

# Vaccine Preventable Diseases

## Pertussis and Measles: Old Foes, New Fears

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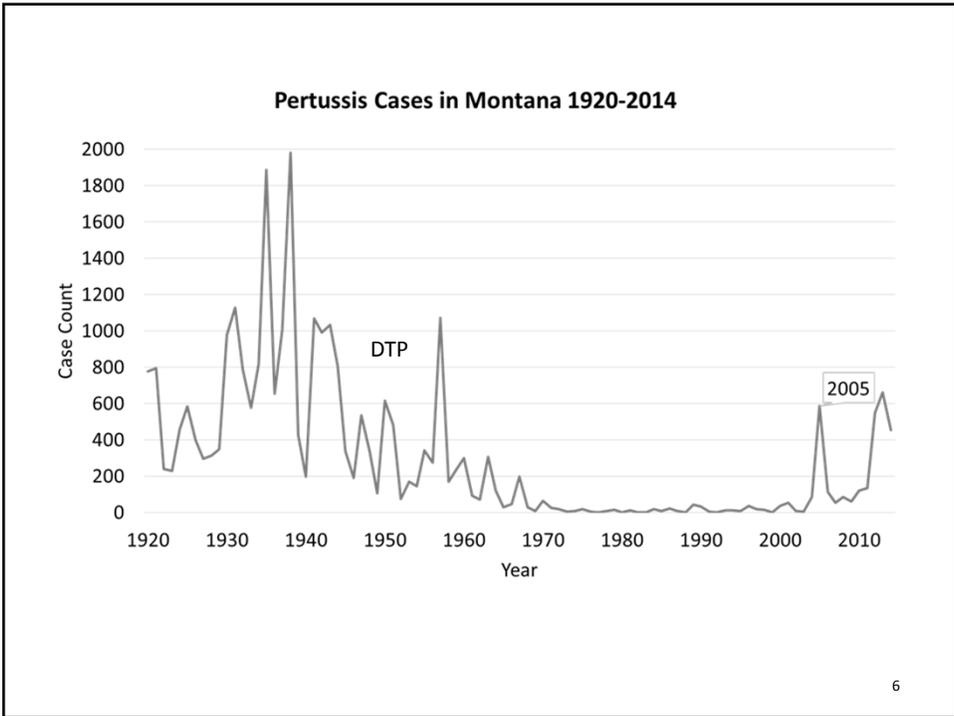
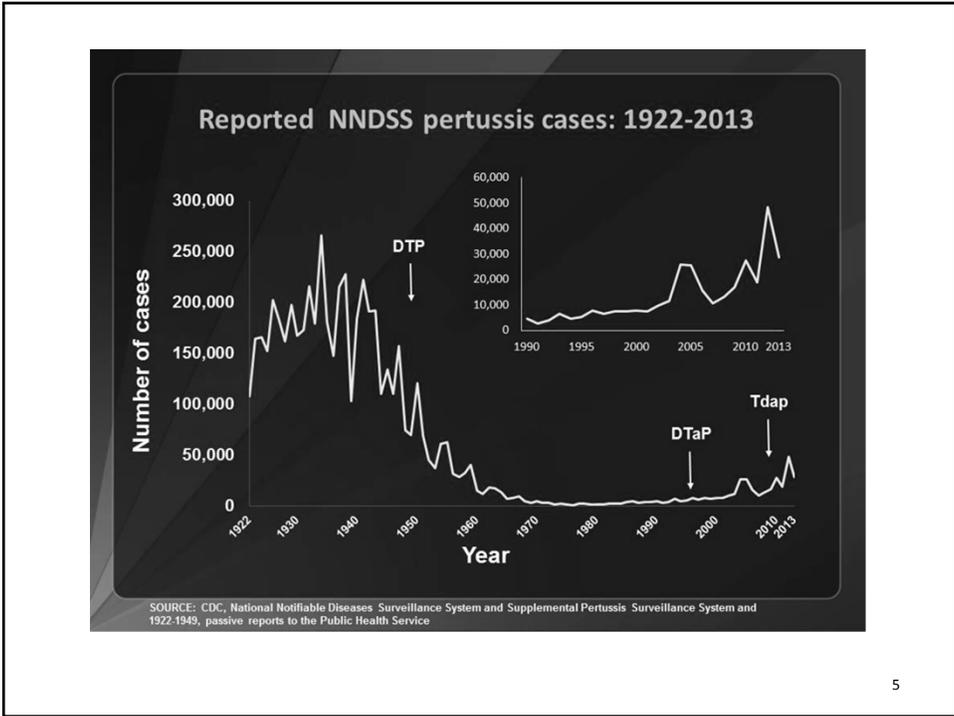
## Learning Objectives

