Vaccine Preventable Diseases Team Update

Vaccine Preventable Diseases (VPD) Team

Charles “Chip” Cohlmia – Team Lead
Allison Sierocki – Epidemiologist II
Kelsey Sanders – Epidemiologist I
Raymond Dinnan – PHPS III
VPD Team Conditions

- Acute Flaccid Myelitis
- Congenital Rubella Syndrome
- Diphtheria
- *Haemophilus influenzae*, invasive
- Hepatitis A
- Hepatitis B (acute and perinatal)
- Measles
- Meningococcal disease, invasive
- Mumps
- Pertussis
- *Streptococcus pneumoniae*, invasive
- Polio (paralytic)
- Rubella
- Tetanus
- Varicella
VPD Team Roles

- Provide support for the local and regional health departments:
  - Resources
  - Recommendations for control of the spread of infectious disease
- Specimen coordination
- Approve investigations
- Health advisories
- Data analysis

State Resources

- Emerging and Acute Infectious Disease Investigation Guidelines
  - Appendix C: Laboratory Resource
- Epi Case Criteria Guide
- Texas National Electronic Disease Surveillance System (NEDSS) Data Entry Guidelines
VPD Team Partners

• Internal Partners:
  ➢ Immunization Unit within Department of State Health Services (DSHS)
  ➢ DSHS Austin Laboratory
  ➢ Legislative bodies

• External Partners:
  ➢ Texas local and regional health departments
  ➢ Schools
  ➢ Hospitals/clinics
  ➢ Texas Medical Association
  ➢ Centers for Disease Control and Prevention (CDC)
  ➢ Other state health departments

External Public Health Partnerships

• Work with the CDC and other states as needed for outbreaks or additional lab testing (such as mumps)
  ➢ Epidemiology and Laboratory Capacity (ELC) Grant

• Stay up-to-date with new criteria for disease classifications decided by Council of State and Territorial Epidemiologists (CSTE) or the CDC

• CDC's Epidemic Information Exchange (Epi-X)
# Vaccine Preventable Disease Case Counts, Texas, 2012-2016

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Flaccid Myelitis (AFM)</td>
<td>0</td>
</tr>
<tr>
<td>Haemophilus influenzae, invasive</td>
<td>3</td>
</tr>
<tr>
<td>Hepatitis B, acute</td>
<td>134</td>
</tr>
<tr>
<td>Hepatitis B Viral Infection, Perinatal</td>
<td>4</td>
</tr>
<tr>
<td>Hepatitis B, acute</td>
<td>170</td>
</tr>
<tr>
<td>Measles (Rubella)</td>
<td>0</td>
</tr>
<tr>
<td>Mumps</td>
<td>15</td>
</tr>
<tr>
<td>Neisseria meningitidis, invasive</td>
<td>37</td>
</tr>
<tr>
<td>Epidemic disease</td>
<td>2,218</td>
</tr>
<tr>
<td>Pertussis</td>
<td>0</td>
</tr>
<tr>
<td>Poliomyelitis, Paralytic</td>
<td>0</td>
</tr>
<tr>
<td>Rubella, Congenital Syndrome (CRS)</td>
<td>0</td>
</tr>
<tr>
<td>Streptococcus pneumoniae, invasive</td>
<td>1,538</td>
</tr>
<tr>
<td>Tetanus</td>
<td>73</td>
</tr>
<tr>
<td>Varicella (Chickenpox)</td>
<td>2,410</td>
</tr>
</tbody>
</table>

* Before 2016, only type b was reportable

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# Total Deaths due to VPDs Case Counts, Texas, 2012-2016

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemophilus influenzae, invasive</td>
<td>0</td>
</tr>
<tr>
<td>Neisseria meningitidis, invasive</td>
<td>4</td>
</tr>
<tr>
<td>Epidemic disease</td>
<td>7</td>
</tr>
<tr>
<td>Pertussis</td>
<td>0</td>
</tr>
<tr>
<td>Poliomyelitis, Paralytic</td>
<td>73</td>
</tr>
<tr>
<td>Streptococcus pneumoniae, invasive</td>
<td>1</td>
</tr>
<tr>
<td>Tetanus</td>
<td>1</td>
</tr>
<tr>
<td>Varicella (Chickenpox)</td>
<td>1</td>
</tr>
</tbody>
</table>

