

**MUMPS OUTBREAK, US, 2006:  
RECOGNITION, MANAGEMENT & PREVENTION  
IN THE HEALTHCARE SETTINGS**

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**MUMPS**

**MICROBIOLOGY  
AND EPIDEMIOLOGY**

# MUMPS

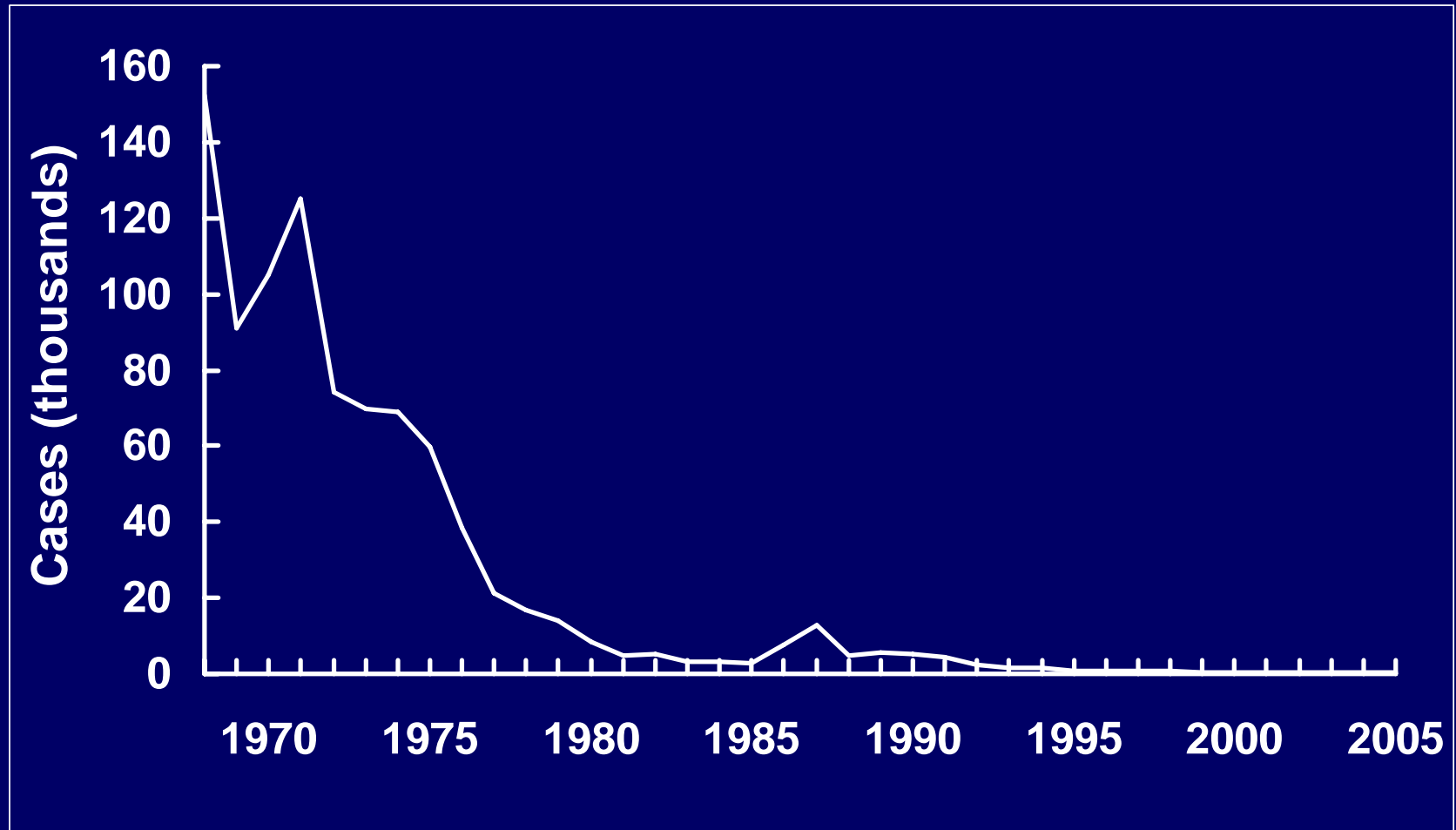
- Microbiology
  - Paramyxovirus (single stranded RNA)
  - Single serotype
- Epidemiology
  - Prevalence: 200-300 cases in US per year (peak late winter and spring)
  - Reservoir: Humans only
  - Distribution: Worldwide
  - Transmission: Droplet & contact (spread through contact with respiratory secretions and saliva or via fomites)