1. Describe the historical impact of pertussis and measles in Montana and the reasons behind recent changes in reported cases nationally and in Montana
2. Identify the core roles of communicable disease public health nurses in relation to outbreaks of communicable diseases

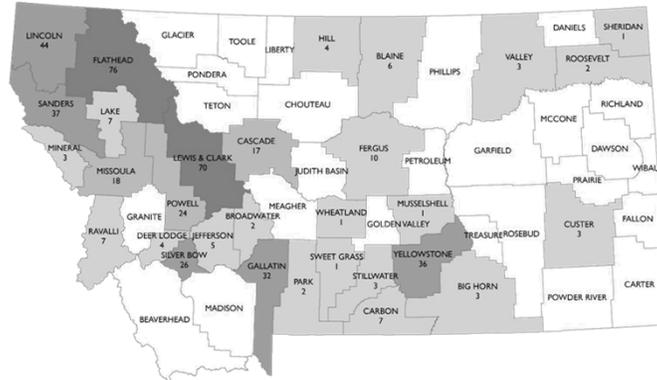
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**PERTUSSIS**

4



## Pertussis Cases in Montana by County 2014\*



491 cases in 28 counties (67% school-aged children)

\*2014 data preliminary

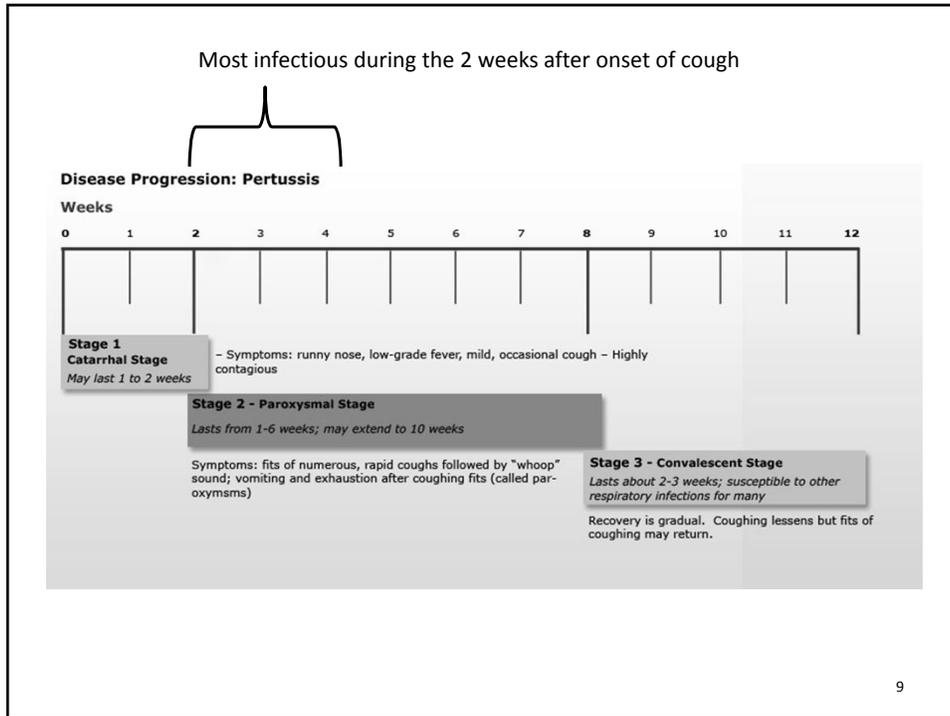
7

## Whooping Cough

- Highly infectious: respiratory droplet spread
- Incubation period typically 7-10 days (range: 5-21 days)
- Complications are more common in infants <1 year of age
  - Approx. 50% are hospitalized
- Illness can be less severe in vaccinated individuals