* Before 2016, only type b was reportable
Varicella

Varicella Epidemiology

- Infectious Agent: Human herpesvirus 3 (varicella-zoster virus)
- Transmission: Droplet or airborne spread of vesicle fluid, respiratory tract secretions, or contact with lesions
- Incubation period: Average of 14-16 days (range 10-21 days)
- Communicability period lasts 1-2 days before and 4-5 days after lesion onset (until crusting)
Varicella
Epidemiology cont’d

• Clinical Illness: maculopapulovesicular rash often accompanied by fever
  ➢ Lesions mainly on trunk
• Temporal pattern: Most cases happen in winter and early spring
• Breakthrough varicella:
  ➢ Varicella infection in vaccinated persons >42 days after varicella vaccination
  ➢ Mild illness
  ➢ Few lesions
  ➢ Usually no fever

Varicella Rash

Unvaccinated child

Vaccinated child
Varicella Vaccine

- Single-antigen varicella vaccine
  - 70% to 90% effective against any varicella disease
  - 90% to 100% effective against severe varicella disease

- MMRV
  - Similar levels of detectable antibody as varicella vaccine

Number of Varicella Cases by Month, Texas, 2016

- January: 106 cases
- February: 106 cases
- March: 114 cases
- April: 138 cases
- May: 183 cases
- June: 95 cases
- July: 80 cases
- August: 70 cases
- September: 118 cases
- October: 109 cases
- November: 105 cases
- December: 117 cases
Varicella Surveillance

- CDC ELC Requirements:
  - CDC Hospitalization Report
  - CDC Outbreak Report
  - Varicella completeness
  - Working on a new varicella reporting form

2016 Varicella Breakdown

- 1,341 cases reported in 2016
  - 1,029 cases (77%) ≤18 years old
  - 312 cases (23%) >18 years old
- 41 cases (3%) were hospitalized
- 15 outbreaks in 2016
  - The 2 largest outbreaks had 20 cases each
    - School bus outbreak
    - Correctional facility outbreak
  - The 3rd largest outbreak had 10 cases on a college/university campus
2016 Varicella Vaccination Breakdown

- 1,341 cases reported in 2016
  - 1,135 cases (85%) had a known vaccination status
    - 620 cases (55%) were vaccinated
    - 515 cases (45%) were not vaccinated
  - 206 cases (15%) had an unknown vaccination status
- The reasons for not being vaccinated varied:
  - Born outside the U.S. 21%
  - Parent/Patient refusal or philosophical objection 10%
  - Underage for vaccination 27%
  - Unknown 34%
  - Other 8%

Varicella Cases, Texas, 2000-2016

- ACIP recommends 2nd dose
- MMRV licensed
- 1995 Varicella licensed
Varicella Cases and Incidence, Texas, 2012-2016

Pertussis
Pertussis Epidemiology

- Infectious Agent: *Bordetella pertussis*
- Transmission: Respiratory droplets
- Incubation period: Average 7-10 days (range is 4-21 days)
- Communicability: Lasts up to 21 days after cough onset or after antibiotic treatment has been completed (usually 5 days)

Pertussis Epidemiology cont’d

- Clinical illness: Three phases of disease:
  1. Catarrhal stage: onset of runny nose, sneezing, low-grade fever, slight cough that gradually becomes more severe (1-2 weeks)
  2. Paroxysmal cough stage: coughing fits, may be followed by inspiratory whoop, apnea, or vomiting (1-6 weeks)
  3. Convalescence: gradual resolution of paroxysmal cough (weeks to months)
    - Vaccinated individuals who become sick will likely have a milder illness
- No temporal pattern
2016 Pertussis Breakdown

- 1,286 cases
  - 291 cases (23%) had a known vaccination status
    - 242 cases (83%) were vaccinated
    - 49 cases (17%) were not vaccinated
  - 995 cases (77%) had an unknown vaccination status