# VACCINE PREVENTABLE DISEASES: MAXIMUM CASES AND CURRENT PREVALENCE

Disease	Max. Cases (Year)	# 2003	% Reduction
Diphtheria	206,939 (1921)	1	99.855
Invasive Hib	20,000 (1984)	2,013	89.935
Measles	894,135 (1941)	56	99.994
<b>Mumps</b>	<b>152,209 (1968)</b>	<b>231</b>	<b>99.848</b>
Pertussis	265,269 (1934)	11,647	95.610
Polio	21,269 (1952)	0	100.000
Rubella	57,686 (1969)	7	99.988
Rubella (congenital)	20,000 (1964-65)	1	99.995
Tetanus	601 (1948)	20	96.672

MMWR 2005;52(#54)

# Mumps—United States, 1968-2005\*

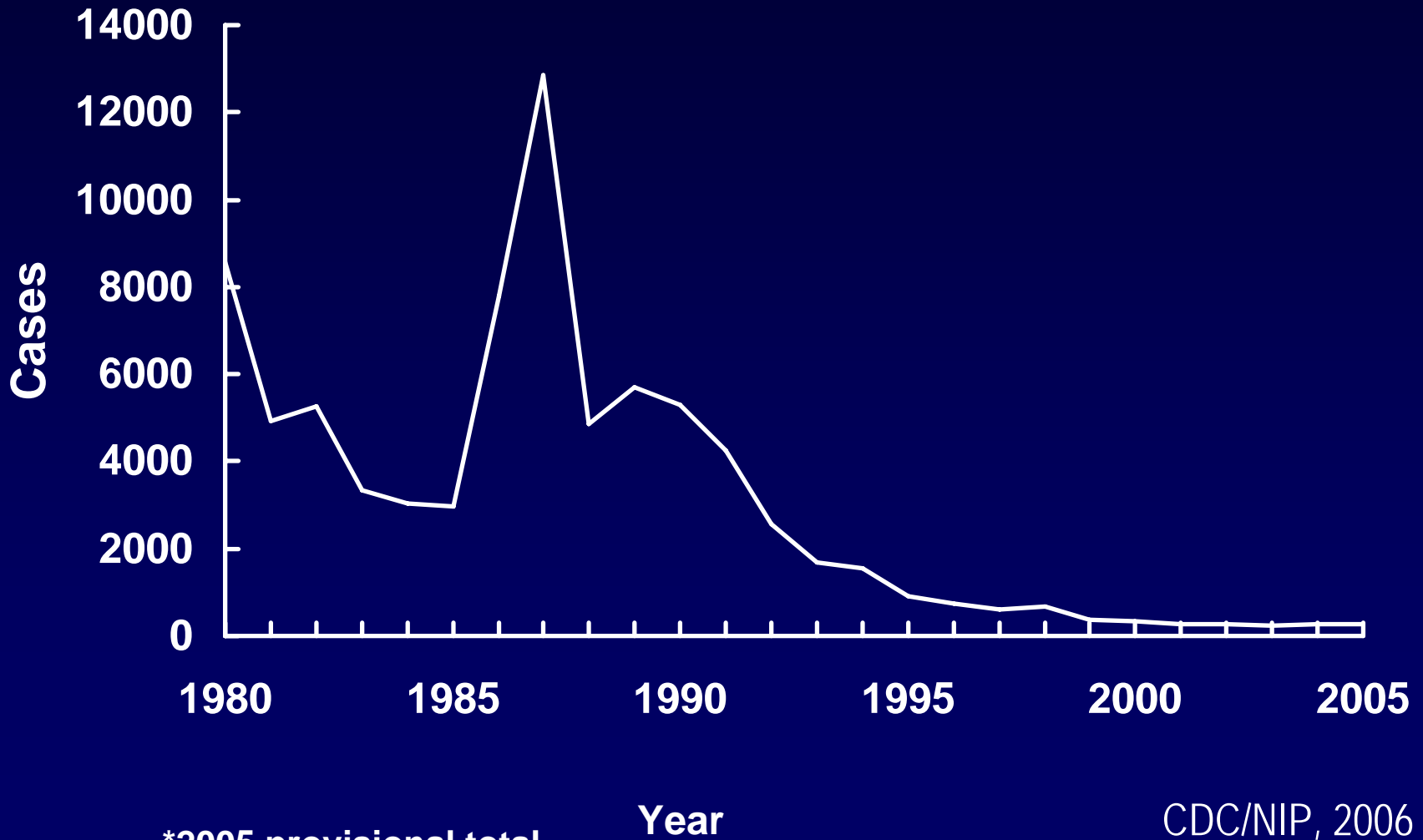


\*2005 provisional total

Year

CDC/NIP, 2006

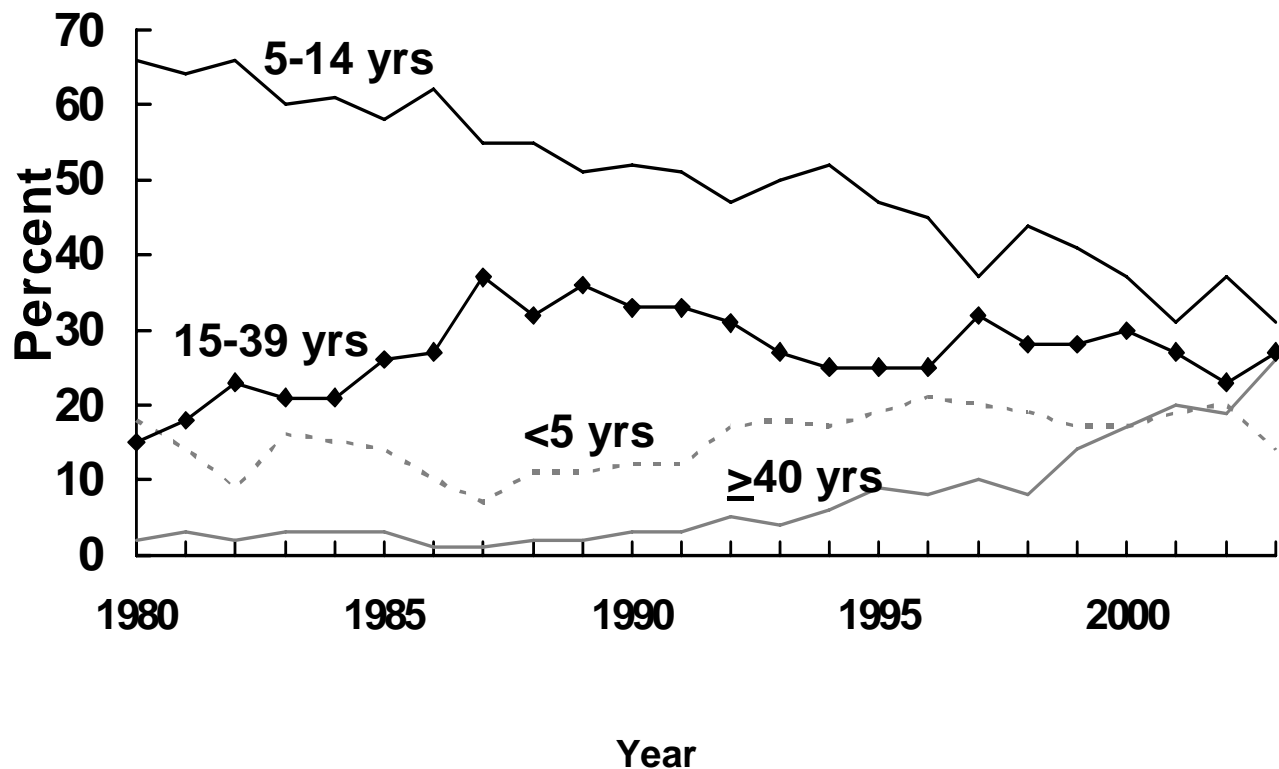
# Mumps—United States, 1980-2005\*



\*2005 provisional total

CDC/NIP, 2006

# Mumps—United States, 1980-2003 Age Distribution of Reported Cases



**MUMPS**

**CURRENT OUTBREAK**

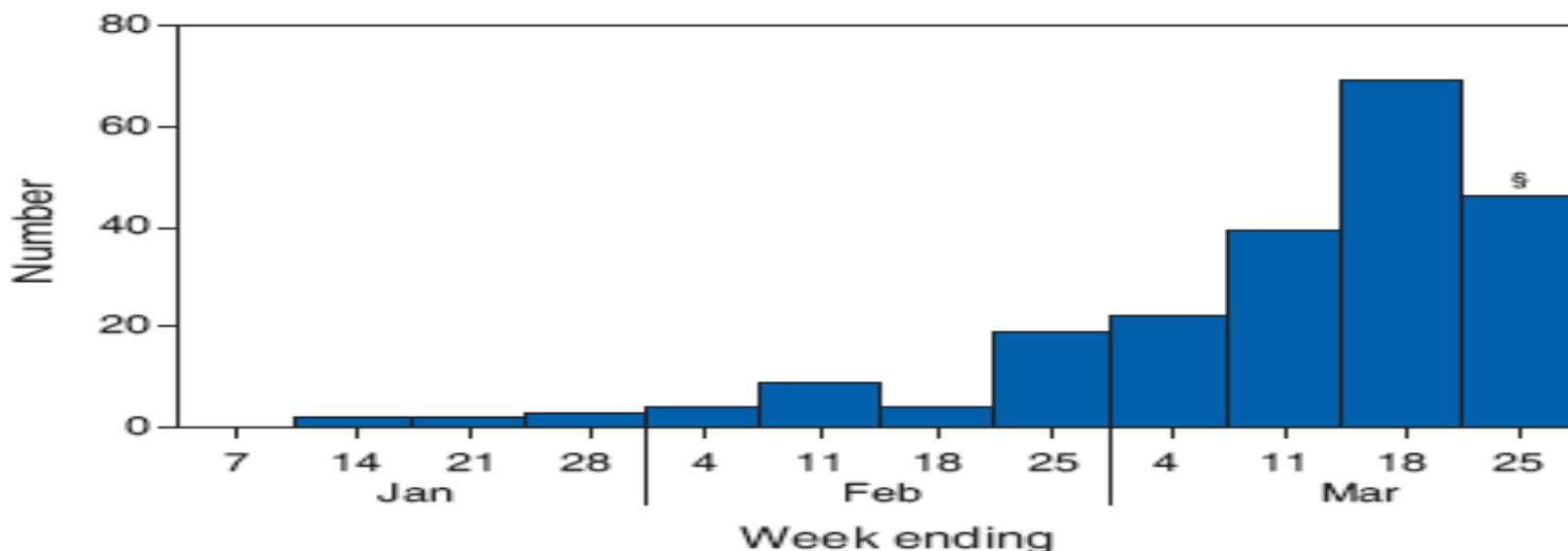
# MUMPS OUTBREAKS

- Sporadic outbreaks occur
- Usual settings for outbreaks
  - Schools, especially high schools and colleges
  - Military bases
  - Healthcare facilities

# MUMPS OUTBREAK, U.S.

- Ongoing since late 2005
- >1,000 cases reported
- First cases recognized in Iowa  $\Rightarrow$  now 9 states involved
- Most cases 18 – 25 years old
- Most persons have had at least 1 mumps vaccine
- Same strain as reported in ongoing outbreak in England (2004-2006; >60,000 cases reported)

