

Mumps

Morning Report

June 7, 2006

Introduction

- Acute viral infection of childhood that classically involves swelling of the parotid glands
- Uncommon in the U. S. since implementation of widespread immunization
- A recent outbreak in the midwest has brought increased attention to the virus

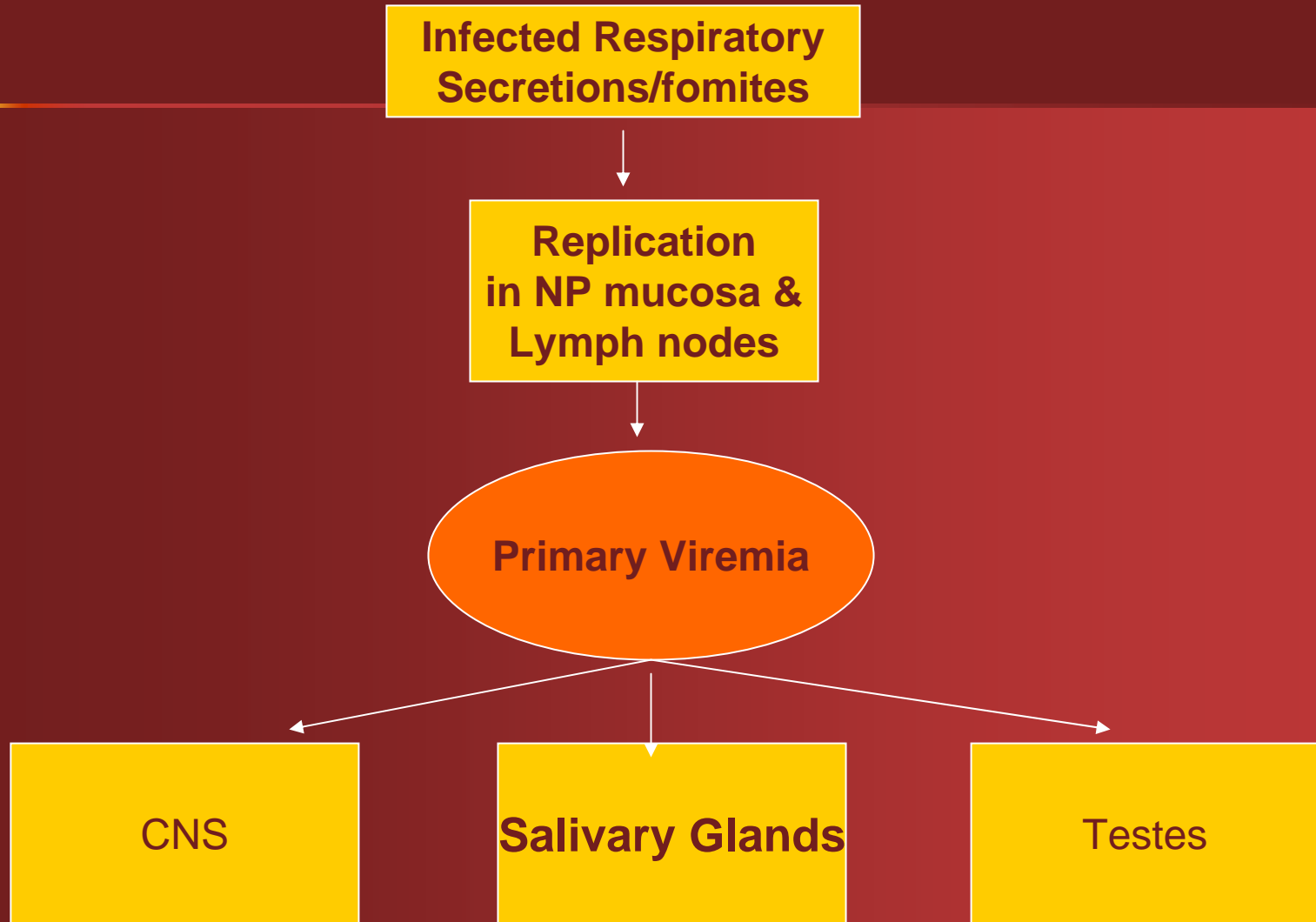
Virology

- Member of the Paramyxoviridae family
- Grows well in culture
- Humans serve as the only natural host