For the 49 cases (17%) who were not vaccinated, reasons for not being vaccinated included:

- Medical Contraindication 10%
- Never offered vaccine 6%
- Parent/Patient forgot to vaccinate 4%
- Parent/Patient refusal or religious exemption 27%
- Under age for vaccination 22%
- Unknown 29%
- Other 2%
Number of Pertussis Cases, Texas, 2000-2016

Pertussis Cases and Incidence, Texas, 2012-2016
Pertussis Vaccines

- 5 doses of DTaP and 1 dose of Tdap
- Pregnant women should have a single dose of Tdap during every pregnancy (27-36 weeks)
  - In 2013, Texas started collecting information about Tdap in pregnant women when investigating a case of pertussis in child <5 years of age.
- Estimates have the vaccine as an 80%-85% efficacy
**Tdap Timeline**

- **2005**: FDA licensed two different Tdap vaccines
- **2011**: FDA approval for Tdap in older persons
- **2012**: ACIP recommendation for pregnant woman to receive Tdap irrespective of receiving Tdap previously
- **2013**: ACIP recommendation for pregnant woman to received Tdap during each pregnancy

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**Maternal Vaccination Status of Pertussis Case-Patients 0-4 years old, Texas, 2013-2016**

![Bar chart showing number of cases of pertussis by maternal vaccination status from 2013 to 2016.](chart)

- Not Vaccinated
- Vaccinated

<table>
<thead>
<tr>
<th>Year</th>
<th>Not Vaccinated</th>
<th>Vaccinated</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>26</td>
<td>18</td>
</tr>
<tr>
<td>2014</td>
<td>163</td>
<td>210</td>
</tr>
<tr>
<td>2015</td>
<td>138</td>
<td>147</td>
</tr>
<tr>
<td>2016</td>
<td>127</td>
<td>107</td>
</tr>
</tbody>
</table>
Invasive Disease

• Invasive: When the bacteria invade parts of the body that are normally free from germs, like spinal fluid or blood, this is known as "invasive disease."
  ➢ Invasive disease is usually severe and can sometimes result in death

https://www.cdc.gov/hi-disease/about/types-infection.html
**Haemophilus influenzae, Invasive (H. flu)**

**H. flu Epidemiology**

- **Infectious Agent:** *Haemophilus influenzae* (*H. flu*) a bacterium capable of causing a range of diseases including:
  - Ear infections
  - Cellulitis (soft tissue infection)
  - Upper respiratory infections
  - Pneumonia, and
  - Serious invasive infections:
    - Meningitis with potential brain damage and epiglottitis with airway obstruction
- **Transmission:** Respiratory droplets and discharge from the nose and/or throat of an infected/colonized person
**H. flu Epidemiology cont’d**

- Incubation period: Hard to define
  - Many are asymptomatic
  - If become ill usually within 10 days of exposure
- Communicability: Organism is present in discharge from the nose or throat
  - Communicability ends within 24 hours of initiation of appropriate chemoprophylaxis
  - Serotype b cases are probably most infectious during the 3 days prior to onset of symptoms
- Despite its name, this bacterium has nothing to do with the influenza viruses

**H. flu Invasive Clinical Illness**

- All serotypes of *Haemophilus influenzae* can cause illness
- Invasive forms:
  - Meningitis – brain swelling
  - Bacteremia – blood infection
  - Periorbital or other cellulitis – skin lesions
  - Septic arthritis – joint infection
  - Osteomyelitis – bone infection
  - Pericarditis – infection of the sac around the heart
  - Pneumonia – lung infection
  - Epiglottitis – Swelling of the windpipe
- Non-invasive forms:
  - Conjunctivitis, otitis media, or bronchitis
  - Not reportable
**H. flu Serotypes**

- At least 6 serotypes of *H. flu*
  - Designated a, b, c, d, e, f
  - Unencapsulated strains (nontypeable)
  - In 2016 all serotypes became reportable

- Type b (Hib)
  - Cause of most severe illness
  - Only type preventable by vaccine
  - Post-exposure prophylaxis (PEP) is available for Hib on case-by-case basis

