INFECTIONS AT THE BORDER COMING TO A HOSPITAL NEAR YOU

Eric McDonald, MD, MPH, FACEP
Medical Director, Epidemiology & Immunization Services
Public Health Services, County of San Diego Health and Human Services

34th Annual IDAC Spring Symposium

5 May 2019
Only a plane (or boat) ride away…
TOPICS

- Measles
- Mumps and Acute Parotitis
- CRPA in Tijuana Hospitals
- Rocky Mountain Spotted Fever
MEASLES

Image Credit: CDC
Number of measles cases reported to WHO from member states 3/1/18 to 2/28/19

Source: WHO. Downloaded 5/2/19 from:
http://www.who.int/immunization/monitoring_surveillance/burden/vpd/surveillance_type/active/measles_monthlydata/en/
Measles case distribution by month and WHO Region (2015-2019)

Source: WHO. Downloaded 5/2/19 from: http://www.who.int/immunization/monitoring_surveillance/burden/vpd/surveillance_type/active/measles_monthlydata/en/
### Top 10**

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ukraine</td>
<td>72408</td>
<td>1629.39</td>
</tr>
<tr>
<td>Madagascar</td>
<td>69720</td>
<td>2800.61</td>
</tr>
<tr>
<td>India</td>
<td>60641</td>
<td>45.8</td>
</tr>
<tr>
<td>Pakistan</td>
<td>28164</td>
<td>145.77</td>
</tr>
<tr>
<td>Philippines</td>
<td>19358</td>
<td>187.36</td>
</tr>
<tr>
<td>Yemen</td>
<td>10566</td>
<td>383.05</td>
</tr>
<tr>
<td>Brazil</td>
<td>10318</td>
<td>49.69</td>
</tr>
<tr>
<td>Nigeria</td>
<td>7481</td>
<td>40.22</td>
</tr>
<tr>
<td>Thailand</td>
<td>6213</td>
<td>90.22</td>
</tr>
<tr>
<td>DR Congo</td>
<td>5864</td>
<td>74.48</td>
</tr>
</tbody>
</table>

### Other countries with high incidence rates***

<table>
<thead>
<tr>
<th>Country</th>
<th>Cases</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Georgia</td>
<td>3017</td>
<td>768.58</td>
</tr>
<tr>
<td>Liberia</td>
<td>2762</td>
<td>598.64</td>
</tr>
<tr>
<td>Albania</td>
<td>1376</td>
<td>470.21</td>
</tr>
<tr>
<td>Israel</td>
<td>3541</td>
<td>432.26</td>
</tr>
<tr>
<td>Kyrgyzstan</td>
<td>2043</td>
<td>343.03</td>
</tr>
<tr>
<td>Serbia</td>
<td>2947</td>
<td>334.12</td>
</tr>
<tr>
<td>Montenegro</td>
<td>187</td>
<td>297.48</td>
</tr>
</tbody>
</table>

### Measles cases from countries with known discrepancies between case-based and aggregate surveillance, as reported by country

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Cases in Case-based</th>
<th>Cases in Aggregate</th>
<th>Data Source for aggregate #s</th>
</tr>
</thead>
<tbody>
<tr>
<td>DR Congo</td>
<td>2018</td>
<td>5621</td>
<td>67072</td>
<td>SITUATION EPIDEMIOLOGIQUE DE LA ROUGEOLE EN RDC, Week of 09/04/2019</td>
</tr>
<tr>
<td></td>
<td>2019</td>
<td>1414</td>
<td>49942</td>
<td></td>
</tr>
<tr>
<td>Somalia</td>
<td>2018</td>
<td>131</td>
<td>9135</td>
<td>Somali EPI/POL Weekly Update Week 13</td>
</tr>
<tr>
<td></td>
<td>2019</td>
<td>6</td>
<td>1081</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** WHO. Downloaded 5/2/19 from: [http://www.who.int/immunization/monitoring_surveillance/burden/vpd/surveillance_type/active/measles_monthlydata/en/](http://www.who.int/immunization/monitoring_surveillance/burden/vpd/surveillance_type/active/measles_monthlydata/en/)
Measles in Ukraine

53,218 in 2018
25,319 in 2019

Ukraine age distribution, vaccination status, and incidence, 2018-03 to 2019-02

Source: WHO. Downloaded 5/2/19 from:
http://www.who.int/immunization/monitoring_surveillance/burden/vpd/surveillance_type/active/measles_monthlydata/en
Measles in Philippines

