

North Texas Measles Outbreak



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**TEXAS DEPARTMENT OF
STATE HEALTH SERVICES**



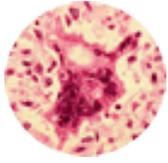
Measles Background, Epidemiology and Response



Measles Symptoms

- Fever >101
- Rash
 - Starts after fever
 - Maculopapular
 - Starts on face, spreads downward
 - Becomes generalized
 - Lasts at least three days
- Cough
- Coryza
- Conjunctivitis





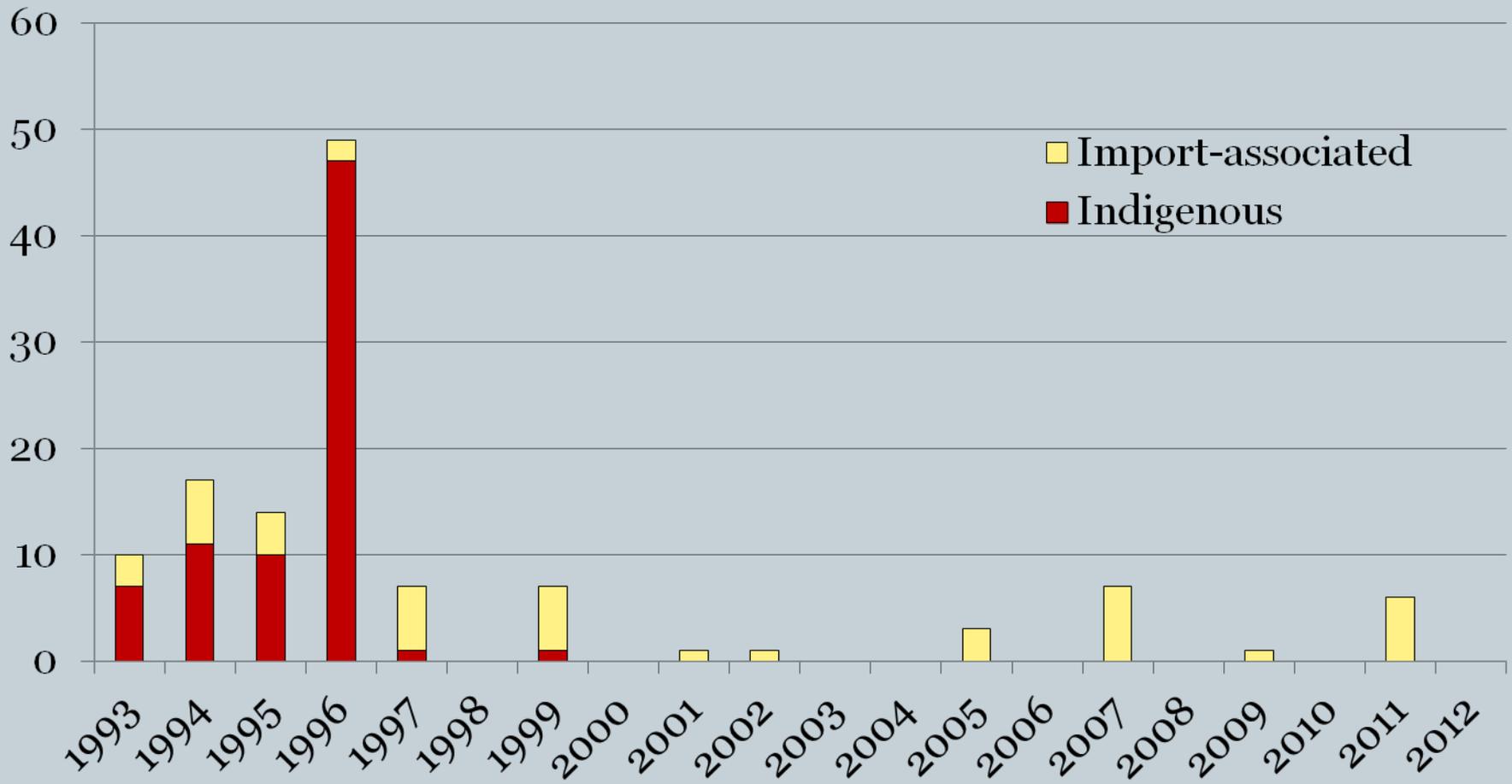
Measles Epidemiology



- Reservoir: Humans
- Transmission: Respiratory
- Communicability: 4 days before rash onset to 4 days after rash appearance
Highly infectious
- Incubation Period: 14 days (range 7-21 days)
- Prevention: 2 doses of MMR vaccine