Epidemiology

- Incubation period **12-25 days** (avg 16-18 days)
- Infectious period greatest 3 days before onset of symptoms and 9 days thereafter
- Clinical and sub-clinical infections provide lifelong immunity
- Peak incidence is winter and early spring
- Highly infectious and spreads rapidly among susceptible people

Pathogenesis



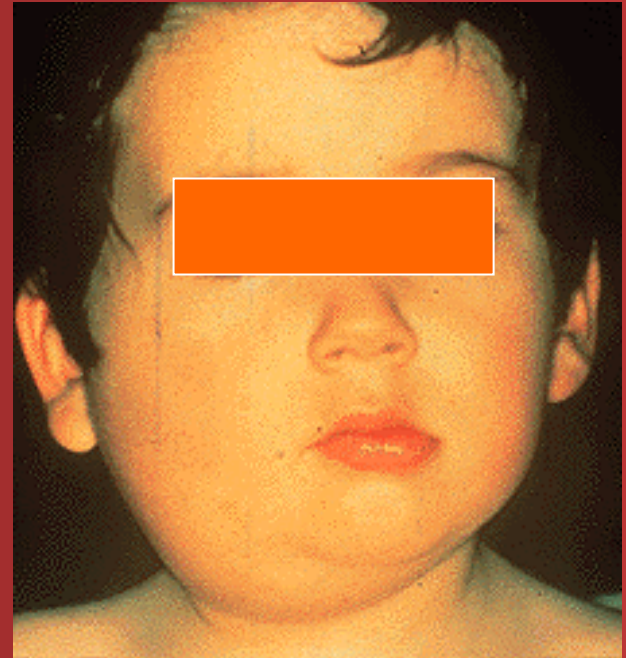
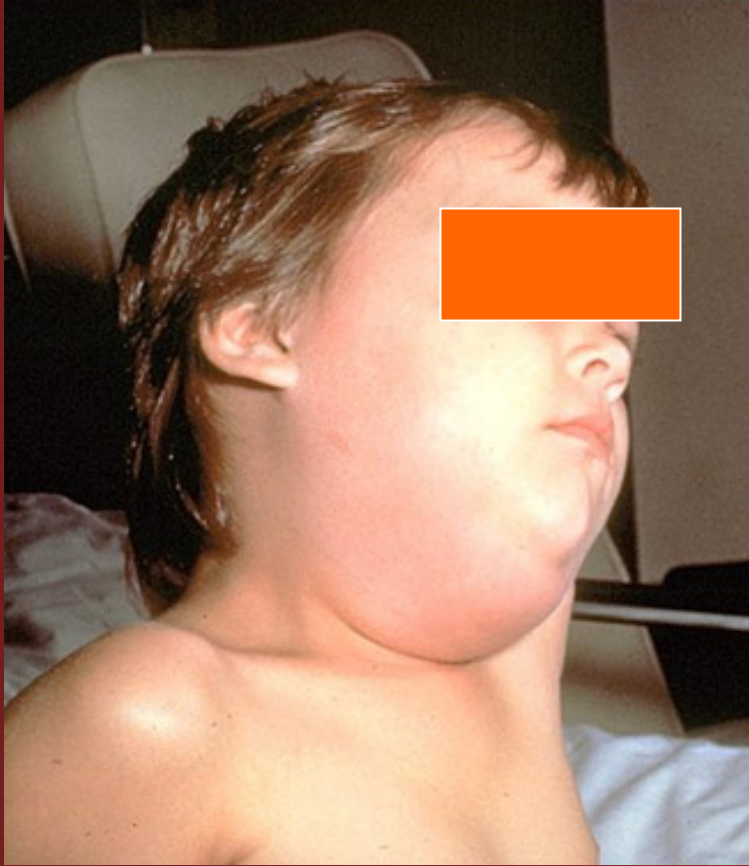
Clinical Manifestations