20,758 cases in 2018
22,967 cases in 2019

Philippines age distribution, vaccination status, and incidence, 2018-03 to 2019-02

Source: WHO. Downloaded 5/2/19 from:
http://www.who.int/immunization/monitoring_surveillance/burden/vpd/surveillance_type/active/measles_monthlydata/en
Measles in Israel

3,140 cases in 2018
411 cases in 2019

Israel age distribution, vaccination status, and incidence, 2018-03 to 2019-02

Source: WHO. Downloaded 5/2/19 from:
http://www.who.int/immunization/monitoring_surveillance/burden/vpd/surveillance_type/active/measles_monthlydata/en
Measles in Venezuela

Figure 10. Reported measles cases by EW of rash onset. Venezuela. 2017-2019 (until EW 13).

727 confirmed cases in 2017
5,667 confirmed cases in 2018
140 confirmed cases in 2019

Measles in Brazil

Figure 2. Reported measles cases by EW of rash onset. Amazonas, Pará, and Roraima states, Brazil, EW 1 of 2018 to EW 13 of 2019.

Measles in Colombia

Figure 8. Confirmed measles cases by EW of rash onset. Colombia, EW 10 of 2018 to EW 14 of 2019.

N = 8,687

Source: PAHO. Downloaded 4/30/19 from:
MEASLES

*Cases as of December 29, 2018. Case count is preliminary and subject to change.
**Cases as of April 26, 2019. Case count is preliminary and subject to change.

Source: CDC. Downloaded 4/30/19 from:
https://www.cdc.gov/measles/cases-outbreaks.html
13 outbreaks (defined as 3 or more cases) have been reported in 2019. 9 are ongoing in:

- New York State, Rockland County – 214 cases
- New York City – 423 cases
- Michigan – 43 cases
- New Jersey – 14 cases
- California – Butte County, LA, Sacramento
- Georgia – 6 cases
- Maryland – 4 cases

38 cases total in CA in 2019, all related to international travel (Philippines = 4, Ukraine = 2, Thailand = 1)
New York Suburb to Declare Measles Emergency, Barring Unvaccinated Children From Public

So far, the measles outbreak in Rockland County has mostly affected ultra-Orthodox communities, public health officials have said. Bryan Anselm for The New York Times

<table>
<thead>
<tr>
<th>County</th>
<th>Total Cases</th>
<th>Pediatric Cases (&lt;18 Years)</th>
<th>Adult Cases (18 Years or Older)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Los Angeles</td>
<td>7</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Orange</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Placer</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Sacramento</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>San Francisco</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>San Mateo</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Santa Clara</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Santa Cruz</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Other (Butte, Calaveras, Tehama)*</td>
<td>16</td>
<td>3</td>
<td>13</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>40</strong></td>
<td><strong>10</strong></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

*To address potential confidentiality concerns with small numbers, data from counties with populations less than 250,000 are not displayed.

21 confirmed measles cases were reported in California in 2018. These data are provisional and subject to change.
Also on Saturday, the Long Beach Department of Health and Human Services confirmed a case of measles in a resident of that city. That patient was described as a vaccinated graduate student at UC Irvine who has not traveled internationally.

The student was recovering at home after visiting several locations throughout Orange and Los Angeles counties while infectious, health officials said. The HCA released a list of locations where people may have been exposed to the viral disease:

- The Pickled Monk, Fullerton, 5/3/19 from 1:45 - 3:30 p.m.
- Brick Basement Antiques, Fullerton, 5/3/19 from 2:40 - 4 p.m.
- Buffalo Exchange, Fullerton, 5/3/19 from 3 - 4:15 p.m.
- EightyEight Cigar, Fullerton on 5/3/19 from 3:15 - 5 p.m.
- UCI Humanities, Instructional Building 100, 4/29/19 from 10 a.m. - 12 p.m.
- UCI Murray Krieger Hall, Classic Department, 4th Floor, 4/29/19 from 11 a.m. - 3 p.m.
- UCI Humanities Hall 112, 4/30/19 from 2 - 5 p.m.
- UCI Student Health Center, 5/2/19 from 1 - 3 p.m.

