CALIFORNIA
MEASLES AND PERTUSSIS
EPIDEMICS

Eric C. McDonald, MD, MPH, FACEP
Medical Director
Epidemiology and Immunizations Services
Public Health Services
County of San Diego Health and Human Services Agency

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DISCLOSURE STATEMENT

- I have no relevant financial relationships with any commercial supporters.

- Unlabeled/Investigational products and/or services will not be mentioned in this talk.
MEASLES
MEASLES - BASICS

- Rash illness, historically childhood infection with 2-4 year epidemic cycle; most cases in winter and spring
- Complications may include otitis media, pneumonia, encephalitis, miscarriage, and death
- Airborne spread - probably the most infectious communicable disease; $R_0 = 15-18$
- Two doses of MMR vaccine offer >99% protection from disease; however, requires very high population immunity to interrupt transmission (92-95%)
- No endemic transmission in the U.S. at this time – declared eliminated in 2000
The number of people that one sick person will infect (on average) is called $R_0$. Here are the maximum $R_0$ values for a few viruses.

- Hepatitis C (2)
- Ebola (2)
- HIV (4)
- SARS (4)
- Mumps (10)
- Measles (18)
MEASLES IN THE PREVACCINE ERA – UNITED STATES, 1950S

Annually:

- 3-4 million cases
  - ~ 500,000 reported cases

- Severe complications
  - 4,000 encephalitis cases
  - 150,000 respiratory complications (pneumonia)

- 48,000 hospitalizations

- 450 deaths
MEASLES IN CALIFORNIA

- Before widespread immunization for measles, there were ~14-30 measles deaths per year in California, most in infants and young children.
- First measles vaccine in U.S. was licensed in 1963.
- By 1966, ~24% of California children <10 years of age had been vaccinated.
- School law in 1968.
  - Measles vaccine needed for kindergarten entry.

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### TABLE 1. — Measles Cases and Case Rates*
California, 1966-1969

<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
<th>Case Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1966</td>
<td>15,257</td>
<td>79.5</td>
</tr>
<tr>
<td>1967</td>
<td>5,271</td>
<td>27.1</td>
</tr>
<tr>
<td>1968</td>
<td>1,464</td>
<td>7.4</td>
</tr>
<tr>
<td>1969</td>
<td>916</td>
<td>4.6</td>
</tr>
</tbody>
</table>

* Rates are per 100,000 population.
MEASLES IN THE POSTVACCINE ERA – UNITED STATES, 1980 - 2000
MEASLES RESURGENCE
UNITED STATES, 1989-1991

- Cases
  - US 55,622
  - CA 18,000

- Age group affected
  - Children <5 years

- Hospitalizations
  - >11,000
  - CA 3,500

- Deaths
  - 123
  - CA 70

- Direct medical costs
  - >$150 million
MEASLES – UNITED STATES
1993-2007

- Record low annual total in 2004 (37 total cases)
- Introduction of 2nd dose of vaccine in 1989 and Federal “Vaccines for Children” program in 1993
  - 2000: “Measles is no longer endemic in the United States”
- Many cases among adults
- Most cases imported or linked to importation
- Elimination of endemic measles in North and South America was achieved in 2002
REPORTED CASES OF MEASLES
SAN DIEGO COUNTY, 1985 – AUGUST, 2015

Data Source: HHSA Immunizations Program
Data through March 31, 2015

3 deaths in 1990
1 death from SSPE
MEASLES - EPIDEMIOLOGY

- "Where have you been?" Most U.S. measles cases are related to international travel or contact with ill travelers

- Measles is endemic in Europe with large outbreaks since 2010: >15,000 cases in France in 2011, >11,000 in Ukraine in 2012, >12,000 in EU in 2013, >5,000 in Ukraine in 2014

- Ongoing transmission in India, the Philippines (47,000 cases, 77 deaths in 2014) and Ethiopia, among other countries – See CDC Travel Alerts

- 145,700 deaths from measles were reported in 2013 globally; >95% of measles-related deaths were reported from countries with weak health infrastructure
2014 U.S. Measles Cases and Outbreaks

644 Cases
23 Outbreaks


representing 89% of reported cases this year

U.S. Measles Cases by Year

*Provisional data reported to CDC’s National Center for Immunization and Respiratory Diseases
2015 U.S. Measles Cases and Outbreaks