- Only 30-40% of mumps infections produce typical acute parotitis
- Prodrome 12-24hrs before swelling
 - low grade fever, H/A, abd pain, anorexia
- Non-suppurative salivary gland swelling occurs in 95% of *symptomatic* patients
- Asymptomatic infection occurs in 15-20% of cases
- Up to 50% of pts experience a non-specific respiratory infx w/ no salivary gland swelling (usually children <5yr)
- Some complications are not uncommon and may occur w/out parotitis which can delay diagnosis
- Adolescents/adults have more severe disease than young children

Clinical Manifestations: *Parotitis*

- Parotid swelling occurs in 95% of *symptomatic* cases
 - Most common in children 2-9 years of age
 - Usually unilateral at onset then bilateral in 90% of cases
 - Submandibular/sublingual glands can be involved
 - Parotid glands become progressively swollen and tender
 - Stensen's duct is often erythematous and swollen
 - Discomfort w/ eating/drinking acidic foods
 - Earache on affected side
 - Resolves in ~7-10 day

Parotitis



Complications: *Orchitis*

- Develops in up to 40% of males w/ mumps
- May occur in the absence of parotitis
- Uncommon in pre-pubertal males
- Symptoms occur ~4-8 days after parotid swelling
- Unilateral involvement most common; bilateral orchitis occurs in ~30%
- Testicle remains swollen and tender ~1 wk
- 50% of males recover completely, 50% have some testicular atrophy
- Infertility is rare

Complications: CNS infection

- Mumps virus is neurotropic
- CSF pleocytosis occurs in ~50% of pts w/ parotid swelling
 - Only 1-10% of these pts have clinical evidence of CNS involvement
- Onset can occur before, during, after or in the absence of mumps parotitis
- Meningitis is more common than encephalitis
- Occurs 3-10 days after onset of parotitis
- CNS infection is generally self-limited w/ no sequelae
- CSF profile: <1000 cells/mm³, lymphocyte predominance, glucose often decreased, nl to elevated protein- *can mimic bacterial meningitis*

Complications: *Other (rare)*

- glomerulonephritis
- Arthralgias/arthritis
- Myocarditis
- Pancreatitis
- oophoritis,
- Mastitis
- Thyroiditis
- Thrombocytopenic purpura
- Congenital infection may result in endocardial fibroelastosis

Laboratory/Diagnosis

Lab findings:

- elevated serum amylase
- Low or normal WBC w/ lymphocytosis

*Virus Isolation:

(via culture or rt-PCR)

- Buccal/oral swabs (pharynx, Stensen's duct) (best at 3-5d)
- Urine (best *after* 5d)
- CSF

Serology:

- *positive mumps-specific IgM antibody
- *4-fold rise in IgG Ab between acute and convalescent titers
- *detection of RNA by reverse transcriptase PCR

CSF (if CNS signs):

- WBC < 1000/lymphocyte pred.
- Normal to elevated protein
- Low or nl glucose

** Indicates laboratory criteria used to confirm diagnosis*

More on Serology....

■ IgM:

- A positive IgM indicates current or very recent infection or reinfection
- IgM rises by 5 days, peaks at 1 week and lasts at least 6 weeks
- False positive results may occur due to X-reaction w/ parainfluenza virus
- *Serum IgM may be negative in up to 50-60% of acute serum samples from patients who have been previously immunized; a suspected case in a vaccinated person should not be ruled out on the basis of a negative IgM!*

More on Serology....