The Long Beach Department of Health and Human Services said eight other locations were also being notified of having been visited by the contagious student in late April and early May:

- 4/28/2019: Pizzanista, 1837 E 7th St., 5:30-7 p.m.
- 4/28/2019: Total Wine, 7400 Carson Blvd., 6-7:30 p.m.
- 4/30/2019: Susan European Dressmaker, 3319 E 7th St., 5-7 p.m.
- 5/1/2019: Art du Vin Wine Bar, 2027 E 4th St., 8-10 p.m.
- 5/1/2019: Ralph's, 2930 E 4th St., 2-5 p.m.
- 5/2/2019: Ralph's, 6290 PCH, 3-6:30 p.m.
- 5/2/2019: AMC Marina Pacifica, 6346 E PCH, 6-10 p.m.
- 5/3/2019: Broadway Carwash 4000 E Broadway, 11 a.m.-1 p.m.
- 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 97-99% 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)

More contagious viruses tend to have higher $R_0$ values.
Prodrome – onset 8 to 12 days after exposure (range=7-21 days)

- Stepwise increase in fever to 101°F or higher
- Dry cough, coryza, conjunctivitis
- Koplik spots (rash on mucous membranes)
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
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."
<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 infectiosa</td>
<td>human parvovirus B19</td>
</tr>
<tr>
<td>Sixth</td>
<td>roseola infanticum</td>
<td>human herpesvirus 7</td>
</tr>
</tbody>
</table>
RASH MAY APPEAR MORE ACNE-LIKE AND WITH LESS SEVERE PRODROME IN PATIENTS WITH PRIOR MMR

Photo courtesy of Robert McDonald, CDC
## 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 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!
- 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 – 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
See your doctor where you are going.
Talk to your doctor about your travel plans.

After you travel
Stay home if you have a fever.
Call your doctor if anyone gets a fever and rash within 3 weeks of returning from your trip.

For more information go to www.cdc.gov/travel.
March 22, 2019

Dear Community Member,

A very large measles outbreak is currently occurring in the Philippines. We are asking for your help in getting this message about measles and the risk of travel to and from the Philippines out to a wide audience. Measles can be prevented with vaccination!

The Philippine Department of Health has reported 20,308 measles cases, including 301 deaths, from January 1 to March 12, 2019. Over half of the measles cases are under five years of age. Most of the cases are from Metro Manila, Central Luzon, Calabarzon, Western Visayas, and Central Visayas. Other regions also have increasing numbers of measles cases and are at risk for outbreaks if the epidemic is not contained.

The best way to protect against measles is to get the MMR (measles, mumps, rubella) vaccine. It is safe, effective and has been used for more than 50 years. We recommend that infants 6-11 months old who are traveling to the Philippines (or other countries where measles is circulating) get one dose of
MEASLES – WHAT CAN YOU DO?

IDENTIFY   ISOLATE   INFORM

▪ Maintain a high index of suspicion in appropriate cases
  ▪ Fever + rash
  ▪ Travel history
  ▪ 3 C’s and Koplik spots
  ▪ Exposure to travelers

▪ Know the immune status of all your staff – NOW!!!

▪ Contact the LHD when suspected, not confirmed

▪ Urine PCR is an ideal test when available (can get thru San Diego PHL 😊)
KAWASAKI DISEASE

Image Credit: Kawasaki Foundation
MUMPS

Image Credit: AP
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total in Mexico</td>
<td>4,193</td>
<td>4,132</td>
<td>3,367</td>
<td>3,570</td>
<td>4,585</td>
<td>8,818</td>
<td>2,633</td>
</tr>
<tr>
<td>Baja California</td>
<td>258</td>
<td>315</td>
<td>220</td>
<td>200</td>
<td>285</td>
<td>362</td>
<td>72</td>
</tr>
<tr>
<td>Sonora</td>
<td>167</td>
<td>111</td>
<td>140</td>
<td>181</td>
<td>222</td>
<td>430</td>
<td>71</td>
</tr>
<tr>
<td>Chihuahua</td>
<td>256</td>
<td>398</td>
<td>232</td>
<td>248</td>
<td>355</td>
<td>1,068</td>
<td>171</td>
</tr>
<tr>
<td>Coahuila</td>
<td>61</td>
<td>79</td>
<td>48</td>
<td>42</td>
<td>202</td>
<td>153</td>
<td>79</td>
</tr>
<tr>
<td>Nuevo Leon</td>
<td>281</td>
<td>273</td>
<td>194</td>
<td>224</td>
<td>384</td>
<td>917</td>
<td>508</td>
</tr>
<tr>
<td>Tamaulipas</td>
<td>204</td>
<td>171</td>
<td>160</td>
<td>202</td>
<td>335</td>
<td>934</td>
<td>310</td>
</tr>
<tr>
<td>Total Border States</td>
<td>1,227</td>
<td>1,347</td>
<td>994</td>
<td>1,097</td>
<td>1,783</td>
<td>3,864</td>
<td>1,211</td>
</tr>
</tbody>
</table>