188
Cases

representing 81% of reported cases this year

U.S. Measles Cases by Year

*Provisional data reported to CDC’s National Center for Immunization and Respiratory Diseases

Data Source: CDC as of August 21, 2015
http://www.cdc.gov/measles/cases-outbreaks.html
2015 Measles Cases in the U.S.
January 1 to August 21, 2015

Cases*:
- 0
- 1-4
- 5-9
- 10-19
- 20+

*Provisional data reported to CDC's National Center for Immunization and Respiratory Diseases

Data Source: CDC as of August 21, 2015
http://www.cdc.gov/measles/cases-outbreaks.html
MEASLES CLINICAL FEATURES

- Prodrome – onset 8 to 12 days after exposure (range=7-21 days)
  - Stepwise increase in fever to 101º F or higher
  - Dry cough, coryza, conjunctivitis
  - Koplik spots (rash on mucous membranes)
Koplik spots in mouth due to pre-eruptive measles on day 3 of illness. Classically described as appearing like "grains of salt on a wet background."
MEASLES CLINICAL FEATURES

- Rash
  - 2-4 days after prodrome, 14 days after exposure
  - Maculopapular, becomes confluent (not itchy, except late in rash)
  - Begins on face and head (not on face, not measles!)
  - Occurs with fever
  - Persists 5-6 days
  - Fades in order of appearance
<table>
<thead>
<tr>
<th>#</th>
<th>Disease</th>
<th>Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>First</td>
<td>measles</td>
<td>rubeola</td>
</tr>
<tr>
<td>Second</td>
<td>scarlet fever</td>
<td>group A streptococcus</td>
</tr>
<tr>
<td>Third</td>
<td>German measles</td>
<td>rubella</td>
</tr>
<tr>
<td>Fourth</td>
<td>scarletina, Duke’s</td>
<td>Same as #2</td>
</tr>
<tr>
<td>Fifth</td>
<td>erythema infectiosia</td>
<td>human parvovirus B19</td>
</tr>
<tr>
<td>Sixth</td>
<td>roseola infanticum</td>
<td>human herpesvirus 7</td>
</tr>
</tbody>
</table>
## MEASLES COMPLICATIONS

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percent reported*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diarrhea</td>
<td>8</td>
</tr>
<tr>
<td>Otitis media</td>
<td>7</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>6</td>
</tr>
<tr>
<td>Encephalitis</td>
<td>0.1</td>
</tr>
<tr>
<td>Hospitalization</td>
<td>18</td>
</tr>
<tr>
<td>Death</td>
<td>0.2</td>
</tr>
</tbody>
</table>

*Based on 1985-1992 surveillance data
Measles Complications by Age Group

- Pneumonia
- Hospitalization

Percent

Age group (yrs)

- <5
- 5-19
- 20+
MEASLES LABORATORY DIAGNOSIS

- Serum measles IgM antibody positive test result (may be negative in the first 72 hours)
- Significant rise in serum measles IgG antibody between acute and convalescent titers
- Isolation of measles virus from clinical samples (blood, urine or NP secretions)
- Detection of viral RNA by reverse transcription polymerase chain reaction (RT-PCR).

ALL CASES OF SUSPECTED MEASLES SHOULD BE REPORTED IMMEDIATELY TO THE HEALTH DEPARTMENT WITHOUT WAITING FOR RESULTS OF DIAGNOSTIC TESTS.
IGM AND IGG ANTIBODY RESPONSES TO ACUTE MEASLES INFECTION

Source: WHO
MEASLES

Treatment

- No specific antiviral treatment available
- Vitamin A once daily for 2 days – World Health Organization (WHO) recommends for all children with acute measles, regardless of their country of residence.
- Supportive

Post-exposure prophylaxis

- MMR vaccine may be given <72 hours of exposure to persons ≥6 months of age with 1 or no documented doses of MMR, if not contraindicated.
- Immune globulin (IG) may be given to exposed susceptible people* of any age ≤6 days of exposure to prevent infection (* = infants <12 months, pregnant women without evidence of measles immunity, severely immunocompromised persons.)

