Mumps Outbreak in the Midwest: Implications for College Health

Sonja Hutchins, MD, DrPH, FACPM
National Center for Immunizations and Respiratory Diseases

ACHA Annual Meeting, June 2, 2006
Objectives

- Clinical Presentation
- Diagnosis
- Vaccine
- US Epidemiology
- Midwest Outbreak
  - Epidemiology
  - Outbreak Control--isolation and vaccination
- Recommendations/Policies
Mumps Virus

- Paramyxovirus
- RNA virus
- One antigenic type
- Rapidly inactivated by chemical agents, heat and ultraviolet light
Epidemiology

- Reservoir: Human
- Transmission: Respiratory droplets
- Communicability: Three days before to nine days (max: 4-5) after onset of active disease
- Temporal pattern: Peak in late winter and spring
Mumps Clinical Features

- Incubation period 14 - 18 days
- Nonspecific prodrome of low-grade fever, headache, malaise, myalgias
- Parotitis in 30% - 40%
- Up to 20% of infections asymptomatic
- May present as lower respiratory illness
## Mumps Complications

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
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<tbody>
<tr>
<td>CNS involvement</td>
<td>15% of clinical cases</td>
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<tr>
<td>Orchitis</td>
<td>20% - 50% (post-pubertal males)</td>
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<tr>
<td>Oophoritis</td>
<td>5% (post-pubertal females)</td>
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<tr>
<td>Pancreatitis</td>
<td>2% - 5%</td>
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<tr>
<td>Deafness</td>
<td>1 / 20,000</td>
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<tr>
<td>Death</td>
<td>1 - 3 / 10,000</td>
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Laboratory Diagnosis

• Isolation of mumps virus

• Detection of mumps nucleic acid by PCR

• Serologic testing
  • Positive IgM antibody
  • Significant increase in IgG antibody between acute and convalescent specimens
Mumps Vaccine
History of Mumps Vaccines in US

1945 Mumps virus isolated
1948 Inactivated vaccine developed
1967 Live attenuated vaccine licensed
(Jeryl Lynn strain)
1971 Combined measles-
mumps-rubella vaccine
1977 Routine 1-dose mumps vaccination
1989 Two-dose MMR schedule
Dr. Maurice and Jeryl Lynn Hilleman
Mumps Vaccine

- **Composition**: Live virus (Jeryl Lynn strain)
- **Clinical Efficacy**: 95% (Range, 90% - 97%)
- **Effectiveness**
  - 1-dose: 75% - 91%
  - 2-doses: 90%
- **Duration of Immunity**: Lifelong
MMR Adverse Reactions

- Fever 5%-15%
- Rash 5%
- Joint symptoms 25%
- Thrombocytopenia <1/30,000 doses
- Parotitis rare
- Deafness rare
- Encephalopathy <1/1,000,000,000 doses
MMR Vaccine
Contraindications and Precautions

• Severe allergic reaction to vaccine component or following prior dose

• Pregnancy

• Immunosuppression

• Moderate or severe acute illness

• Recent blood product
US Epidemiology (Vaccine Era)
Mumps – United States, 1968-2005*

- Mumps Vaccine licensed 1967
- Routine childhood recommendation 1977
- Resurgence

*2005 provisional data
Mumps Resurgence 1986-87

- ~20,000 cases
- Result of incomplete vaccination coverage of adolescents and young adults after introduction of vaccine
- Outbreaks in high schools, colleges and workplace among young adults
- Large outbreaks in states without school requirements for vaccination
  - 1986 -- 15 states without requirements 14-fold higher incidence than in states with requirements*

*Cochi SL, Decker WR, Drew ME, Wies D, JID 1988;142:499-507*
Mumps Resurgence 1986-87

• Outbreaks in highly vaccinated 1 dose students in elementary, junior high, high schools with vaccine coverage > 95%+

• Attack rates mostly 6-18%

• 1 dose MMR not sufficient to eliminate endemic disease transmission

Mumps – United States, 1980-2005

*2005 provisional data

2-dose schedule
Mumps Vaccination Program Goal

Healthy People 2010 – Elimination of indigenous mumps transmission in the United States
Mumps Epidemic — United Kingdom, 2004–2005

During 2004–2005, the United Kingdom (UK) experienced a nationwide epidemic of mumps, which peaked during 2005 when 56,390* notified cases were reported in England and Wales. The majority of confirmed cases during 2004–2005 were in persons aged 15–24 years, most of whom had not been eligible for routine mumps vaccination. Mumps usually is a self-limited viral disease that appears as parotitis. However, mumps also can lead to serious complications such as encephalitis or pancreatitis. This report summarizes the epidemiology of the 2004–2005 mumps epidemic in England and Wales.

Reporting was based on notified cases (i.e., clinically diagnosed cases of mumps reported by general practitioners). Since late 1994, laboratory confirmation of all notified cases of mumps has been recommended using a test to detect mumps-specific IgM antibodies in either serum or an oral fluid (I). The proportion of such cases began to increase in 1999 and increased further in each subsequent year, indicating an increase in the incidence of true infection.

*Clinically diagnosed cases of mumps reported by general practitioners.
†Cases confirmed by measure of mumps-specific IgM in oral fluid samples only.