**As of 2000, measles is considered eliminated
in the US and all of the Americas**

Measles in Texas, 1993-2012



How Epi Responds to Measles



- Isolate patient
- Identify all contacts for entire 9 day infectious period
 - Alert all contacts of exposure
 - Assess vaccination history of all contacts
 - ÷ Can test for IgG response
 - Assess symptoms of all contacts
 - Offer vaccine or IG to all unvaccinated contacts
 - ÷ 72 hour window for vaccine after exposure
 - ÷ Six day window for IG after exposure
 - Quarantine unvaccinated contacts
 - ÷ Possibly up to 3 weeks!

Assessing Reported Measles



- **Does patient have right symptoms?**
 - | Rash, no fever? No other symptoms? Rash not generalized?
- **Is patient vaccinated? How recently?**
 - | Measles vaccination can cause measles-like symptoms
- **Did patient travel? Where?**
 - | Measles is endemic in most of the world
 - | Measles is not endemic in North, South and Central America
- **Has lab testing been performed?**
 - | Who did it? What tests?
- **Any sick contacts?**

Measles Case Definition

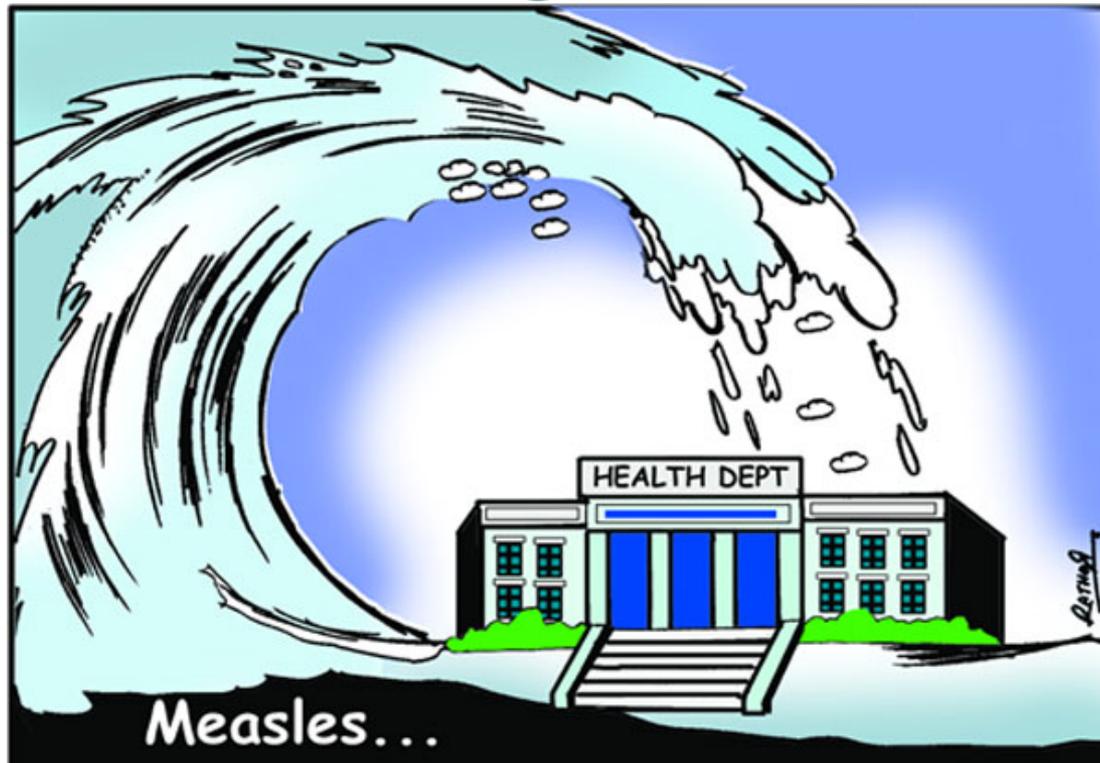


- Fever >101 , rash over 3 days and either cough, coryza, or conjunctivitis

AND

- Measles antigen detected by PCR, OR
- Virus isolated, OR
- Measles IgM antibody + at public health lab, OR
- Measles IgG antibody acute-convalescent seroconversion or 4-fold increase, OR
- Epidemiologically linked to a lab-confirmed case

2013 Measles Outbreak



And so it begins...