CALL COUNTY!
MEASLES – INFECTION CONTROL

- Infectious Period: 4 days before rash onset through 4 days after rash onset (day of rash onset is day 0)
- Incubation Period: 8-12 days after exposure (day 0) and rash onset is typically 14 days (range 7-21 days) after exposure
- Exposure: sharing the same airspace with an infectious person (during the 4 days prior through the 4 days after rash onset) = same classroom, home, clinic waiting room, airplane, store, etc. up to 2 hours after the person was present.

KNOW THE IMMUNE STATUS OF ALL STAFF NOW!!!
MEASLES – SAN DIEGO 2014

Index Case

Home

- Household = Index case, husband & 88 yo mother
- Held dinner party with 4 guests during infectious period

Work

- 24 Hour Research facility
- Shifts overlap
- 27 staff member exposure

Medical Visits

- Clinic X 2
- Medical Center ED
- 300+ patient exposures
MEASLES – SAN DIEGO 2014

Index Case

- Home
  - Case #3 – 28 yo female from dinner party.

- Work
  - No Secondary Cases from work site

- Medical Visits
  - Case #2 – 5 month old female from ED exposure
  - Case #4 – 43 yo female from ED exposure
MEASLES – SAN DIEGO 2014

Case #2

~ 5 month old female exposed 2/17 at Medical Center ED
~ Symptoms: fever, diarrhea, rash, ulcers on soft palate
~ Exposed 118 patients & 43 staff at Medical Center ED
Case #3

~ 28 yo female exposed during dinner party at Index Case’s home
~ Symptoms: HA, body aches, N/V, fever, rash, blisters around mouth
~ Exposed 225+ at Primary Care & Urgent Care, as well as work, “Babies First Ultrasound”
MEASLES – SAN DIEGO 2014

Case #4

~ 43 yo female, healthcare worker, exposed 2/17 at Medical Center ED
~ Symptoms: Fever, sore throat, rash
~ Exposed 504+ at work clinic, clinic for care, church 24 hour fitness
Lessons learned

- Have a policy of evaluating patients (especially children) with fever and rash quickly and separately
- Patients should call ahead when they have fever with rash
- Document the immunization status of providers before potential exposure
- Encourage vaccination on schedule
From December 28 to March 27, 2015, 146 people from 7 states [AZ (7), CA (130), CO (1), NE (2), OR (1), UT (3), WA (2)] were reported to have measles and are considered to be part of a large, ongoing outbreak linked to an amusement park in California*.

*Provisional data reported to CDC's National Center for Immunization and Respiratory Diseases

Data Source: CDC as of March 27, 2015
http://www.cdc.gov/measles/cases-outbreaks.html
California Measles Cases

40 cases Visited Disneyland 12/17 – 20/2014

30 household members

11 community exposures (e.g. ER)

50 unknown source, but linked via strain type

3 with No linkage (different genotype)

Data Source: CDPH as of March 27, 2015
Confirmed Measles Cases* by Rash Onset Date and Transmission Setting

Data Source: CDPH as of March 27, 2015
Age distribution of Confirmed Measles Cases

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Total</th>
<th>Incidence per 100,000 population*</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1</td>
<td>15</td>
<td>2.86</td>
<td>11%</td>
</tr>
<tr>
<td>1-4</td>
<td>21</td>
<td>1.05</td>
<td>16%</td>
</tr>
<tr>
<td>5-19</td>
<td>24</td>
<td>0.31</td>
<td>18%</td>
</tr>
<tr>
<td>20-29</td>
<td>30</td>
<td>0.54</td>
<td>22%</td>
</tr>
<tr>
<td>30-39</td>
<td>21</td>
<td>0.40</td>
<td>16%</td>
</tr>
<tr>
<td>40-49</td>
<td>12</td>
<td>0.23</td>
<td>9%</td>
</tr>
<tr>
<td>50-59</td>
<td>9</td>
<td>0.18</td>
<td>7%</td>
</tr>
<tr>
<td>60-69</td>
<td>1</td>
<td>0.03</td>
<td>1%</td>
</tr>
<tr>
<td>70+</td>
<td>1</td>
<td>0.03</td>
<td>1%</td>
</tr>
</tbody>
</table>

*Population denominator data from the Department of Finance have been standardized with 2010 Census data

Data Source: CDPH as of March 27, 2015
### Vaccination status of Confirmed Measles Cases