FIGURE 1. Number of notified* cases of mumps and proportion of cases that were laboratory confirmed† — England and Wales, 2004–2005
Mumps Outbreak at a Summer Camp — New York, 2005

On July 26, 2005, the Sullivan County Health Department (SCHD) and the New York State Department of Health (NYSDOH) were notified of a cluster of cases of parotitis among campers and staff members at a summer camp. An investigation conducted by NYSDOH identified 31 cases of mumps, likely introduced by a camp counselor who had traveled from the United Kingdom (UK) and had not been vaccinated for mumps. This report summarizes the results of the subsequent investigation by NYSDOH, which determined that, even in a population with 96% vaccination coverage, as was the case with participants in the summer camp, a mumps outbreak can result from exposure to virus imported from a country with an ongoing mumps epidemic.
Midwest Outbreak
* Reported cases as of May 2\textsuperscript{nd}, 2006. In PA, 12 of the 22 cases are outbreak related.
1 Week of onset is the week of symptom onset for 1880 (91%) of cases; week of laboratory diagnosis for 131 (6%); week of report for 50 (2%); and week of diagnosis for 11 (<1%). Date of onset missing for one case.

2 Last day of reporting week

+ Cases still being assessed, reporting not complete
Number of Mumps Cases by Age in the 11 States with >1 Outbreak-Associated Mumps Case, 1 January – 29 April, 2006 (n=2073)\(^1\)

\(^1\) Age unknown for 6 of the 2073 cases.
Age-Specific Incidence of Mumps in the 8 Outbreak-Associated States\(^1\), 1 January – 29 April, 2006 (n=2073)\(^2\)

Median age 21 years (range <1-96 yrs)

\(^1\) IA, IL, KS, MO, NE, PA, SD, WI

\(^2\) Age unknown for 6 of the 2073 cases.
Mumps Outbreak
May 2, 2006

• College students
• Parotitis: 66% reported cases
• Reported complications (incomplete)
  • 27 orchitis
  • 11 meningitis
  • 4 encephalitis
  • 4 deafness
  • 1 each of oophoritis, mastitis, pancreatitis
• 25 hospitalizations
• No deaths
Mumps Outbreak 2006

- Mumps G genotype (12 specimens) - source unknown
- Vaccination status cases (Iowa)
  - 6% unvaccinated
  - 12% 1 dose
  - 51% 2 doses
  - 31% unknown vaccination status (adults)

Preliminary data
- Attack rates in 2 highly affected college campuses
  - 2.0% (97% students 2 vaccine doses)
  - 3.8% (77% students 2 vaccine doses)
- Vaccine failure rate in 2 dose recipients ~ 5% (room mate contact study)
Mumps Prevention and Control
Date: April 19, 2006

Joint Statement from the American College Health Association and Centers for Disease Control and Prevention (CDC)

Multi-State Mumps Outbreak Alert

BACKGROUND:
The state of Iowa has been experiencing a large outbreak of mumps that began in December 2005 (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5513a3.htm). As of April 12, 2006, 605 suspect, probable and confirmed cases have been reported to the Iowa Department of Public Health (IDPH). The majority of cases are occurring among persons 18-25 years of age, many of who are vaccinated and are on college campuses. The first reported cases in Iowa were among college students and mumps cases have been identified in college students in at least one other state. Cases of mumps are under investigation in 8 neighboring states, including Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, Nebraska, and Wisconsin (http://www.phppo.cdc.gov/HAN/ArchiveSys/ViewMsgV.asp?AlertNum=00243).

Although the source of the current U.S. outbreak is unknown, the mumps viral strain has been circulating in the U.S. since 2001, and many U.S. residents have not been vaccinated against mumps.

The American College Health Association (ACHA) in collaboration with the Centers for Disease Control and Prevention (CDC) recommends the following:

1. Individuals travel to countries with ongoing mumps outbreaks should be vaccinated before leaving.
2. Travelers to countries with ongoing mumps outbreaks should be vaccinated before returning.
3. Travelers to countries with ongoing mumps outbreaks should be vaccinated before leaving.
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The mumps virus is spread by the respiratory route and can be transmitted through direct contact with infected saliva or respiratory secretions. The disease is characterized by parotitis (inflammation of the salivary glands), which can cause pain and swelling of the jaw. Mumps may also cause inflammation of the testicles, ovaries, or pancreas in men and women.

The ACHA and CDC encourage colleges and universities to inform students, faculty, and staff about the mumps outbreak and to recommend that they be vaccinated against mumps if they have not done so. The ACHA and CDC also encourage colleges and universities to inform their health services about the outbreak and to recommend that they provide mumps vaccinations to students, faculty, and staff who are not currently vaccinated.

The ACHA and CDC also encourage colleges and universities to inform students, faculty, and staff about the importance of good hygiene, including handwashing, and to recommend that they take steps to prevent the spread of mumps, such as avoiding close contact with people who have mumps and staying home if they have flu-like symptoms.

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Key Modifications to 1998 ACIP Recommendations, May 17, 2006+

- Acceptable evidence of immunity
  - 2 doses for:
    - school-aged children (K-12)
    - high-risk adults (e.g., HCWS and college students)
- Routine vaccination at health-care facilities
  - Born during or after 1957: 2 doses
  - Born before 1958: consider 1 dose if no evidence of immunity
- Outbreak Settings (2nd dose considered)
  - Children 1-4 years and low-risk adults if affected
  - HCWs born before 1957 if lack other evidence of immunity

Published in MMWR, June 1, 2006
Joint Letter
ACHA and CDC

• New students and returning students (if possible): Documentation of 2 doses of MMR

• Documentation:
  • Vaccination record
  • Pre-entrance health forms or electronic records (returning students)

• Schools consider deferred student registration if no proof

• Students notified in late spring or summer

• 2 doses for staff considered during outbreak
Additional Resources
http://www.cdc.gov
Thank You