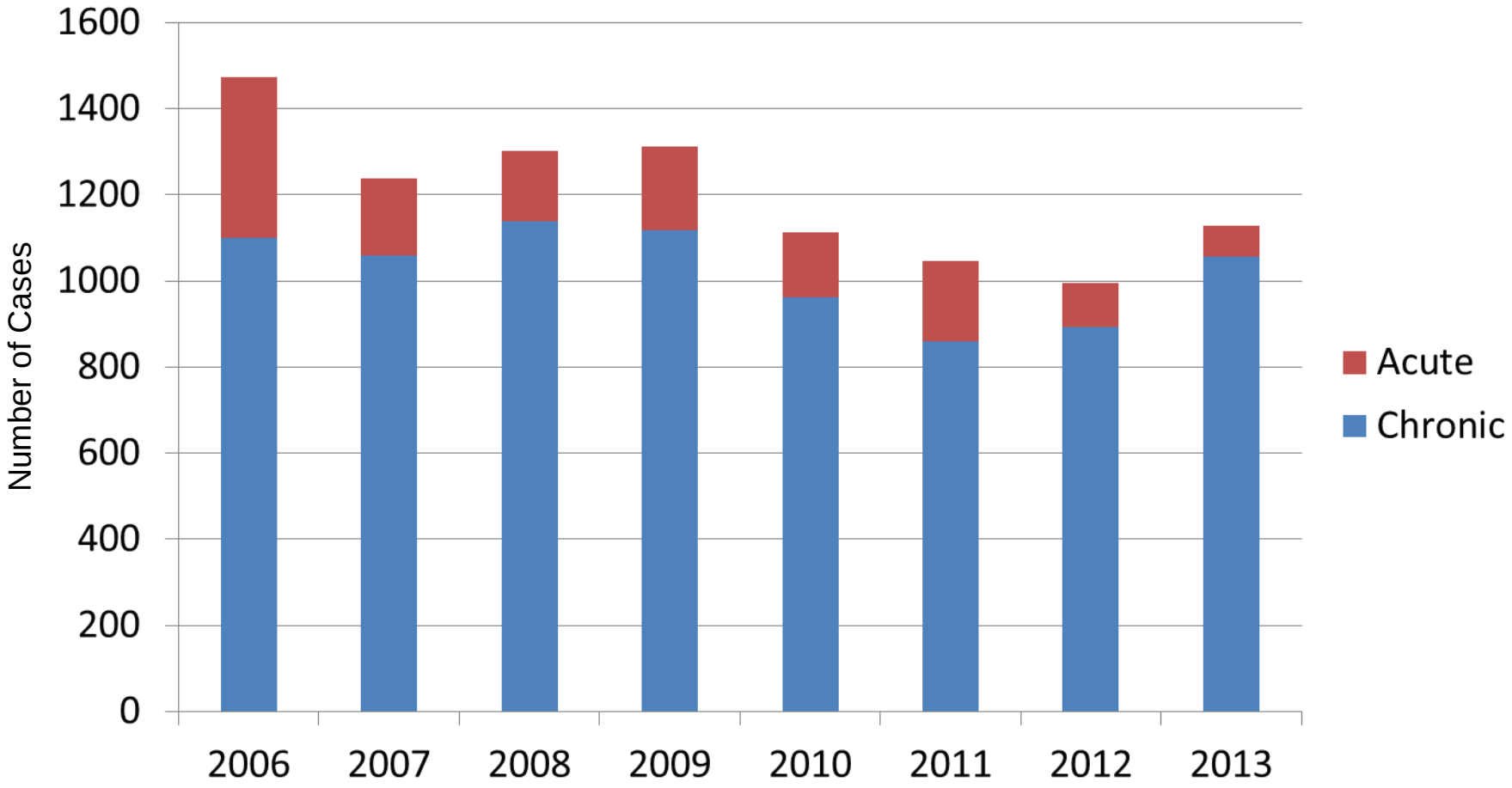
- Confirmed: A case that meets the clinical case definition or has clinically compatible illness AND is either lab confirmed or epi-linked to a confirmed case
- Probable: A case that meets the clinical case definition without laboratory confirmation and is epi-linked to a clinically compatible case.
- Suspect: A case with clinically compatible illness or that meets the clinical case definition without lab testing, or a case with lab tests suggestive of mumps without clinical information.

Confirmed Mumps, Arizona, 2004-2013



Hepatitis B

Hepatitis B, Acute and Chronic 2006-2013



Perinatal Hepatitis B

- Hepatitis B Vaccine for all infants preferably within 24 hours (or before hospital discharge)
- For mothers that have Hepatitis B, HBV and HBIG recommended for the infant within 12 hours of birth
- For mothers with unknown status, mothers should be tested and infant should receive first dose of HBV within 12 hours of birth. If mother tests positive for Hepatitis B, infant should receive HBIG as soon as possible and no later than 7 days old
- All pregnant women should be tested for Hepatitis B during an early prenatal visit with every pregnancy

Influenza

Arizona Seasonal Influenza/RSV Surveillance Update

- Local flu activity reported for Week 15 (April 6, 2014 – April 12, 2014)
- A total of 10,130 influenza cases have been reported from all 15 counties during the 2013-2014 season
- The majority of influenza this season has been influenza A
  - Of those subtyped, the majority has been influenza A (H1N1)pdm09
- One pediatric death has been reported in the 2013-14 season
- A total of 2,511 RSV cases have been reported from 14 counties during the 2013-2014 season
- ADHS Flu/RSV Activity Reports available at: http://www.azdhs.gov/phs/oids/epi/flu/index.htm

Influenza H7N9 Update

- As of 4/15/2014, there have been 421 cases and 127 deaths
  - 136 cases during first wave 2/2013-5/2013
  - 285 cases during second wave 10/2013-current
- Infection occurring in middle aged and older men
- Cases reported in 10 Chinese provinces and Malaysia
  - Malaysian cases reported recent travel to China
- Transmission is believed to be due to contact with poultry (approx. 80% of cases report recent exposure)
  - No sustained human-to-human transmission
- The virus is susceptible to oseltamivir and zanamivir
- CDC is taking the earliest steps needed to develop a candidate vaccine

Arizona Infectious Disease Conference
July 22-24, 2014

- Location: Black Canyon Conference Center, 9440 N. 25th Ave, Phoenix, AZ, 85021
- Topics: VPDs, Healthcare-Associated Infections, Influenza, Refugee Health, Vector-borne and Zoonotic Diseases, TB, HIV, STDs, and more
- Cost: Free!
- Disease Outbreak Tabletop Exercise
- Registration available online:
  - http://www.surveymonkey.com/s/2014AZID

ADHS VPD Surveillance Staff

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Contact: 602-364-3676

Questions?

Thank you!