Percent of Mexico Cases
- Baja California: 29.2%
- Sonora: 32.5%
- Chihuahua: 29.5%
- Coahuila: 30.7%
- Nuevo Leon: 38.8%
- Tamaulipas: 43.8%

* 2019 data through Epidemiology Week 16, ending 4/14/19
Source: Secretaría de Salud. Data from reports accessed 4/30/19 at: https://www.gob.mx/salud/acciones-y-programas/direccion-general-de-epidemiologia-boletin-epidemiologico
MUMPS – MEXICO 2018

Total reported in Mexico = 8,818

Total reported in 6 Mexican border states = 3,864 (43.8% of total)

Total reported in Mexico = 2,633 through 4/22/19

Total reported in 6 Mexican border states = 1,211 (46.0% of total)
* Case count is preliminary and subject to change.

**Cases as of February 28, 2019. Case count is preliminary and subject to change.

Source: CDC. Downloaded 4/30/19 from: https://www.cdc.gov/mumps/outbreaks.html
At least 236 cases in facilities across the country.

Up to 2,200 inmates quarantined at any one time.
Emergency Department Visits with Chief Complaints Related to Parotitis or Mumps
7/2/17 - 3/3/18

Data Source: County of San Diego Emergency Department Syndromic Surveillance
Prepared by the County of San Diego, Health & Human Services Agency
Public Health Services, Epidemiology & Immunization Services Branch, 3/5/19
Emergency Department Visits with Chief Complaints Related to Parotitis or Mumps
7/1/18 - 3/2/19

Data Source: County of San Diego Emergency Department Syndromic Surveillance
Prepared by the County of San Diego, Health & Human Services Agency
Public Health Services, Epidemiology & Immunization Services Branch, 3/5/19
To: CAHAN San Diego Participants  
Date: March 15, 2019  
From: Immunization Program, Public Health Services

Mumps and Acute Parotitis Cases Increase in San Diego

This health advisory informs CAHAN participants that mumps may be circulating in San Diego County and contributing to an increase in acute parotitis cases seen at local emergency departments (EDs). Information is also provided on the clinical presentation, laboratory testing, and reporting of mumps.

Key Messages

- To date in 2019, five unrelated mumps cases have been reported in San Diego residents. Two patients had not travelled outside the county, indicating local mumps exposures are occurring.
- Local EDs have treated an increased number of acute parotitis cases in 2019. Some of these cases may be undiagnosed mumps.
- Patients with acute parotitis should have travel and sexual histories obtained, and viral causes should be considered, including mumps, influenza, and HIV.
- Mumps should be considered when individuals present with parotitis, other salivary gland swelling, orchitis, and aseptic meningitis, even when patients have been fully vaccinated.
- Polymerase chain reaction (PCR) testing of a properly collected buccal swab is preferred for mumps diagnosis in acute parotitis. The mumps PCR test is performed in some commercial labs and in the San Diego County Public Health Laboratory (SDCPHL).
- Providers are requested to promptly report any suspected mumps case to the County Immunization Program by calling 866-358-2966 (after hours call 858-565-5255).
- Mumps is endemic in many countries. Outbreaks are ongoing in Honduras and parts of Mexico. Anyone ≥6 months of age planning to go abroad should have age appropriate immunization with measles, mumps, and rubella (MMR) or evidence of immunity before travel.
Mumps - an acute viral illness caused by an RNA virus in the Paramyxoviridae family - the only cause of epidemic parotitis.

Parotitis – especially sporadic cases – may be due to viruses other than mumps.

Parotitis can also be caused by
- Epstein-Barr virus
- Human herpesvirus B6 (the cause of roseola)
- Cytomegalovirus
- Parainfluenza virus types 1 and 3
- Influenza A virus
- Coxsackieviruses and other enteroviruses
- Lymphocytic choriomeningitis virus
- Human immunodeficiency virus
- Staphylococcus aureus
- Nontuberculous Mycobacterium
**Prodromal symptoms** are nonspecific, may include myalgia, anorexia, malaise, headache and low-grade fever.

Unilateral or bilateral swelling of one or more salivary glands, usually the parotid glands (parotitis), which occurs in 30%-40% of infected persons.

**Parotitis** tends to occur within the first 2 days and may be first noted as earache and tenderness on palpation of the angle of the jaw.

Symptoms tend to decrease after 1 week and usually resolve after 10 days.