- Serotyping
  - Performed at the DSHS laboratory
  - Recommended for all *H. flu* isolates from sterile sites
  - Required on isolates from children under 5 years old by *Texas Administrative Code (TAC) §97.3(a) (4)*

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**Number of Invasive *H. flu* Cases, Texas, 1980-2016**

*1980-2015 only Hib cases reported; 2016 all serotypes reported*
Hib Vaccine

• CDC recommends Hib vaccination for children under 5 years of age
  ➢ Usually given to babies starting at 2 months of age
    • Primary series 2 or 3 doses and a booster
  ➢ Older children and adults usually do not need a Hib vaccine
• Of the 15 Hib case-patients reported in 2016, 6 (40%) had a reported vaccination status
  ➢ Of the 6 case-patients with a known vaccination status, 5 (83%) were previously vaccinated

Number of Invasive H. flu Cases and Incidence, Texas, 2012-2016*

*2012-2015 only Hib cases; 2016 all serotypes reported
Number of Invasive *H. flu* Cases by Age Group, Texas, 2016

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4 years</td>
<td>43</td>
</tr>
<tr>
<td>5-17 years</td>
<td>18</td>
</tr>
<tr>
<td>18-49 years</td>
<td>40</td>
</tr>
<tr>
<td>50-64 years</td>
<td>60</td>
</tr>
<tr>
<td>65+ years</td>
<td>156</td>
</tr>
</tbody>
</table>

Number of Invasive *H. flu* Cases by Serotype, Texas, 2016

<table>
<thead>
<tr>
<th>Serotype</th>
<th>Number of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>15</td>
</tr>
<tr>
<td>b</td>
<td>15</td>
</tr>
<tr>
<td>c</td>
<td>0</td>
</tr>
<tr>
<td>d</td>
<td>2</td>
</tr>
<tr>
<td>e</td>
<td>10</td>
</tr>
<tr>
<td>f</td>
<td>20</td>
</tr>
<tr>
<td>Non-b</td>
<td>15</td>
</tr>
<tr>
<td>Non Typeable</td>
<td>114</td>
</tr>
<tr>
<td>Not tested</td>
<td>47</td>
</tr>
<tr>
<td>Unknown</td>
<td>79</td>
</tr>
</tbody>
</table>
Number of Invasive *H. flu* Case-patients Under the Age of 5 by Serotype, Texas, 2016

**Streptococcus pneumoniae**, Invasive (Strep Pneumo)
Invasive *Streptococcus pneumoniae* Epidemiology

- Infectious Agent: *Streptococcus pneumoniae*
- Transmission: Direct person to person contact through respiratory droplets and by autoinoculation in persons carrying the bacteria in their upper respiratory track
- Incubation period: Varies but can be as short as 1 to 3 days
- Communicability: Time frame unknown
  - May be as long as the organism is present in the respiratory tract secretions
  - Probably less than 24 hours after effective antimicrobial therapy is started

2017 Updates

- Texas Administrative Code (TAC) requires isolates be sent to DSHS lab for serotyping for cases of children under 5 years old
  - Complications with isolate submission
Number of Invasive *S. pneumoniae* Cases, Texas, 2003-2016

- **1977**: 1st polysaccharide vaccine licensed for use in US; 1983 reformulated to cover 23 serotypes
- **1997**: Single dose of PCV13 approved; expanded use to adults; 92 known serotypes of *S. pneumoniae*
- **2000**: 1st conjugate vaccine (PCV7) licensed for use in US recommended for children 2-23 months of age
- **2005**: PCV13 licensed for use in US; replaced PCV7 for routine use for children

Pneumococcal Vaccination

- **Conjugate vaccine recommended:**
  - 2 months, 4 months, 6 months, and 12-15 months of age
  - Adults 65 years of age and older
- **Polysaccharide vaccine recommended:**
  - Adults 65 years of age and older
  - Adults 19 through 64 years of age who smoke cigarettes or have asthma
  - Anyone 2 through 64 years of age with certain long-term health problems or with a weakened immune system
Number of Invasive *S. pneumoniae* Cases and Incidence, Texas, 2012-2016