8

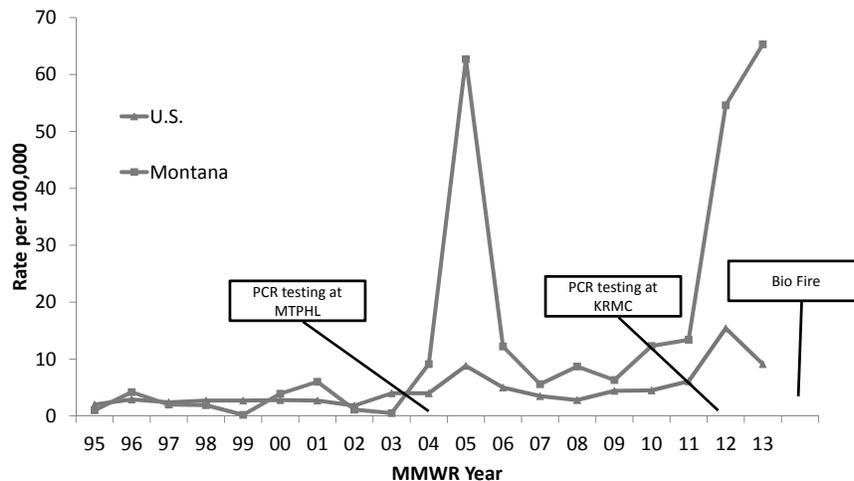


## Why the resurgence?

1. Reporting/diagnostic improvements
2. Decrease in vaccination rates
3. Waning immunity
4. Changes in the bacteria?



## 1. Implementation of PCR testing



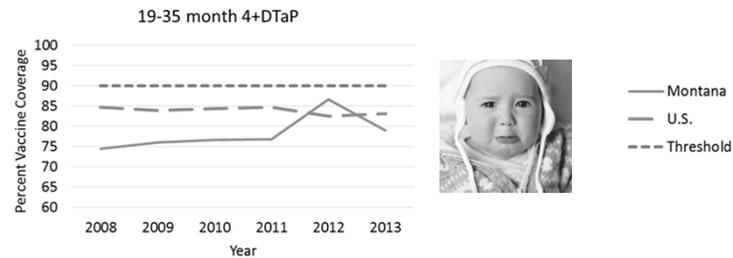
11

## 2. Decline in vaccination rates

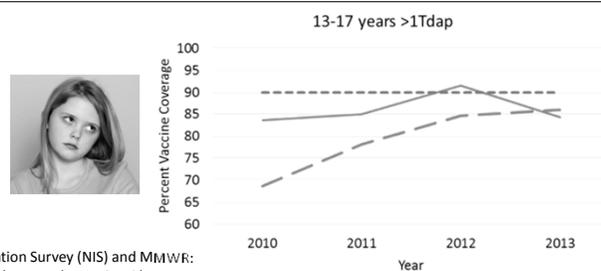
- 1998 Andrew Wakefield study:
  - suggesting link between vaccines and autism (later discredited)
- Thimerosal (removed beginning in 1999)
- Adverse effects (80-95% are categorized as 'mild')
- Celebrity 'endorsements'
- Social media

12

## 2. Decline in vaccination rates?



Percent of kindergarteners with medical/ religious exemptions: 2013-14 school year: 3.6% (vs. 1.8% U.S.)



Sources: National Immunization Survey (NIS) and MMWR:  
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6341a1.htm>

13

## 3. Waning immunity

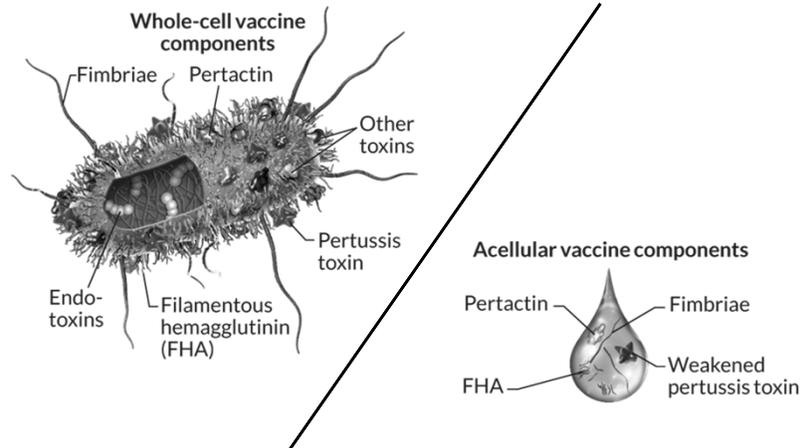
- 1950: DTP (whole cell vaccine)
- 1997: acellular version (DTaP)
  - Designed to target 4 surface protein
  - Recent studies (2013) indicate acellular vaccine may not be as protective as once thought
- 2010: Tdap recommended for booster