40-50% may only have nonspecific or respiratory symptoms.

Up to 20% are asymptomatic.
MUMPS - COMPLICATIONS

- **Orchitis** (testicular swelling) is a common complication and may occur in as many as 50% of postpubertal males.

- **Central nervous system** (CNS) involvement is common but fewer than 10% have symptoms of CNS infection.

- **Other** rare complications include arthritis, mastitis, glomerulonephritis, myocarditis, endocardial fibroelastosis, thrombocytopenia, cerebellar ataxis, transverse myelitis, ascending polyradiculitis, pancreatitis, oophoritis, and hearing impairment.

- Mumps during the first trimester is associated with an increased rate of spontaneous abortion, but although mumps virus can cross the placenta, there is no evidence that this results in congenital malformation.
Mumps exposure

- Unprotected face-to-face (<3 feet) contact with an infectious person for at least 5 minutes.

Incubation period

- Usually 16 to 18 days, but cases may occur 12 to 25 days after exposure.

Period of communicability

- Communicability is probably highest from 2 days before to 5 days after onset of parotitis; mumps virus has been isolated in saliva from 7 days before through 9 days after onset of swelling.
Live-attenuated mumps vaccine is given as part of measles, mumps and rubella (MMR) vaccine in the U.S.

Post-licensure data estimate the effectiveness of 1 dose of mumps vaccine at approximately 80% (64%-95%) and two doses at 90% (88%-90%).

In recent large outbreaks, mumps infections have occurred in many persons with a history of 2 doses of MMR.
Acute mumps infection can be laboratory confirmed by:
- the presence of serum mumps IgM,
- a significant rise in IgG antibody titer in acute- and convalescent-phase serum specimens,
- positive mumps virus culture, or
- detection of virus from a buccal specimen by reverse transcriptase polymerase chain reaction (RT-PCR).

Serologically confirming mumps in an immunized person may be challenging:
- IgM response may be absent or short lived
- studies have shown that individuals with detectable mumps IgG titers have still developed mumps infection.
Unimmunized: buccal specimen & acute blood specimen should be collected; a convalescent specimen may be requested.

Immunized: buccal specimen should be collected; acute and convalescent blood specimens may also be submitted for IgM testing and/or detection of IgG rise. Collection of a buccal specimen within 1 to 3 days of parotitis onset is optimal, however virus may be detected for up to 9 days after parotitis onset.

Status unknown: buccal & blood specimens should be submitted. Immunization status of the patient should be clearly indicated on the laboratory submittal form.

Outbreak: buccal specimen is the preferred specimen for testing.

See this CDC video on how to collect the specimen: 
https://www.youtube.com/watch?v=ThvoJBjsUvQ
Salivary Duct Systems

- Stensen duct drains the parotid gland.
- Wharton duct drains the submandibular gland.
Stensen’s duct
Stensen’s duct
Wharton’s duct
Neither mumps vaccine nor immune globulin (IG) is effective for mumps postexposure prophylaxis.

However, MMR vaccination of exposed persons who have had less than two doses of mumps containing vaccine is recommended unless otherwise contraindicated, because if the current exposure does not cause infection, vaccination should induce protection against subsequent exposure(s) to mumps, measles or rubella.

Third MMR booster for those with basic series in college/university outbreaks – useful in outbreak situation
Mumps Cases, San Diego County
1993-2019*

* 2019 data are year to date.

Prepared by the County of San Diego, Health & Human Services Agency, Public Health Services, Epidemiology & Immunization Services Branch, 5/4/19
Single mumps case confirmed at SDSU

by David Santillan, Assistant News Editor
March 29, 2019
Filed under Breaking, News

San Diego State officials have identified a case of the mumps virus involving a student. According to a campus-wide email sent Friday afternoon by Cynthia Cornelius, the SDSU Student Health Services medical director, the student who contracted the illness is doing well and is no longer contagious. ...
Line of mostly students wait to enter a vaccination clinic amid an mumps outbreak at Temple University in Philadelphia, on 3/27/19.

MUMPS - US

Mumps Cases as of April 26, 2019

N = 736

Source: CDC. Downloaded 4/30/19 from: https://www.cdc.gov/mumps/outbreaks.html
MUMPS

WHAT CAN YOU DO?

