Objectives

• Define current U.S. epidemiology of mumps
• Define clinical diagnostic criteria for mumps
• Define available lab tests to confirm diagnosis
• List steps to take on campus to educate community & limit spread
Mumps is

- An acute viral illness
  - Usually self limited
- Highly infectious
- Vaccine preventable
- Caused by a single stranded RNA virus
  - Paramyxovirus
- Humans are the only known natural host
- A college health risk for local outbreak
Historical Mumps

• Past history of worldwide epidemics
  – Among school age children
  – Average of ~162,000 cases in U.S. annually
• Vaccination introduced in U.S. in 1967
  – 1968 incidence: 152,209 cases
  – 1993 incidence: 1,692 cases
  – 2011 incidence: 370 cases (>99% reduction)
• Sporadic outbreaks, often involving colleges
  – 2006: 5783 cases in 45 states
    • 1192 cases in Iowa, many at University of Iowa
  – 2009: about 3502 cases
Outbreaks in Colleges and Universities

- Since July 2010, the U.S. has experienced 15 mumps outbreaks of 20 or more cases
  - 11 (73%) outbreaks occurred in a college/university size range 29-253 cases, median of 39 cases
  - 9 (60%) outbreaks were in highly immunized populations
- Spring 2014 outbreak: 386 cases in Ohio, many linked to the Ohio State University. Additional cases were seen at other schools.
- University outbreaks generally lasted a few months or less and stayed contained, with minimal spread to the broader community
Mumps in Wisconsin, 2014

Confirmed Cases of Mumps by Age, Wisconsin
March 15-August 1, 2014 (n=56)
Most outbreak cases occur in previously vaccinated students

Iowa, 2006 experience
- 6% unvaccinated
- 12% had one MMR
- 51% had two doses of MMR

Wisconsin, Spring 2014
- 56 confirmed cases; 32 in college/university students
- 71% had two doses of MMR, 21% unknown
- only 5% unvaccinated
Herd Immunity

• The higher the contagious ability of the organism, the higher prevalence of immune individuals needed for “herd” immunity
  – For mumps, the prevalence of immunity needs to be 90%
• Among people who received just one MMR
  – Prevalence of protection on this group is about 80%
• Among people who received two MMR shots
  – Prevalence of protection in this group is about 90%
• Only 25 states require 2 MMR on entrance to colleges
How many students on your campus are susceptible?

88% vaccine efficacy X 93% immunized

= 82% of the population is protected, which means

18% of your population is susceptible to mumps
Mumps Transmission

• This disease is highly infectious
• Spreads by
  – Respiratory droplets
  – Contact
  – Fomites
• Incubation period usually 14-18 days from exposure to symptoms
• Viral shedding precedes symptoms, peak contagiousness just before onset of parotitis
• Most cases only require isolation for 5 days
Clinical Mumps Infection

– First: a nonspecific prodrome:
  • low grade fever, malaise, headache, myalgia
– Then:
  • Parotitis in 95% of symptomatic cases
    – 90% of these become bilateral
    – Parotid swelling may take 10 or more days to resolve
  • Some cases are inapparent
    – 15-20% of all cases are asymptomatic or pauci-symptomatic
Mumps Complications

- Disease in adults is more severe than in children
- Mumps may cause
  - Meningitis, orchitis, encephalitis, oophoritis, pancreatitis, deafness
Mumps Diagnosis

– For cases with parotitis
  • This is a clinical diagnosis!
  • Routine blood work may show
    – Leukopenia, high serum amylase
  • Specific testing mostly used for extrasalivary gland involvement

– Lab evidence:
  • Positive IgM mumps antibody
  • Significant rise in IgG titers
  • Isolation of mumps virus or mumps nucleic acid

• In classic cases:
  – Lab confirmation is NOT required
Specific Tests

- **Serology**
  - IgM testing
    - 50-60% of proven cases will have negative titers among vaccinated individuals
  - IgG testing (titers)
    - Four fold increase over time is diagnostic
    - Get specimen at onset and at 2-3 weeks later
- **Viral culture**
  - Diagnostic if positive, but difficult to perform
- **PCR**
  - Outperforms culture, can be rapid, but access limited
Differential Diagnosis- Mumps

• Bilateral involvement
  – Diagnosis is usually straightforward
  – Can rarely consider parainfluenza, CMV, HIV, EBV, adenovirus
• Unilateral
  – Consider all the above viruses, but most of all think mumps
  – Non-infectious causes: stones, Sarcoid, Sjogrens, thiazide
• Remember: mumps probably more likely than stones, other noninfectious causes, even if patient is vaccinated
Treatment

- Good luck!
- Symptomatic
- Pain management
- Hydration
- Rest
- No pickles!
- Reassure
Take Home Messages

• Learn the anatomy of the parotid gland
• It is all about the parotid gland
More Take Home Messages

- If you can feel the top surface of an acute swelling in the neck, it probably is not the parotid.
- If you feel that something is acute swelling as an extension downward from the angle of the jaw, it probably is parotid swelling.
- Acute parotid swelling should elicit serious consideration of mumps.
• Don’t be afraid of making a clinical diagnosis of mumps
• Unilateral or bilateral parotid swelling can occur in mumps
• Parotid stones are not common in young adults
Tips

• Don’t let vaccination records get in the way of making a diagnosis
• Don’t wait too long for testing results
• Don’t rely on serology to make a diagnosis
• If you can get a rapid amylase assay, it can help sway opinion
• If not sure, isolate 1 day, re-examine the next day
Isolation and Control

• Isolate persons with mumps for five days from onset of symptoms
  – Isolation means: you may not attend classes, work, exams, social activities
  – Provide “isolation” excuse letter to students to use with instructors
  – Consider sending patients home to mom and dad

• Assess immunization status of roommates and close personal contacts
  – If two doses documented, no further action
  – mumps serology not useful; no correlate of protection
What about a third dose?

- Large scale immunization clinics have been used in some outbreaks as an intervention measure
- Some have been designated as “3rd Dose” clinics
  - Most had only limited response and no data to document efficacy
  - When used in schools without an immunization requirement it can be difficult to verify how many doses the students had previously received
  - No easy way to determine who is susceptible
- Current status: insufficient evidence of benefit
- Not recommended
Outbreak Education Strategies

As cases accumulate…

- Post dedicated mumps info on your web site
- Consider mass email encouraging students to verify their MMR status
- Direct contact/messaging to students known to be unvaccinated
- Use of social media
- Faculty/staff/instructors included, to help them understand the need for isolation
Summary – Mumps in College Students

- Both sporadic cases and outbreaks of mumps in college students are not uncommon
- Most cases of mumps in college settings occur in previously immunized students
- The diagnosis of mumps is primarily clinical; PCR is useful for lab confirmation where available
- Treatment is supportive
- Isolate cases for five days