*Clinical Infectious Diseases* 2013;56(9):1248-54

14

### 3. Waning immunity: DTP vs. DTaP



15

### 4. Evolution of the bacteria

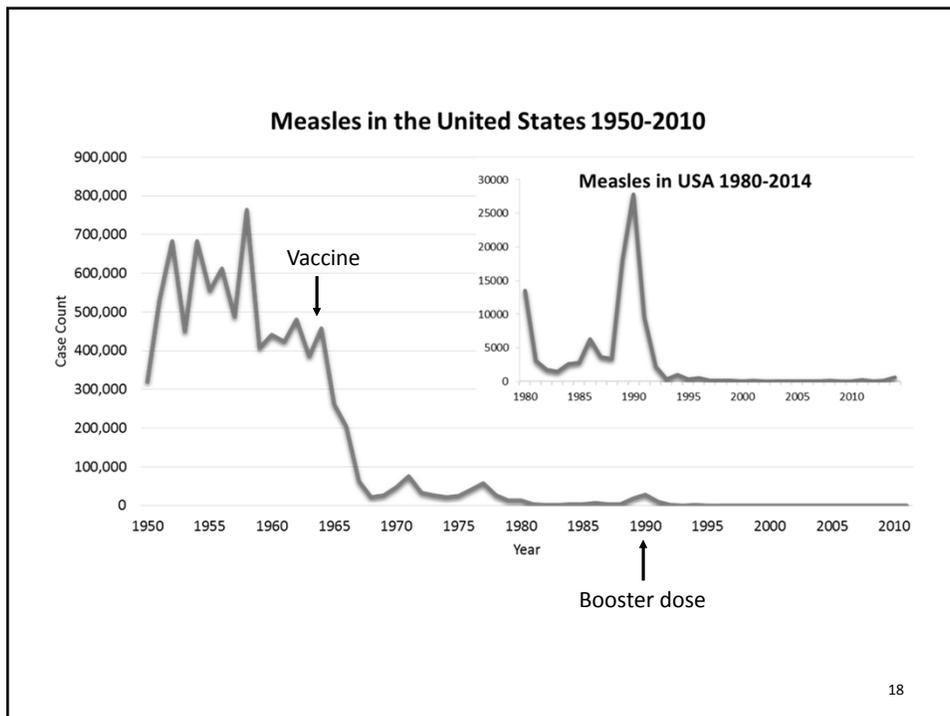
- 2015 publication in Journal of Infectious Diseases: analysis of 100 isolates (U.K.)
  - Mutations in surface proteins used in vaccine
  - 80% of strains did not produce pertactin
- Strains also detected in France, U.S.
- Effectiveness of vaccine and/or pathogenesis of *B. pertussis* under investigation

*Journal of Infectious Diseases* January 6, 2015;