■ IgG:

- Obtain both acute (3-5 days after illness onset) and convalescent (2-5 wks after onset) serum to determine look for a four-fold rise in titer
- *In vaccinated persons the existing IgG will begin to rise soon after exposure and infection. At the time of the onset of symptoms and collection of the acute serum, the IgG may be already quite elevated and obviate the 4 fold rise in the convalescent serum.*

CDC Specimen Recommendations

- Collection of both **serum samples** and a mumps **viral specimen** (*buccal swab/urine) are highly recommended
- Contact your local health department to determine where to submit specimens and how to ship them

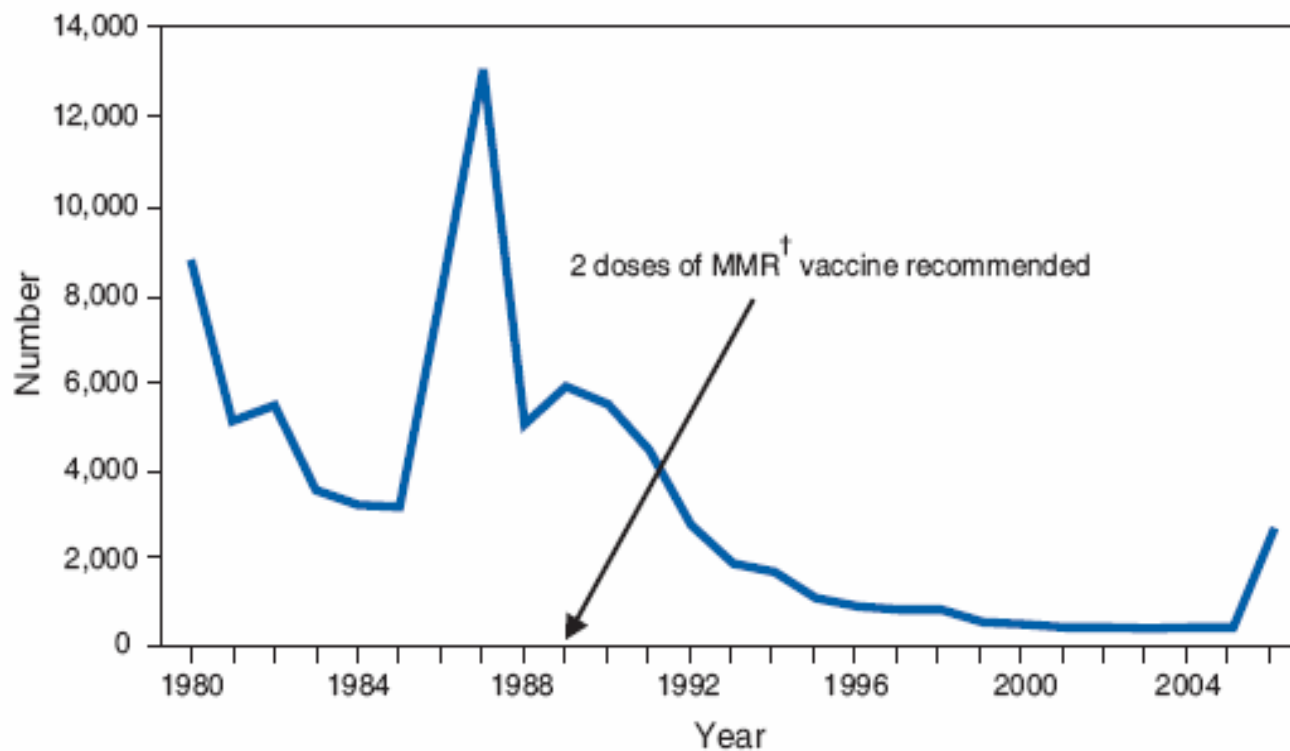
Case Classification for Mumps:

- **Clinical case definition:** acute onset of unilateral or bilateral tender, self-limited swelling of the parotid or other salivary glands, lasting 2 or more days, and without other apparent cause
- **Confirmed case definition:** laboratory confirmed *or* meets the clinical case definition and is linked epidemiologically to a confirmed or probable case.
- **Probable case definition:** meets clinical case definition w/ no serologic or virologic testing confirmation and is not epidemiologically linked to a confirmed case