<table>
<thead>
<tr>
<th></th>
<th>Total*</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unvaccinated</td>
<td>56</td>
<td>69%</td>
</tr>
<tr>
<td>Vaccinated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 dose</td>
<td>10</td>
<td>12%</td>
</tr>
<tr>
<td>2 doses</td>
<td>13</td>
<td>16%</td>
</tr>
<tr>
<td>3 doses</td>
<td>2</td>
<td>2%</td>
</tr>
</tbody>
</table>

*20 cases self-report vaccination; 1 case had prior measles IgG positivity; 2 cases were tested as part of a contact investigation and found to be IgG negative; 30 cases have unknown vaccination status

### Hospitalization Status of Confirmed Measles Cases

<table>
<thead>
<tr>
<th></th>
<th>Total*</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitalized</td>
<td>20</td>
<td>19%</td>
</tr>
<tr>
<td>Not hospitalized</td>
<td>86</td>
<td>81%</td>
</tr>
</tbody>
</table>

*28 have missing hospitalization data

Data Source: CDPH as of March 27, 2015
SAN DIEGO CASES

Disneyland 12/18/14

Group 1
- 2 primary
- 1 secondary

Group 2
- 1 primary

Group 3
- 1 primary
- 6 secondary

Group 4
- 2 primary
- 1 secondary
SAN DIEGO OUTBREAK – GROUP 1

5 year old = Primary case
- Disneyland 12/18/14
- Unvaccinated
- Onset 1/2/15
- Exposures:
  - Parkway Plaza Mall – GameStop, Sunglasses Hut & Carousel (?)

10 month old = Primary case
- Disneyland 12/18/14
- Unvaccinated
- Onset 1/3/15
- Exposures:
  - None

3 year old = Secondary Case
- Household Contact
- Unvaccinated
- Onset 1/12/15
- Exposures:
  - None
SAN DIEGO OUTBREAK – GROUP 2

18 month old

- Disneyland 12/18/14
- Unvaccinated (delayed vaccine schedule)
- Onset 12/30/14
- Exposures: Learned of case after PEP & Incubation periods over, so no in-depth contact investigations:
  - Household
  - CPCMG Urgent Care, Grossmont
  - Rady Children’s Hospital
### SAN DIEGO OUTBREAK – GROUP 3

<table>
<thead>
<tr>
<th>18 year old = Primary case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disneyland 12/18/14</td>
</tr>
<tr>
<td>Unvaccinated</td>
</tr>
<tr>
<td>Onset 1/1/15</td>
</tr>
<tr>
<td>Exposures:</td>
</tr>
<tr>
<td>Household (7)</td>
</tr>
<tr>
<td>SRS UC (78)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>14 year old = Secondary case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disneyland 12/18/14</td>
</tr>
<tr>
<td>Unvaccinated</td>
</tr>
<tr>
<td>Onset 1/12/15</td>
</tr>
<tr>
<td>Exposures:</td>
</tr>
<tr>
<td>Julian Fitness Center (?)</td>
</tr>
<tr>
<td>Absolute Personal Fitness (?)</td>
</tr>
<tr>
<td>SRS UC (47)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8, 5, &amp; 1 year old = Secondary cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Household contacts</td>
</tr>
<tr>
<td>Unvaccinated</td>
</tr>
<tr>
<td>Onset 1/12/15</td>
</tr>
<tr>
<td>Exposures:</td>
</tr>
<tr>
<td>SRS UC</td>
</tr>
</tbody>
</table>
### SAN DIEGO OUTBREAK – GROUP 3

<table>
<thead>
<tr>
<th>11 year old = Secondary Case</th>
<th>49 year old = Secondary case</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Household Contact</strong></td>
<td><strong>Disneyland 12/18/14</strong></td>
</tr>
<tr>
<td><strong>Unvaccinated</strong></td>
<td><strong>Hx of 1 MMR</strong></td>
</tr>
<tr>
<td><strong>Onset 1/13/15</strong></td>
<td><strong>Onset 1/14/15</strong></td>
</tr>
<tr>
<td><strong>Exposures:</strong></td>
<td><strong>Exposures:</strong></td>
</tr>
<tr>
<td>• SRS UC (47)</td>
<td>• City of San Diego</td>
</tr>
<tr>
<td></td>
<td>Operations Building</td>
</tr>
<tr>
<td></td>
<td>(205)</td>
</tr>
<tr>
<td></td>
<td>• Trader Joe’s (?)</td>
</tr>
<tr>
<td></td>
<td>• Rite Aid Pharmacy (?)</td>
</tr>
<tr>
<td></td>
<td>• CVS Pharmacy (?)</td>
</tr>
<tr>
<td></td>
<td>• Von’s (?)</td>
</tr>
</tbody>
</table>
SAN DIEGO OUTBREAK – GROUP 4