Number of Invasive *S. pneumoniae* Cases by Age, Texas, 2016
Meningococcal Disease, Invasive (*Neisseria meningitidis*)

**Epidemiology**
- **Infectious Agent:** Bacterium *Neisseria meningitidis*
- **Transmission:** Person to person
  - Direct contact with respiratory secretions (e.g. kissing)
  - Indirect contact (e.g. sharing utensils)
  - Aerosol droplets (e.g. coughing and sneezing)
- **Incubation Period:** Usually 3-4 days (range is 1-10 days)
- **Communicability:** As long as the bacteria are present in discharges from the nose and mouth
  - Person is no longer infectious after 24 hours of appropriate antimicrobial treatment
Number of *N. meningitidis* Cases, Texas, 1980-2016

- 1st conjugate vaccine licensed for use in US for under 2 year olds & added to recommended immunization schedule
- Quadrivalent polysaccharide vaccine licensed in US for 2+ year olds
- 2nd conjugate vaccine licensed for use in US for 11-55 year olds & ACIP recommends booster dose for college
- Serogroup B vaccines licensed

Serogroups Worldwide

Meningococcal Vaccinations

- Vaccines available in the US
  - Conjugate/polysaccharide:
    - Covers serotypes A, C, Y, and W
    - Recommended for 11-12 year olds
    - Booster recommended 5 years after (16-18 years old)
    - Colleges require proof of conjugate vaccination within 5 years before starting school
  - Serogroup B:
    - Covers serotype B only
    - Recommended for 10-23 year olds (preferably 16-18 years old)
    - Recommended for certain groups of at increased risk for meningococcal disease

Number of *N. meningitidis* Cases by Serogroup, Texas, 2012-2016

![Graph showing the number of N. meningitidis cases by serogroup from 2012 to 2016.](image)
Number of *N. meningitidis* Cases and Incidence, Texas, 2012-2016

![Graph showing number of *N. meningitidis* cases and incidence per 100,000 population by year from 2012 to 2016.](image)

Number of *N. meningitidis* Case-Patients by Age Group, Texas, 2016

![Bar chart showing number of *N. meningitidis* case-patients by age group in Texas in 2016.](image)
Case Study

• Original notification of a potential meningococcal case in Regional Health Department 6/5S on 4/20/2017
  ➢ Culture returned a few days later resulting in culture-confirmed *Neisseria meningitidis*
  ➢ Individual was not vaccinated
  ➢ Individual started symptoms on 4/16/2017
    ▪ Attended a social gathering on 4/16/2017

Now... about this social event.

Bunnies on the Bayou

• Volunteer organization “dedicated to the raising and distributing of funds for various charitable and cultural programs that seek to improve the quality of life and promote education and awareness of human rights for the individuals in the Houston LGBT community.”
• Social calendar culminates in an event held in Houston, Texas on Easter Sunday every year
  ➢ Heralded as “the largest outdoor cocktail party in Texas”
Bunnies on the Bayou

- Regional Health Department 6/5S worked alongside local health departments to identify high-risk contacts
  - Nine individuals were found to be high-risk and were given PEP
  - An Epi-X was sent out to other states, informing them of the potential exposure and to keep an eye out for meningococcal cases reporting attendance at this event
- No additional cases were reported

Mumps
Mumps Epidemiology

- Infectious Agent: Mumps virus, a single-stranded RNA paramyxovirus
- Transmission: Respiratory droplets or direct contact with nasopharyngeal secretions
- Incubation period: Average is 16-18 days (range is 12-25 days)
- Communicability as early as 3 days before and up to 5 days after symptom onset

Mumps Epidemiology cont’d

- Clinical Illness:
  - Prodromal symptoms are non-specific and include myalgia, anorexia, malaise, headache, and low-grade fever that lasts 3-4 days
  - Parotitis (inflammation or swelling of the parotid glands)
  - 20% of cases are asymptomatic
  - Most common complication is orchitis (50% of males)
- Temporal pattern
  - Peak in cases in late winter and early spring