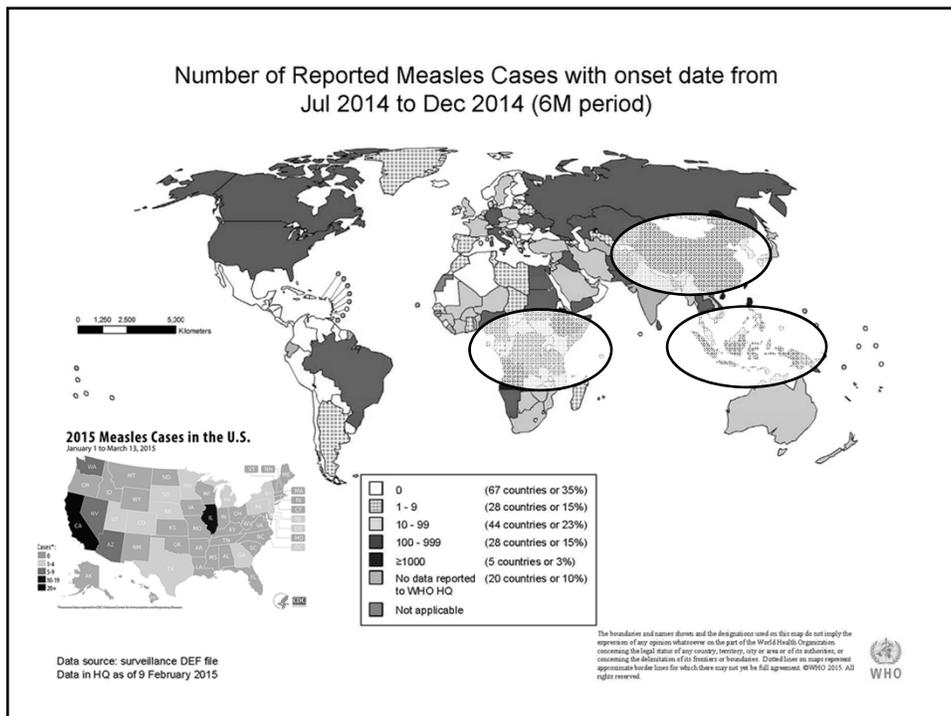
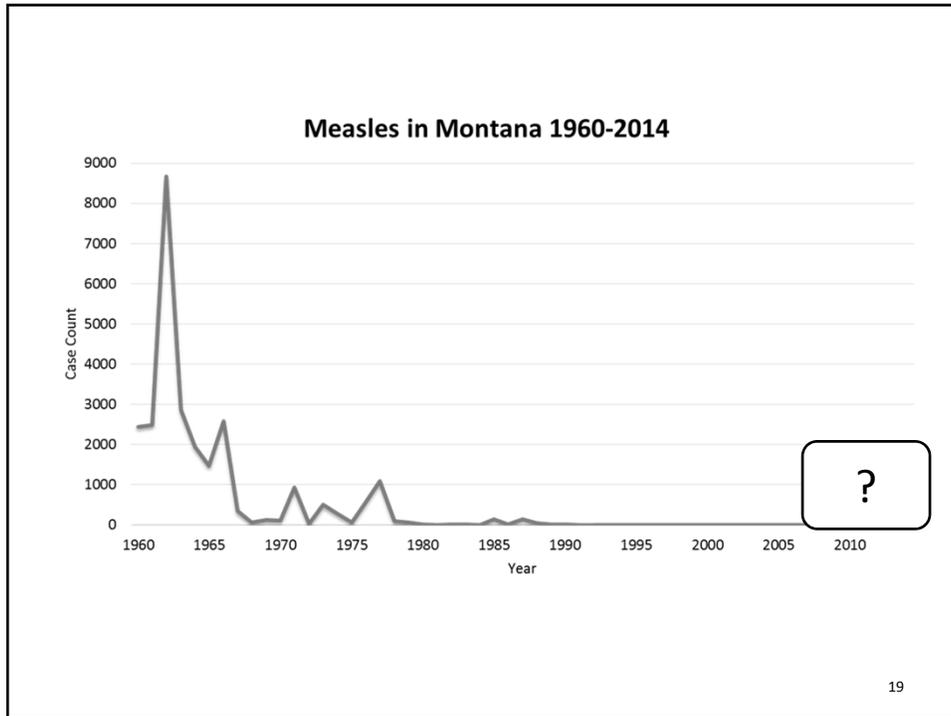
16

# MEASLES

17



18



## MEASLES

The last cases of measles in Montana were reported in **1990**

**Measles spreads easily:**  
1 person can infect **18** others.

The virus can live on surfaces for **2 hours**

The Measles, Mumps, and Rubella (MMR) vaccine is safe and effective against measles.

If 100 people who received MMR vaccine were exposed to measles, only 2 or 3 would get the disease.