19 year old = Primary case
- Disneyland 12/18/14
- Unvaccinated
- Onset 12/29/14
- Exposures:
  - Household (5)
  - The Landings, Carlsbad (?)

18 year old = Primary case
- Disneyland 12/18/14
- Unvaccinated
- Onset 12/30/14
- Exposures:
  - Household (5)
  - Ice Plex, Escondido (?)
  - Regal Carlsbad 12 Theater (18)

21 year old = Secondary case
- Close contact to 19 year old
- Unvaccinated
- Onset 01/14/15
- Exposures:
  - Devil’s Punchbowl (?)
  - Phil’s BBQ, San Marcos (29)
  - Disneyland & CA Adventure(?)
  - Albertson’s (58)
  - Sprouts Market (?)
  - Vista Community Clinic (30)
CONTACT INVESTIGATIONS

- Contact Investigations:
  - Group 1 = 140 + press release
  - Group 2 = None – outside incubation period
  - Group 3 = 330 + press release
  - Group 4 = None – Public setting too large = press release
QUARANTINE

Total Contacts placed on Quarantine due to lack of immunity & unknown immunity status

- Group 1 = 12
- Group 2 = None
- Group 3 = 13
- Group 4 = None
IMMUNIZATION PROGRAM ACTIONS

- In-depth contact investigations to identify any at risk for developing infection
- Outreach to community providers regarding identification, testing, isolation precautions, and reporting of suspect measles cases
  - Multiple Health Alerts
- Public Notification of possible exposures
  - Multiple Press Releases
- Public Health Lab testing – added capability
  - IgG & IgM testing
  - PCR testing
- 140 consults for R/O measles in 2015
PROVIDER RECOMMENDATIONS

1. **Test:** Suspect cases with classic measles symptoms, regardless of vaccination history (or prior IgG seropositivity)
   - Cough, coryza, conjunctivitis
   - Descending rash that starts on the face/head (if no rash on the face/head/neck or if rash starts on the trunk = measles not likely).

2. **Test:** Contacts of measles cases who have fever and rash of varying severity regardless of vaccine history (or prior IgG seropositivity).
3. Test: At Your Discretion – Suspect cases who do not meet the clinical case definition (fever <101, or not all Cs) and have no known exposure (but have 2 MMRs or prior seropositivity). May depend on:

- Epidemiology of measles in the community – are there many cases with an unknown source?
- Whether the suspect case potentially exposed others in sensitive settings (healthcare facility, childcare facility with infants), e.g., did the suspect visit an NICU while potentially infectious?
- International travel, international travelers
4. Other Considerations:

- Itchy rash? May be itchy from day 4-7, but not itchy immediately
- Rash on palms and soles? Measles rashes may be on palms and soles, but not as prominent as on face/chest.
- What is the rash distribution and spread look like? Even if disease is modified, the order of appearance (face/head) and direction of spread is the same.
- Time of fever and rash (fever first followed by rash a few days later).
5. Healthcare Immunity Status

- Know the immune status of all your staff – NOW!!!
- Healthcare worker must have documentation of:
  - Positive Measles IgG test; OR
  - 2 doses of measles vaccine given in 1968 or later, separated by at least 28 days, and 1st dose given on or after the 1st birthday

- If no proof of immunity – home quarantine/symptom watch for healthcare worker begins on day 5 after 1st exposure through day 21 after last exposure.
VACCINE REACTIONS

- Rash that occurs days 5-12 post vaccination with MMR
- Patients can have symptoms comparable to those associated with wild type measles
- PCR on the patient’s urine and throat swab will likely be positive for measles
- Additional testing (genotyping) is needed to discriminate between vaccine strain and wild type strain
  - Vaccine strain is genotype A
  - Additional testing takes several days
- In some cases the level of virus is too low to successfully genotype
MEASLES – OUTREACH

VISITING ANOTHER COUNTRY? PROTECT YOUR FAMILY.