- On 8/7/13, an MD reported 4 measles patients to Tarrant County Health Department (TCHD)
 - | Pending laboratory testing
- Patients were all connected to a church
 - | Physician affiliated with a staff clinic at the church
- Rash onset dates of 7/25 (source case), 7/30 (source case's child), 8/4 and 8/5.
- Source case identified retroactively by MD that diagnosed child
 - | Recently returned from Asia
 - | Hospitalized 7/23-7/27, not diagnosed with measles

Evaluating the Church Exposure



- Source case was only at the church on one Sunday while infectious
- ~2000 members
- Nursery offered during services
- The church operated a daycare during the week

Response Activities



- The church allowed TCHD to provide prophylaxis on-site
 - TCHD vaccinated (or gave IG) to 220 people exposed at the church
- The church opened the staff clinic to all parishioners with measles symptoms
- TCHD, adjacent county health departments, the regional state health department in Arlington, and the state health department issued health alerts
 - Area health departments also sent measles information to local schools and daycares

The Outbreak Continues...



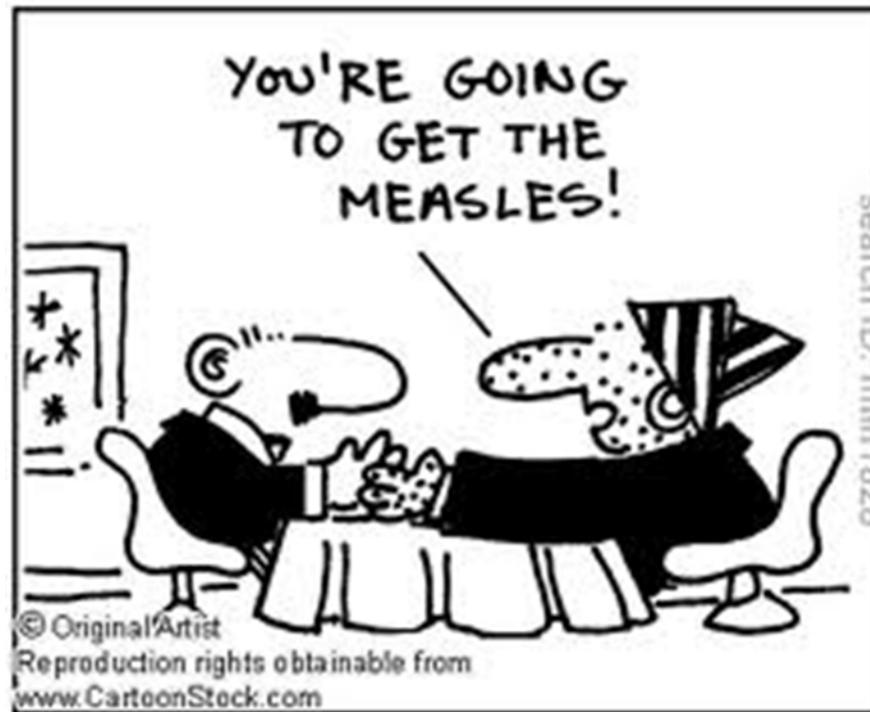
- **17 more cases identified**
 - Five in Denton County, 12 in Tarrant
 - Last rash onset was 8/21/13
- **Additional exposure sites identified**
 - Inpatient and outpatient healthcare facilities
 - Healthcare facilities and TCHD assessed staff immunity and notified patients of exposure
- **Increased reports of measles across the state**
 - Concentrated in greater Fort Worth area
 - Dozens of additional suspects ruled out

The Outbreak by the Numbers



Age Group	Number of Cases (%)	Number Vaccinated (%)
<1 year	2 (9.5%)	0 (0.0%)
1-6 yrs	6 (28.6%)	0 (0.0%)
7-19 yrs	6 (28.6%)	0 (0.0%)
20-29 yrs	3 (14.3%)	0 (0.0%)
40-49 yrs	4 (19.0%)	2 (50%)
Total	21 (100%)	2 (9.5%)