- Consider mumps in patients with parotitis, especially in college-age individuals and international travelers.
- A correctly obtained buccal specimen for PCR testing is the best test for mumps – contact the Epidemiology Program for timely assistance.
- Be aware of mumps outbreaks in other countries (Honduras, some Mexican states, Nepal, China, Japan, etc).
- All international travelers should have two doses of MMR.
- Sign up for Monthly Communicable Disease Reports (EISB (619) 692-8499 or EpiDiv.HHSA@sdcounty.ca.gov)
CARBAPENEM RESISTANT PSEUDOMONAS AERUGINOSA & TIJUANA HOSPITALS

Image Credit: CDC
CRPA

- The Antibiotic Resistance Laboratory Network (ARNET) received 26 reports of CRPA from 10 states between 9/28/18 and 10/8/18
- Strain most common in older patients
- Patients with multiple health care exposures
Six isolates were from patients with history of healthcare in Mexico

Unusual because patients were relatively young, had wound cultures

Majority medical tourists, 3 linked to same hospital

Launched binational public health investigation
Confirmed case
+ P. aeruginosa
+ Carbapenem resistant
+ Elective invasive surgery in Mexico since 01/2018
+ Surgery in 30 days prior to specimen collection
+ VIM mechanism

Suspect case
+ P. aeruginosa
+ Carbapenem resistant
+ Elective invasive surgery in Mexico since 01/2018
+ Surgery in 30 days prior to specimen collection
Unknown VIM mechanism
▪ 9 cases identified during Sept-Nov 2018

▪ All had surgery in Tijuana, Mexico

▪ 6 linked to Grand View Hospital
Infection control assessment at Grand View found that there was non-adherence to core infection control practices (e.g., hand hygiene)

No chemical or biological indicators to ensure sterility during equipment reprocess

Risk for bloodborne pathogen and bacterial infections

Surgical suite reportedly closed by Mexican health authorities

CDC issues travel advisory, San Diego issues CAHAN
Drug-Resistant Infections in Patients Who Had Weight-Loss Surgery in Mexico

Warning - Level 3, Avoid Nonessential Travel

Alert - Level 2, Practice Enhanced Precautions

Watch - Level 1, Practice Usual Precautions

Key Points

- Some US residents returning from Tijuana, Baja California, Mexico, have been diagnosed with infections caused by an antibiotic-resistant form of *Pseudomonas aeruginosa* bacteria.
- All of the travelers with this particular infection had surgery performed in Tijuana. Most (but not all) of them had weight-loss surgery. Over half of those infected had their procedure at the Grand View Hospital.
To: CAHAN San Diego Participants  
Date: March 18, 2019  
From: Epidemiology Program, Public Health Services

**Update: Carbapenem-resistant *Pseudomonas aeruginosa* Infections after Hospitalization in Tijuana**

This health alert updates providers that four local cases have been reported of *Pseudomonas aeruginosa* infections with carbapenem resistance due to Verona integron-encoded metallo-β-lactamase (VIM-CRPA) linked to previous hospitalizations in Tijuana, Mexico. The [level 2 travel alert](https://www.cdc.gov/travel/destinations/safety/pseudomonas-aeruginosa.html) issued by the Centers for Disease Control and Prevention (CDC) regarding surgeries in Tijuana facilities has been updated. Recommendations and resource links are provided.

**Key Messages**

- Four cases of VIM-CRPA have been reported in San Diego County in individuals with previous hospitalizations in Tijuana, Mexico.
- The local cases are linked to an ongoing multistate cluster of VIM-CRPA in persons returning from Tijuana after having invasive medical procedures. About half of those infected had their surgery performed at Grand View Hospital in Tijuana.
- Travelers to Tijuana should not have surgery at Grand View Hospital until further notice.
- CDC recommends that any patient with surgery at Grand View Hospital after August 1, 2018 discuss screening for blood borne pathogens with their provider.
- Providers admitting patients with infections after invasive medical procedures in Tijuana should test for carbapenemase-producing organisms and strongly consider implementing pre-emptive contact precautions while awaiting lab results.
- Providers should report carbapenem-resistant *Pseudomonas aeruginosa* to the County Epidemiology Program and arrange to test these specimens for resistance mechanism via the San Diego County Public Health Laboratory (SDCPHL).
- Individuals planning to go abroad for medical procedures should consult with their local providers prior to departure and follow CDC medical tourism [travel advice](https://www.cdc.gov/travel/).
30 CASES FROM 17 STATES IDENTIFIED AS OF APRIL 19, 2019
EPI-CURVE, VIM-CRPA

- Confirmed or suspect case
- Suspect case active outreach

Infection Control Assessment Facility A

Binational investigation

Travel notice

List of 741 patients exposed to Facility A

Date of specimen collection (Epidemiological week)