Think Measles.
Measles is widespread in places like Europe, Africa, Asia, India, and the Philippines.

Before You Travel
Contact your doctor when you are planning an international trip.

After You Travel
Call your doctor if anyone gets a fever and rash within 3 weeks of returning from your trip.
Describe where you travelled.

Your doctor if you are planning an international trip.
For more information go to www.cdc.gov/travel.
MEASLES – TOOLS AND GUIDES
CALIFORNIA DEPARTMENT OF PUBLIC HEALTH

- CDPH Measles Advisory 1/21/15

- CDPH Facility Infection Control Guidelines

- CDPH Measles Investigation Quick Sheet

- CDPH Measles Laboratory Testing Guidelines

- CDPH-VRDL Guidelines for Laboratory Services
  http://www.cdph.ca.gov/programs/vrdl/Documents/VRDL%20Guidelines%20for%20Laboratory%20Services%20manual%205-4-8%20130319.pdf
PERTUSSIS
PERTUSSIS - BASICS

- Highly contagious respiratory infection caused by *Bordetella pertussis*
- Primarily a toxin-mediated disease
- Bacteria attach to cilia or respiratory epithelial cells
Bordetella pertussis bacterium

Filamentous hemagglutinin

Pertussis toxin

Normal ciliary movement

Ciliary stasis

Respiratory tract lumen

Ciliated epithelial cells
PERTUSSIS - BASICS

- Transmission occurs by close contact via droplets
- Very contagious: approximately 90% of susceptible household contacts become infected
- Cyclic (peaks every 2-5 years)
- Most poorly controlled VPD
- Immunity wanes after vaccination or disease
- 92-95% of population must be immune to eliminate transmission
- Infants ≤ 1 year of age are most vulnerable
- Adolescents & adults transmit disease to infants
PERTUSSIS - BASICS

- Incubation Period 7 – 10 days (range 5 – 21 days)
- Infectious Period
  - Persons ≥ 1 year of age = from onset of cold-like symptoms until after 5 days of treatment or until 21 days after cough onset if no (or partial) treatment is given
  - Infants < 1 year are considered infectious for 6 weeks without treatment
PERTUSSIS - STAGES

- Catarrhal stage 1 - 2 weeks
- Paroxysmal cough stage 1 - 6 weeks
- Convalescence stages - weeks to months

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

- Cold-like symptoms
  - Coryza
  - Sneezing
  - Occasional cough
- Fever usually absent or minimal
- Stage lasts for about 1-2 weeks with cough gradually becoming more severe

Catarrhal Stage
PERTUSSIS - SYMPTOMS

- Spasms of severe coughing followed by a sudden deep inspiration
- Characteristic “whooping” sound
  https://www.soundsofpertussis.com/
- Post-tussive vomiting common in all ages
- Illness may be milder in previously vaccinated people

Paroxysmal Stage
PERTUSSIS - SYMPTOMS

- Coughing, whooping and vomiting decreasing in frequency and severity
- Paroxysms may recur with subsequent respiratory infections
- Classic pertussis is 6-10 weeks, but may last longer in some people

Convalescent Stage
PERTUSSIS – YOUNG INFANTS

- Initially mild cough, runny nose, no fever
- Develops into serious symptoms:
  - May gag, gasp or stop breathing (apnea)
  - Face may turn blue, purple or red (cyanosis)
  - Post-tussive vomiting
  - May not have noticeable cough or “whoop”
  - Seizures
  - Respiratory distress
  - Pneumonia
PERTUSSIS - BASICS

- Adolescents and adults
  - Disease is often milder than infants and children
  - Infection may be asymptomatic or present as classic pertussis
  - Adults may describe intermittent
  - Older persons often source of infection for children
PERTUSSIS – TREATMENT

- Azithromycin – 5 days (most effective/common)
- Erythromycin – 14 days (7-14 days infants ≥6 months & children)
- Clarithromycin – 7 days (not recommended for < 1 month of age)
- Bactrim/Septra – 10-14 days

Post-exposure prophylaxis (PEP) is SAME AS TREATMENT.
San Diego County Pertussis Annual Total Cases by Year of Report, 1999 – 2015

Note: prior to 2007, counts based on diagnosis date. 2007-13 data is based on episode date.