Getting an MMR vaccine protects you, your family, and those that are most vulnerable. Here's why:

Babies cannot get an MMR until they are 1 year of age. If 10 babies were exposed to someone with measles, 9 would get the disease.

### Signs & Symptoms

**7-14 days after exposure:**

- High fever
- Cough
- Runny nose
- Conjunctivitis

**2-3 days later:** tiny white spots inside the mouth (Koplik spots)

**3-5 days later:** a rash begins on the face and spreads downwards.

**3 of 10** will develop complications:

- Pneumonia
- Brain swelling
- Diarrhea
- Death
- Hearing loss

If you develop symptoms of measles, call ahead to your healthcare provider.

21

## Transmission

- Highly contagious viral illness
- Respiratory transmission of virus
- Can spread illness 4 days before to 4 days after rash onset (minimal after 2nd day following rash onset)
- Virus survival time (surface)

*Consider waiting room situation*

*Phone consult*

22

## Clinical Presentation

- Koplik spots (prodrome)
- Generalized, maculopapular rash lasting starting at the head then descending
- Temperature  $\geq 101^{\circ}\text{F}$  or  $38.3^{\circ}\text{C}$
- Cough, coryza, or conjunctivitis.



<http://www.immunize.org/photos/measles-photos.asp>

23

## Exposures Assessment

Thorough checklist provided by DPHHS

1. Age/ prior illness?
2. Vaccination status
3. Clinical presentation
4. Travel history/ visitors\*
5. Case definition

\*No measles cases have been reported in Montana since 1990. Consider exposures... know surveillance.

24

## Laboratory Testing

- Respiratory specimen
  - Urine
  - Serum must be >48hours post rash onset
- } As early as rash onset\*  
and < 7 days following (PCR)
- Ship cold & fast
  - Same-day results for PCR (weekend testing)

\*Consult with health department if prior onset

25

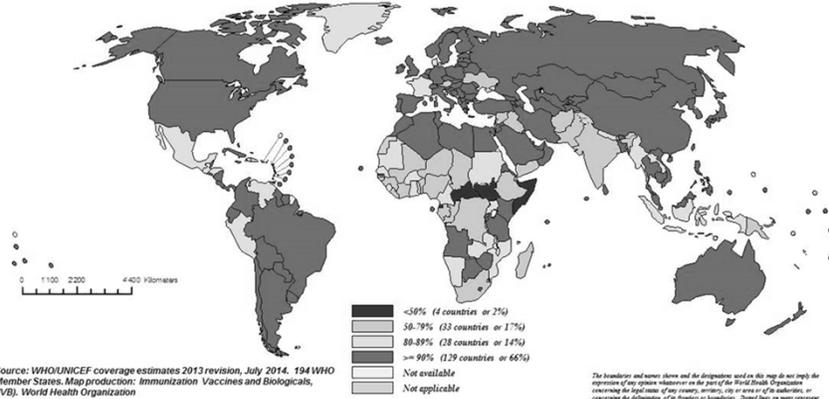
## Risk of Resurgence?

1. Reporting/diagnostic improvements
2. Decrease in vaccination rates
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4. Changes in the virus?



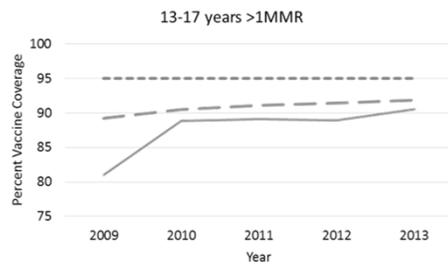
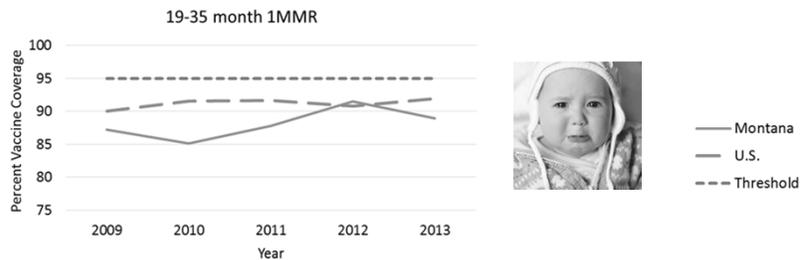
26