Mumps Vaccination

• 2 doses of MMR or MMRV began recommendation in 1989 and implemented in 2006
• Still researching effectiveness of a 3rd dose
• 88% effectiveness with two doses (78% with one dose)

Timeline

1945 • Mumps virus isolated\(^1,2\)
1948 • Inactivated mumps vaccine developed (later discontinued) \(^1\)
1967 • Single antigen vaccine licensed\(^1,2\)
1971 • MMR licensed by Merck\(^2\)
1977 • One-dose MMR recommended for routine use\(^1\)
1989 • Two-dose measles vaccination policy\(^1\)
2005 • MMRV licensed by Merck\(^2\)
2006 • Two-dose mumps vaccine policy\(^1\)

(1) Epidemiology and Prevention of Vaccine-Preventable Diseases – CDC Pink Book
(2) http://www.immunize.org/timeline/
Mumps Cases, Texas, 1990-2017*

*2017 data provisional as of 11-1-2017

Number of Cases

Two-dose mumps policy implemented

Mumps Cases and Incidence, Texas, 2012-2016

*2017 data provisional as of 11-1-2017
Mumps Cases and Incidence by Age Group, Texas, 2012-2017*

- 565 cases of mumps since 10/1/2016
  - 369 (65%) are outbreak related—divided among 16 outbreaks
    - Largest outbreak: Johnson County – 191 cases
    - Smallest outbreaks: Amarillo, Wichita, and Beeville, TX – 2 cases each
    - 196 cases denoted as not being associated with an outbreak
  - 41 counties affected
Mumps Vaccination, Texas, October 2016-2017*

- 565 cases of mumps since 10/1/2016
  - 486 cases (86%) of mumps cases have a known vaccination history
    - Of these 486 cases (86%) who we know their vaccination history:
      - 407 cases (84%) have been vaccinated
      - 79 cases (16%) have not been vaccinated
  - Breakdown by age group:

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Vaccinated N / (Column %)</th>
<th>Not Vaccinated N / (Column %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤18 years of age</td>
<td>223 / (55)</td>
<td>14 / (18)</td>
</tr>
<tr>
<td>&gt;18 years of age</td>
<td>184 / (45)</td>
<td>65 / (82)</td>
</tr>
</tbody>
</table>

*Data provisional as of 11-9-2017
Texas Mumps Outbreaks

Mumps Outbreaks in Texas*

- An outbreak is classified as at least 2 confirmed or probable cases
- 2016—4 outbreaks
  - Johnson County outbreak went into 2017 as well
- 2017—14 outbreaks*
- Johnson County was our largest outbreak—191 cases

<table>
<thead>
<tr>
<th></th>
<th>2016 (N / Column %)</th>
<th>2017* (N / Column %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not part of an outbreak</td>
<td>51 / 27</td>
<td>167 / 41</td>
</tr>
<tr>
<td>Outbreak</td>
<td>140 / 73</td>
<td>244 / 59</td>
</tr>
<tr>
<td>Total</td>
<td>191</td>
<td>411</td>
</tr>
</tbody>
</table>

*2017 data provisional as of 11-1-2017
### Number of Mumps Cases by Outbreak and MMWR Year, Texas, 2016-2017*

<table>
<thead>
<tr>
<th>Outbreak</th>
<th>2016</th>
<th>2017*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 UT</td>
<td>15</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>2016 Dallas</td>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Collin</td>
<td>12</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Johnson</td>
<td>107</td>
<td>84</td>
<td>191</td>
</tr>
<tr>
<td>2017 Dallas 1</td>
<td>0</td>
<td>71</td>
<td>71</td>
</tr>
<tr>
<td>Beeville</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2017 Dallas 2</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>SPI</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Tarrant</td>
<td>0</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Bexar</td>
<td>0</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Willacy 1</td>
<td>0</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Amarillo</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2017 UT</td>
<td>0</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Wichita</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2017 Dallas 3</td>
<td>0</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>2017 Travis</td>
<td>0</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Willacy 2**</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