Includes all Closed (Confirmed, Suspect, & Probable) cases reported to Public Health

Prepared by County of San Diego, Health & Human Services Agency,
Public Health Services, Epidemiology & Immunization Services, 9/4/15
County of San Diego Pertussis Cases by Episode Month, 2010 - 2015 YTD (as of 9/4/15)

Includes all Closed (Confirmed, Suspect, & Probable) cases reported to Public Health

Prepared by County of San Diego, Health & Human Services Agency,
Public Health Services, Epidemiology & Immunization Services, 9/4/15
San Diego County Number of Pertussis Cases Reported by Age Group, 2015 YTD YTD (N=675)

Includes all Closed (Confirmed, Suspect, & Probable) cases reported to Public Health

Prepared by County of San Diego, Health & Human Services Agency,
Public Health Services, Epidemiology & Immunization Services, 2/26/15
San Diego County Number of Pertussis Cases Reported by Race/Ethnicity and Age Group, 2015 YTD (N=675)

Includes all Closed (Confirmed, Suspect, & Probable) cases reported to Public Health

Prepared by County of San Diego, Health & Human Services Agency,
Public Health Services, Epidemiology & Immunization Services, 9/4/15
Pertussis Rates by Age Group and Race/Ethnicity, San Diego County, 2015 YTD (N=675)

Includes all Closed (Confirmed, Suspect, & Probable) cases reported to Public Health

Prepared by County of San Diego, Health & Human Services Agency,
Public Health Services, Epidemiology & Immunization Services, 9/4/15
Pertussis incidence per 100,000 population, by county – California, 2015*

Reported to CDPH as of 9/15/2015
Corresponding category ranges: 0; 0.1-2.7; 2.8-8.8; 8.9-18.0; 18.1-41.5
Figure 2. Number and incidence of reported pertussis cases by year of onset -- California, 1945-2015*

*Includes cases reported to CDPH as of 7/28/2015

Figure 4. Pediatric pertussis cases by age -- California, 2015*

*Reported to CDPH as of 9/15/2015

Source: CDPH, downloaded 9/18/15 from:
Figure 5. Pertussis rates by age and race/ethnicity -- California, 2014*

- White, non-Hispanic
- Hispanic, all races
- Black, non-Hispanic
- Asian/Pacific Islander
- All race/ethnicities

*Reported to CDPH as of 8/1/2015

Source: CDPH, downloaded 9/16/15 from:
Figure 5. Pertussis rates by age and race/ethnicity -- California, 2010

Source: CDPH, downloaded 9/16/15 from:
PRIORITY CONTROL STRATEGY

EVERY PREGNANT WOMEN RECEIVES TDAP BOOSTER FOR EVERY PREGNANCY AT 27-36 WEEKS EGA!
IMMUNIZATION

- DTaP (Diphtheria, Tetanus, and acellular Pertussis)
  - Total of 5 vaccinations recommended at:
    - 2, 4, and 6 months of age
    - 15-18 months of age
    - booster at 4-6 years of age
- Tdap Booster (Tetanus, diphtheria and acellular pertussis)
  - Everyone 11 years and older should get 1 Tdap
  - No minimum interval between Td and Tdap
EXPOSURE MANAGEMENT IN DAYCARE, CHILDCARE & K-12TH GRADE SETTINGS

Lab Confirmed Case

Pregnant Staff
- Refer them to OB/GYN
- Recommend Tdap at 27-36 weeks gestation

Infants ≤12 months of age
- PEP recommendation letter
- PEP – refer or provide

Pertussis Notification to students/staff

All new sites
- ≥6 weeks since last notification
Eric C. McDonald, MD, MPH, FACEP
Medical Director, Epidemiology and Immunizations Services
Public Health Services
County of San Diego, Health and Human Services Agency

3851 Rosecrans Street (MS-P578)
San Diego, CA 92110
Email: eric.mcdonald@sdcounty.ca.gov
Cell: (619) 987-1135
Phone: (619) 692-8436
Fax: (858) 715-6458