2018

2019

No. cases

0 1 2 3 4 5 6

36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 1 2 3 4 5 6 7 8 9 10
19 Isolates Underwent Whole Genome Sequencing (WGS)

Dataset legend

- Facility A
- Facility B
- Facility C
- Facility D
- Facility E
- Non-medical tourist
- 2015 gastric sleeve
## Resistance Profile Representative of Isolates

<table>
<thead>
<tr>
<th>BMD Tests</th>
<th>RESULT</th>
<th>INTERPRETATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amikacin</td>
<td>32 µg/mL</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Aztreonam</td>
<td>16 µg/mL</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Cefepime</td>
<td>16 µg/mL</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>32 µg/mL</td>
<td>Resistant</td>
</tr>
<tr>
<td>Ceftazidime-avibactam</td>
<td>&gt;16/4 µg/mL</td>
<td>Resistant</td>
</tr>
<tr>
<td>Ceftolozane-tazobactam</td>
<td>&gt;16/4 µg/mL</td>
<td>Resistant</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
<td>&gt;8 µg/mL</td>
<td>Resistant</td>
</tr>
<tr>
<td>Colistin</td>
<td>2 µg/mL</td>
<td>Susceptible</td>
</tr>
<tr>
<td>Doripenem</td>
<td>&gt;8 µg/mL</td>
<td>Resistant</td>
</tr>
<tr>
<td>Gentamicin</td>
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<tr>
<td>Imipenem</td>
<td>&gt;64 µg/mL</td>
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<td>Levofloxacin</td>
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</tr>
<tr>
<td>Meropenem</td>
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<td>Resistant</td>
</tr>
<tr>
<td>Piperacillin-tazobactam</td>
<td>32/4 µg/mL</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Tobramycin</td>
<td>&gt;16 µg/mL</td>
<td>Resistant</td>
</tr>
</tbody>
</table>
Data only available from public hospitals in Tijuana

- 261 inpatient cultures were identified with *Pseudomonas aeruginosa*
  
  - 110 (42%) were resistant to carbapenems.
  
  - None were tested for VIM.

- 32 deaths

- 61% male
Age distribution of cases of carbapenem resistant *P. aeruginosa*, from hospitals of Tijuana, Mexico (2017-2019).

- **N= 110, data 1/17 to 2/19**

**Source:** Epidemiology Department, Health Ministry, Baja California
Distribution by diagnosis of cases of carbapenem resistant *P. aeruginosa*, from hospitals of Tijuana, Mexico (2017-2019).

N= 110, data 1/17 to 2/19

Source: Epidemiology Department, Health Ministry, Baja California
Cases of carbapenem resistant $P. \text{aeruginosa}$, from Hospitals of Tijuana, Mexico (2017-2019), by date of detection.

N= 110, data 1/17 to 2/19

Source: Epidemiology Department, Health Ministry, Baja California
Advise patients who seek care outside U.S. to research foreign provider and to avoid having any procedures at Grand View Hospital.

Test for blood borne pathogens in those with surgery after August 2018 at Grand View

Be vigilant for the possibility of resistant infections occurring in patients who have traveled abroad for medical procedures, especially those with a history of invasive procedures in Tijuana.

Perform rectal screening for carbapenemase-producing organisms when admitting patients who have a history of overnight stays in foreign healthcare facilities.

Obtain cultures and perform antimicrobial susceptibility testing to guide treatment of infections in patients who have a history of having undergone invasive procedures.
Isolate patients with VIM-CRPA regardless of specimen source and place on contact precautions. Ask them about healthcare outside the U.S.

Consult with an infectious disease specialist when caring for patients with CRPA. CRPA infections are difficult to treat, requiring protracted and complex antibacterial drug combinations and courses.

Report cases of any surgical site infections in patients who have recently undergone surgery in foreign medical facilities.

Test any CRPA or carbapenem-resistant Enterobacteriaceae for VIM and other plasmid-mediated carbapenemases.

Mechanism testing for VIM and other plasmid-mediated carbapenemases may be arranged via SDPHL.
Consult with a travel medicine provider at least 4–6 weeks before trip to discuss general information for healthy travel and to learn about specific risks related to the procedure and to travel before and after the procedure.

Make sure that any current medical conditions you have are well controlled, and that your regular health care provider knows about your plans for travel and medical care overseas.

Check the qualifications of the providers who will be doing the procedure and credentials of the facility where the procedure will be done.