Treatment & Prevention

- No specific anti-viral therapy is available
- Treatment is supportive
- Mumps vaccine is a live-attenuated virus
- USPHS did not recommend universal vaccination until 1977 (10yrs after vaccine development)
- Expanded recommendation for 2-dose MMR began in 1989
- Universal vaccination resulted in a 99% decline in reported cases
- Levels of antibody are considerably lower after vaccination than after natural infx
- Protective efficacy of the vaccine ranges from ~80-90%

FIGURE 4. Number of reported mumps cases, by year — United States, 1980–2006*



Control Measures

- Patients are non-infectious 9 days after onset of parotid swelling
 - Return to school or daycare recommended **after 9 days** from onset of illness
- Droplet precautions indicated in hospital setting
- Immune globulin or mumps vaccine does not offer effective post-exposure prophylaxis
 - An interval of 2-4 wks after vaccination is required for full immunogenicity
- Vaccination programs during outbreaks are effective in preventing disease after subsequent exposure

Mumps Epidemic- Iowa, 2006

- Outbreak began in December 2005 at a university in eastern Iowa
- Viral isolates were identified as genotype G, the same strain in the UK epidemic
 - UK outbreak has been ongoing from 2004-2006 and has involved >70,000 cases
- Median patient age was 21 (range 3-85yrs)
- 51% of patients had documentation of receiving 2 doses of vaccine (only 6% w/ no doses)
- Only 16% of cases were linked epidemiologically
- Source of the Iowa epidemic is unknown

2006 Multi-State Outbreak of Mumps

- 10 additional states have been linked to the Iowa outbreak
- From January 1- May 2, 2006 **2,597** cases of mumps were reported from Iowa, Illinois, Kansas, Missouri, Nebraska, Pennsylvania, South Dakota and Wisconsin w/ Colorado, Mississippi and Minnesota reporting cases with travel from an outbreak state
- 11 potentially infected pts traveled by aircraft on 33 commercial flights- only 2 cases identified from air travel thus far

FIGURE 1. Number* of reported mumps cases linked to multistate outbreak, by state — United States, January 1– May 2, 2006