The Laboratory Role in Measles Outbreaks



Laboratory Confirmation of Cases



- 21 cases
- 15 laboratory confirmed
 - 4 by IgM only
 - 2 by PCR only
 - 2 by PCR and viral isolation
 - 5 by IgM and PCR
 - 2 by IgM, PCR and viral isolation
- 6 confirmed by epidemiologic-link only

Measles Serology—Pros and Cons



- Serum for measles IgM can be collected up to 30 days after onset
- Serum collected immediately after onset can be falsely IgM negative
- Antibody testing can be affected by vaccination
- Hard to collect serum on infants
- Obtaining acute and convalescent samples difficult
- Rapid turn around

Measles Serology—Private and Public



- **IgM/IgG widely available at commercial/hospital laboratories**
 - Commercial testing not always specific enough
- **DSHS provides measles IgM/IgG testing**
 - DSHS test preferred to commercial lab tests
- **Epi tries to obtain serum from positive tests at private labs to retest at DSHS**
 - Serum frequently discarded after seven days
 - Usually requires freezing serum and shipping on dry ice

DSHS Serology Testing



Laboratory Results	Number (%)	Outcome
Specimens received	34 (on 32 patients)	
Unsatisfactory specimens	4 (12%)	Repeat specimens sent on 2 pts
Tested specimens	30 (88%)	
Equivocal IgM results	2 (7%)	<ul style="list-style-type: none">• Not confirmed as cases• Due to MMR?
Positive IgM results	12 (40%)	<ul style="list-style-type: none">• 10 confirmed as cases• 2 ruled out by epi/clinical
Negative IgM results	16 (53%)	None confirmed as cases

IgM Positive Results



- Confirmed 3 patients that did not have PCR
 - Including the source case
- 4 had negative IgG results
 - Favorite result!
- 1 also had positive rubella IgM results
 - Cross-reactivity can be a problem

Measles Virology/Molecular Testing: Pros and Cons



- Easy specimen collection (throat swab)
- Viral isolation very difficult
- Vaccination can affect results, but less likely than serology
- Maximum of 10 days for specimen collection
 - Best collection within 5 days of rash onset
- Allows for typing to make epidemiologic connections
- PCR: rapid turn around
- Viral isolation: slow turn around

Measles Virology/Molecular Testing: Public and Private



- Measles PCR not available outside of public health
- DSHS does not perform measles PCR
- Viral isolation available at DSHS, some commercial laboratories
- APHL started a vaccine preventable disease reference lab program in 2013
- DSHS virology lab initiated PCR testing through APHL using the Minnesota PHL

DSHS-APHL Molecular/Viral Testing



Laboratory Results	Number (%)	Outcome
Specimens received	48 (on 42 patients)	
Unsatisfactory specimens	5 (10%)	Repeat specimens sent on 2 pts
Tested specimens	43 (90%)	
Positive PCR results	11 (26%)	All confirmed as cases
Negative PCR results	31 (72%)	None confirmed as cases
Indeterminate by PCR	1 (2%)	Not confirmed as a case
Virus isolated	6 (14%)	<ul style="list-style-type: none">pH1N1 and HSV1both measles PCR-
Measles virus isolated	4 (9%)	<ul style="list-style-type: none">100% measles PCR+

RNA Detected Results



- Confirmed 2 cases with negative IgM results (not at DSHS)
 - Vaccinated persons, serology collected early
- Genotype identified as D9
 - Confirmed import from Asia
 - Confirmed epi links between cases

Thanks to the DSHS Lab



- **Serology**

- ┆ Eleanor, Shashi, Jing, Sharlan

- **Virology**

- ┆ Crystal, Martha, Jennifer, Kniquezia, Peter, Charles

- **Check-in**

- ┆ Walter, Kyle, Randy

- **Container prep**

- ┆ Priscilla, Rick

I really appreciate all your effort, patience, and skill.

Measles Summary



- Measles is only a plane ride away
- Measles misdiagnosis is common, lab testing required
- Pockets of unvaccinated communities exist
 - | Measles will transmit efficiently in these pockets
- Multiple healthcare exposures, only one secondary case in an outpatient setting
 - | Indicates good community and healthcare vaccine coverage
- Maintaining high level of MMR vaccination is critical to measles control
 - | Herd immunity works

THANK YOU!



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