Remember that foreign standards for health care providers and facilities may be different from those of the United States.
MEDICAL TOURISM

- Check standards from an accrediting group (Joint Commission International, DNV International Accreditation for Hospitals, International Society for Quality in Healthcare)

- Have a written agreement with the health care facility or the group arranging the trip, defining what treatments, supplies, and care are covered by the costs of the trip.

- If you go to a country where you do not speak the language, determine ahead of time how you will communicate with your doctor and other people who are caring for you.

- Take with you copies of your medical records that include the lab and other studies done related to the condition for which you are obtaining care and any allergies you may have.
• Bring copies of all your prescriptions and a list of all the medicines you take, including their brand names, generic names, manufacturers, and dosages.

• Arrange for follow-up care with your local healthcare provider before you leave.

• Before planning vacation activities, such as sunbathing, drinking alcohol, swimming, or taking long tours, find out if those activities are permitted after surgery.

• Get copies of all your medical records before you return home.
INVESTIGATION ONGOING

- Four cases in San Diego under investigation
- MMWR report pending
- Ongoing work with BC health authorities
Rocky Mountain spotted fever (Fiebre Manchada de las Montañas Rocosas) is a tick-borne disease caused by *Rickettsia rickettsia*. 

Infects endothelial cells, causes vasculitis

- Non-specific symptoms
- Multi-system organ failure

No “classic” presentation

Can be rapidly fatal

- >20% case fatality rate in untreated cases
- Median time to death 8 days
SEASONAL FOR MOST OF U.S.

SFR cases by month of onset 1993 through 2014

Source CDC. Downloaded 7/8/17 from http://www.cdc.gov/rmsf/stats/
Reported cases of RMSF in the United States for 2015

Source CDC. Downloaded 5/26/18 from https://www.cdc.gov/ticks/tickborne-diseases/rmsf.html
Rocky Mountain Wood Tick

Dermacentor andersoni

Downloaded 11/5/15 from http://www.cdc.gov/ticks/geographic_distribution.html

Photo credit: CDC
American Dog Tick

Dermacentor variabilis

Downloaded 11/5/15 from http://www.cdc.gov/ticks/geographic_distribution.html

Photo credit: CDC
Rhipicephalus sanguineus

Brown Dog Tick

Downloaded 11/5/15 from http://www.cdc.gov/ticks/geographic_distribution.html

Photo credit: CDC
Rats

Dogs, cats

Brown dog tick

Humans

Dogs, cats

Environment

Environment

Environment
Early clinical manifestations

- **Day 1-2**: fever, headache, myalgia (*may be responsive to OTC pain/fever meds*)
- **Day 2-4**: May develop respiratory signs (cough, community-acquired pneumonia) and/or gastrointestinal signs (nausea, vomiting, abdominal pain)
- **Day 2-4**: light maculopapular rash *may* appear
- **Day 2-4**: Thrombocytopenia, hyponatremia, elevated liver enzymes (AST, ALT) *may* occur
Later clinical manifestations

- Worsening systemic illness (cough, dyspnea, arrhythmias, hypotension, severe abdominal pain)
- Petechial rash may develop
- Thrombocytopenia, hyponatremia, elevated liver enzymes (AST, ALT) usually present
- Onset of neurologic signs (photophobia, altered mental status, seizures)
Testing is used for surveillance and public health (magnitude of cases, confirm risks)

No early diagnostic test can definitively rule RMSF in or out

Do not base treatment decisions on (or wait for) test results
PCR or IHC of whole blood, serum, tissue

- Most accurate for severely ill/fatal cases
- Unlikely to be positive for mild RMSF or samples taken early (day 1-4 of illness)

Serology (IFA)

- Detects antibodies
- Testing of paired sera (acute, convalescent 2-4 weeks later) recommended
- Can be difficult to interpret
- Often negative during acute illness
- Antibodies from prior infections may persist for years
Doxycycline saves lives!

- Best treatment for suspected RMSF in children and adults
- Treatment needed early when RMSF is suspected
- Does NOT cause tooth staining in children when used to treat RMSF

Avoid tick habitat

Use DEET (at least 20%) or wear permethrin-treated clothing

Shower soon after being outdoors
  Washes away unseen nymphs and gets tick infested clothing off of the body

Daily tick checks—remove attached ticks ASAP

Treat pets appropriately for ticks year-round,
  ESPECIALLY ANY DOGS THAT CROSS THE BORDER

Call your provider if you develop a fever or rash
For more information contact:

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
Phone: (619) 692-8436
Fax: (858) 715-6458
Email: eric.mcdonald@sdcounty.ca.gov