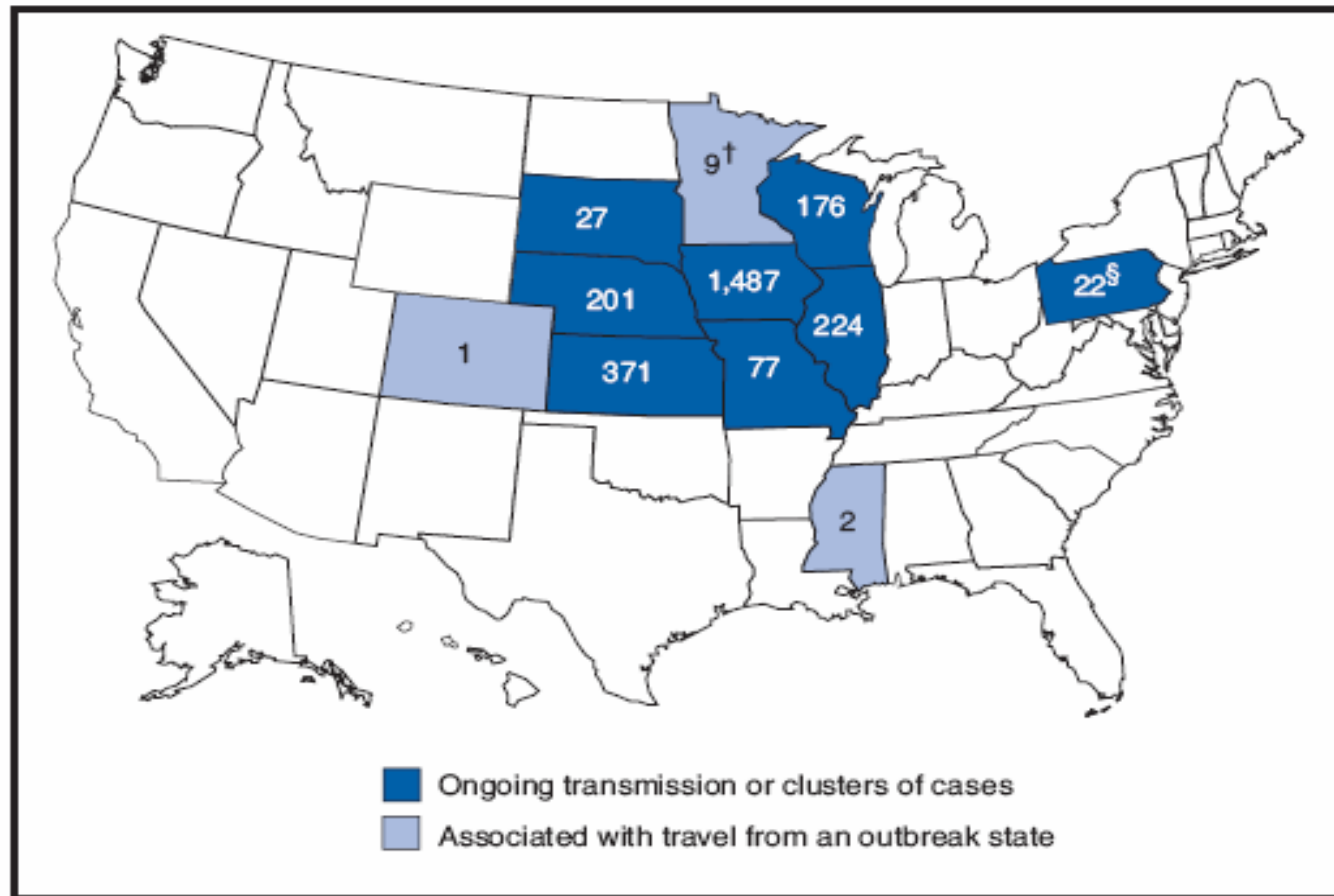
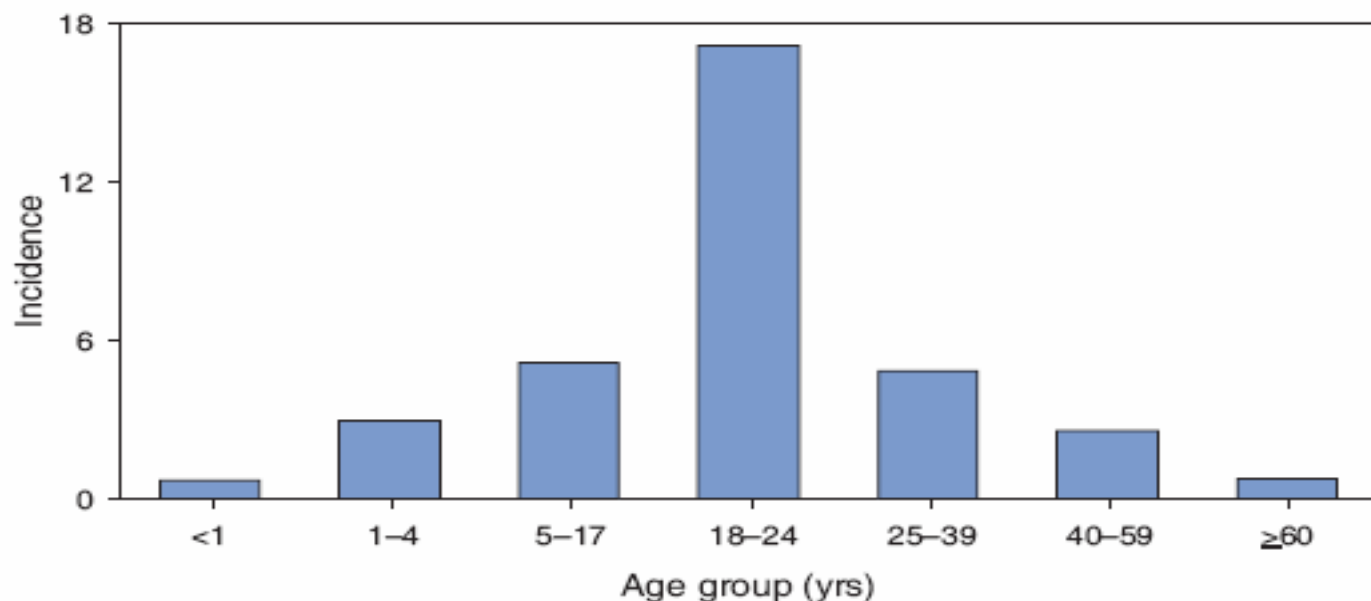