## Immunization coverage with measles containing vaccines in infants, 2013



27

## 2. Decline in vaccination rates?



28

## **ROLES OF PUBLIC HEALTH & HEALTHCARE IN OUTBREAK SITUATION**

29

### **Role of Public Health**

**1. Surveillance**

- Monitor diseases, detect unusual increases, establish baselines for diseases

**2. Investigation**

- Investigate outbreaks, identify cause of illness, interview cases, outbreak control

**3. Mitigation**

- Recommend control measures, identify at-risk groups, targeted prevention outreach

## Role of Healthcare

### 1. Identify and treat patients

- Proper detection of disease, laboratory testing, treatment of patient

### 2. Collaborate with local health department

- Reporting disease immediately (ARM 37.114.201 & 203), communication, awareness

### 3. Policy and education

- Adequate policies to prevent transmission at facility (waiting room, contacts etc.), education for staff on emerging issues

## Case Investigation & Contact Management



Other contacts: Travel, grocery store, others



Professional contacts: Co-workers, events,

One case for you...



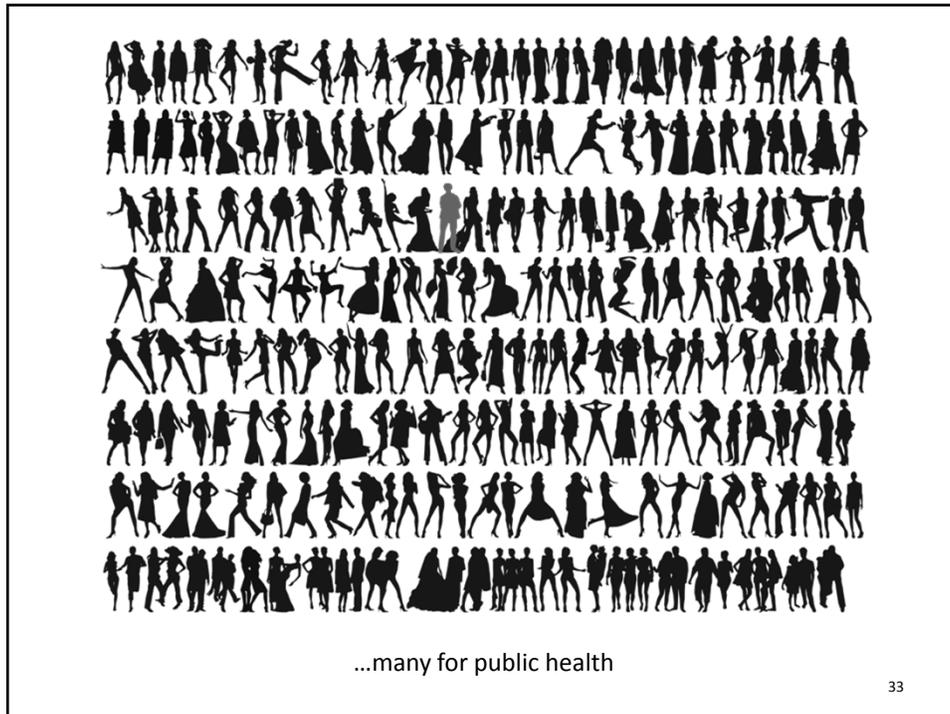
Partner



Social contacts: Schools, playmates, friends, church, neighbors



Household contacts: Relatives, siblings, grandparents



## Challenges to consider

### **Pertussis**

- Long incubation period
- PEP difficult in sustained, community-wide outbreaks
- Co-circulation of other respiratory pathogens (flu, common cold, RSV, parapertussis, etc.)
- Milder illness, yet infectious
- Infectious before cough onset (nasal secretions)

### **Measles**

- Exposure assessment
- Know your immune status
- Airborne transmission and survival time on surface = extensive contact tracing
- Infectious 4 days pre and post rash onset

## Old Foes, New Fears

- Threat of resurgence is real
- Travel, media, susceptibility add layer of complications
- Early detection & reporting is critical (ARM 37.114.201)  
→ Don't wait until laboratory confirmation!
- Thorough exposure assessment to determine level of suspicion
- Collaboration between healthcare and public health → two way street
- Improve vaccination rates

35

## Questions?



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36