*2017 data provisional as of 11-1-2017  **ongoing outbreak

### Number of Mumps Cases Associated with the Johnson County Outbreak by Demographic Indicators and MMWR Year, Texas, 2016-2017*

#### Age Group

<table>
<thead>
<tr>
<th>Age Group</th>
<th>2016</th>
<th>2017*</th>
<th>Outbreak Total</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 years</td>
<td>4</td>
<td>4</td>
<td>8</td>
<td>4%</td>
</tr>
<tr>
<td>6-10 years</td>
<td>17</td>
<td>16</td>
<td>32</td>
<td>17%</td>
</tr>
<tr>
<td>11-15 years</td>
<td>28</td>
<td>17</td>
<td>45</td>
<td>23%</td>
</tr>
<tr>
<td>16-20 years</td>
<td>25</td>
<td>16</td>
<td>41</td>
<td>21%</td>
</tr>
<tr>
<td>21-25 years</td>
<td>10</td>
<td>4</td>
<td>14</td>
<td>7%</td>
</tr>
<tr>
<td>26-30 years</td>
<td>7</td>
<td>10</td>
<td>17</td>
<td>9%</td>
</tr>
<tr>
<td>31-40 years</td>
<td>12</td>
<td>11</td>
<td>23</td>
<td>12%</td>
</tr>
<tr>
<td>41-50 years</td>
<td>5</td>
<td>3</td>
<td>8</td>
<td>4%</td>
</tr>
<tr>
<td>51-60 years</td>
<td>0</td>
<td>3</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td>61+ years</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td>107</td>
<td>84</td>
<td>191</td>
<td>100%</td>
</tr>
</tbody>
</table>

#### Race

<table>
<thead>
<tr>
<th>Race</th>
<th>2016</th>
<th>2017*</th>
<th>Outbreak Total</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian</td>
<td>8</td>
<td>0</td>
<td>8</td>
<td>4%</td>
</tr>
<tr>
<td>Black or African American</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>5%</td>
</tr>
<tr>
<td>Native Hawaiian or Other Pacific Islander</td>
<td>42</td>
<td>48</td>
<td>90</td>
<td>47%</td>
</tr>
<tr>
<td>Unknown</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>White</td>
<td>80</td>
<td>30</td>
<td>80</td>
<td>42%</td>
</tr>
<tr>
<td>Total</td>
<td>107</td>
<td>84</td>
<td>191</td>
<td>100%</td>
</tr>
</tbody>
</table>

*2017 data provisional as of 11-1-2017
Issues with Mumps

- Reporting — Increase in cases over the past year are due to both increased awareness about mumps and higher prevalence of the virus
- Infection—Mumps virus is shed up to 3 days prior to symptom onset
  ➢ This makes it hard to assess 3rd dose effectiveness
- Vaccine is 88% effective at 2 doses
- No effective post-exposure prophylaxis
- Lab testing—PCR vs IgM

3rd dose MMR in Outbreaks

- CDC guidelines for a 3rd dose in 2012:
  1. >90% 2-dose vaccination coverage
  2. Depends on the setting—schools and correctional facilities
  3. High attack rates (> 5 cases per 1,000)
  4. Ongoing transmission (> 2 weeks) (1)

- ACIP recommendation for 3rd dose campaigns in outbreak situations from October 2017
  http://www.aappublications.org/news/2017/10/26/Mumps102617
Why the increase in mumps outbreaks?

- Outbreaks in high population density areas and high contact areas (i.e. universities, schools)
- Vaccine efficacy (88% 2-dose with a range of 66%-95%)
- Is there a waning of vaccine-induced immunity?¹
  - Only suggestions as of right now
  - Does not explain geographic nature of mumps outbreaks
  - Oldest vaccinated cohorts not always the most affected
- Is immunity due to vaccination less effective on different mumps strains?
  - No evidence yet but length of time since vaccination may be a possibility¹


Resources

- Centers for Disease Control and Prevention website www.cdc.gov
- EAIDB Case Criteria Guide http://www.dshs.texas.gov/idcu/default.shtm
Thank you

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