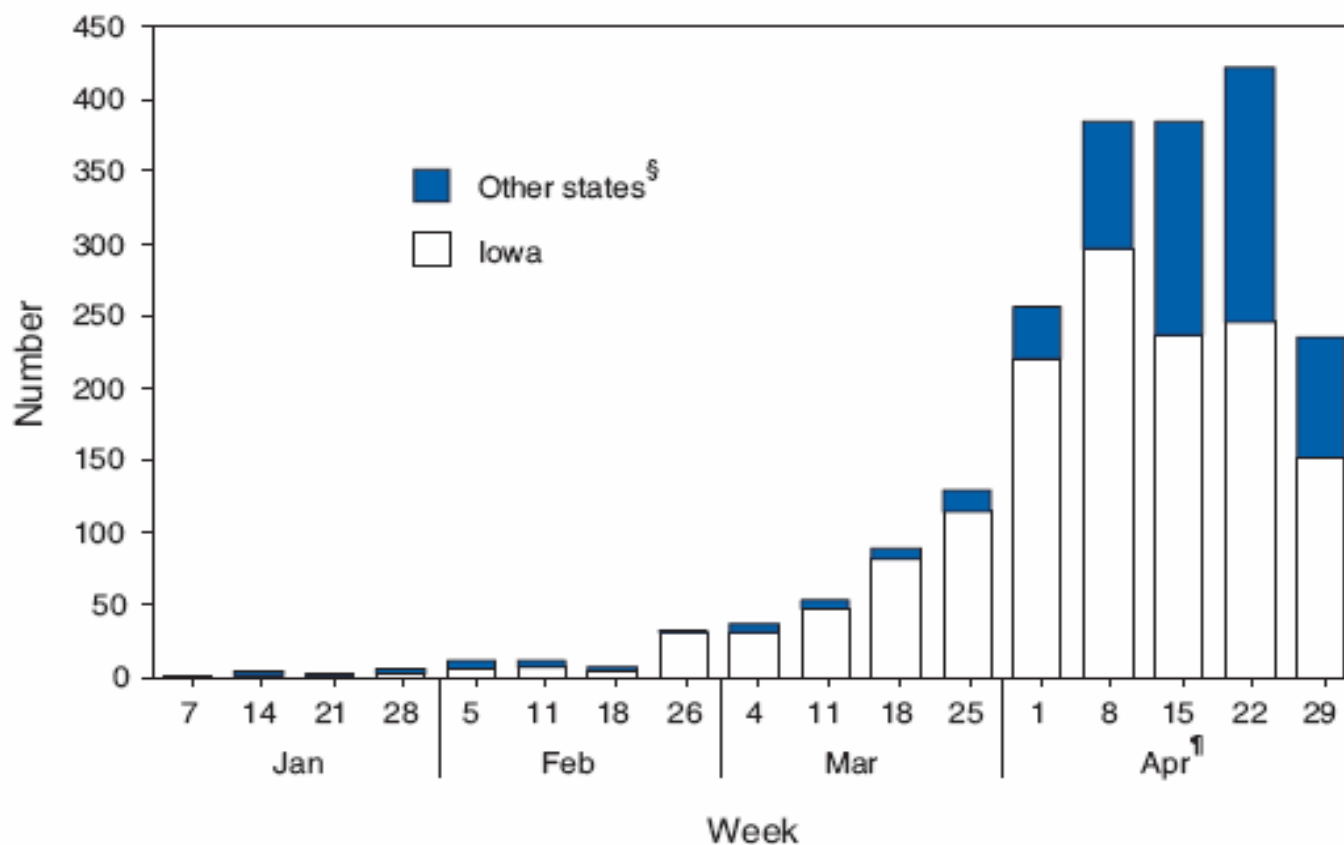
FIGURE 2. Incidence* of mumps reported in eight outbreak states,† by age group — United States, January 1– May 2, 2006



* Per 100,000 population (n = 2,061).

† Iowa, Illinois, Kansas, Missouri, Nebraska, Pennsylvania, South Dakota, Wisconsin.

FIGURE 3. Number* of reported mumps cases linked to multistate outbreak, by week of onset† — United States, January 1– May 2, 2006



* n = 2,073.

†

Factors contributing to the spread..

- College campus environment
- 2-dose coverage w/ MMR among college students is likely lower than the median 97% coverage of children entering elementary school
- Delayed recognition and diagnosis (younger physicians have not seen the mumps)
- Vaccination is not 100% effective
- Vaccine might be less effective in preventing asymptomatic disease and these pts may contribute to transmission
- Waning immunity

High vaccination coverage w/ 2 doses of MMR likely prevented thousands of additional cases in younger children in this outbreak!

Controlling the Outbreak...

- Define the at risk population and transmission setting
- Identify and isolate suspected cases
- Rapidly identify and vaccinate susceptible persons

Specific Strategies:

- **Vaccinate susceptible persons with a 2nd dose of MMR**
 - *Susceptible persons*: college students, health care workers, workers in schools, institutions w/out evidence of immunity, plus children 1-4 who have received only 1 dose (28 day minimum interval)
 - Strongly consider vaccination to workers born before 1957 w/ no evidence of immunity
- **Exclude susceptible persons from school/work that are effected by the outbreak**
 - Exclusion should continue from the 12th day after the first exposure thru the 26th day after the last exposure

Specific Strategies:

- **Identify and test suspected cases and report cases to the local public health agency**
 - <http://www.cdc.gov/nip/diseases/mumps/mumps-lab.htm>
- **Isolate persons having mumps for 9 days after symptom onset to prevent transmission**
- **Use droplet precautions in hospital settings**

Mumps Q & A (Disease)

- What are the most common complications of mumps?
- Can fully vaccinated people get mumps?
- How long is an infected person able to spread the disease?
- If symptoms develop after exposure, how long should my child stay home from school?
- Is mumps a reportable disease?

Mumps Q & A (Lab)

- What specimens should be collected from patients suspected of having mumps?
- What is the best time to collect:
 - Acute serum?
 - Convalescent serum?
 - Buccal/throat swabs? What is the best way to collect?
 - Urine specimens?
- Can you rule out mumps in a previously vaccinated patient w/ a negative IgM?
- What agent can cause a false positive result w/ serologic assays for mumps?

Mumps Q & A (vaccine)

- What should I do if I don't know if I've been vaccinated?
- If I had mumps as a child, should I get vaccinated?
- If my child is exposed to mumps, what should I do?
- Has mumps vaccine been shown to be effective in preventing disease after exposure?
- How long does it take for the vaccine to induce full immunogenicity?

Mumps Q & A (Outbreak)

- Where did the outbreak in the midwest start? What age group was most affected?
- Is the virus causing the current outbreak a rare strain?
- Does the current vaccine protect against the mumps virus causing the outbreak?
- Should an infant receive MMR to prevent mumps during an outbreak before the age of 12 months?
- Should I get my child's second dose before age 4?
- Should we quarantine exposed people?

Mumps Q & A (Travel)

- What should I do if I plan to travel to an outbreak state?
- Can mumps be spread on airplanes?