**FIGURE 1. Number\* of mumps cases,† by week of onset — Iowa, 2006**

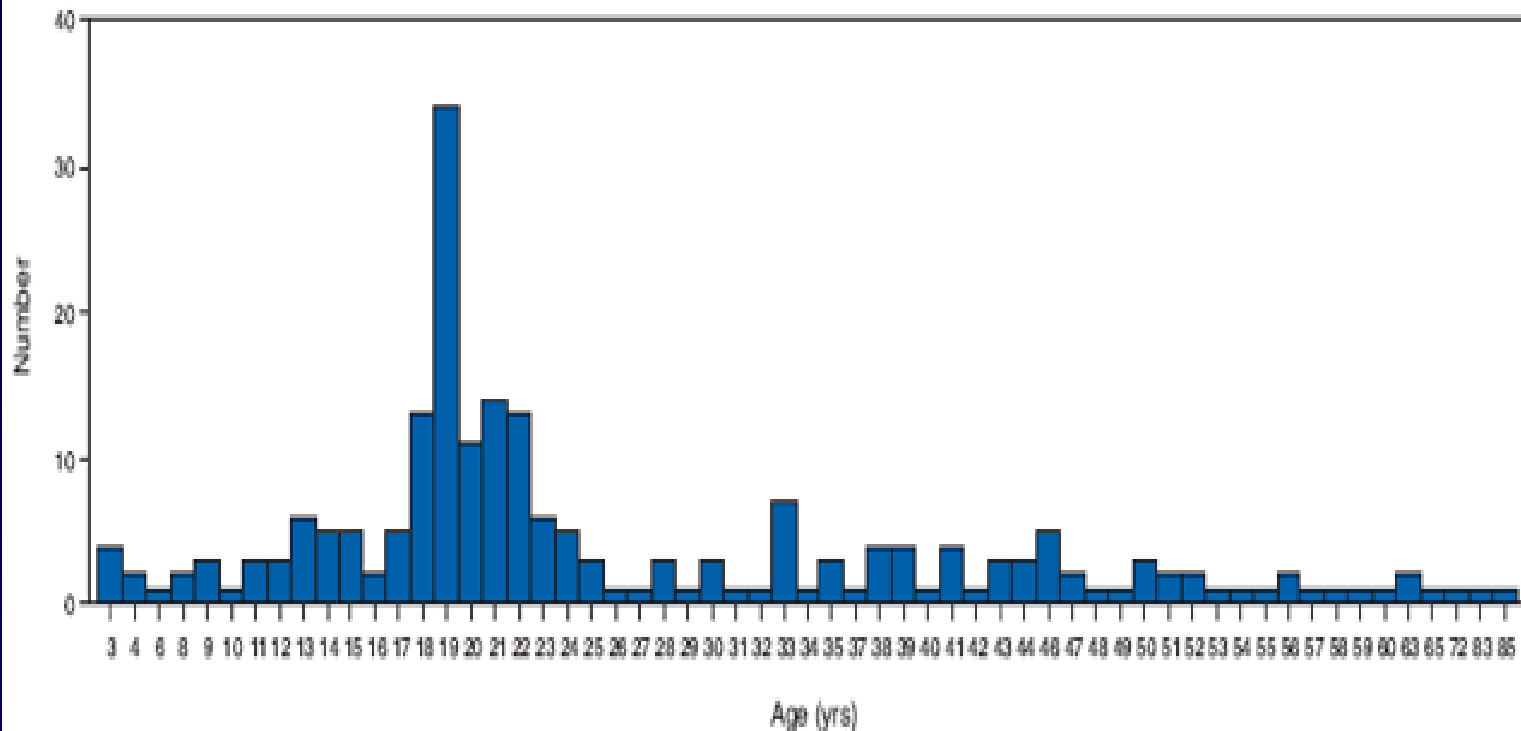


\* N = 219.

† Includes confirmed, probable, and suspect cases. Case definitions were modified from Council of State and Territorial Epidemiologists/CDC mumps case definitions for use in this outbreak. *Confirmed*: case that meets the clinical case definition (i.e., unilateral or bilateral tender, self-limited, swelling of the parotid or other salivary gland, lasting >2 days and without other apparent cause) and is laboratory confirmed (i.e., by a positive IgM test result or positive viral culture) or epidemiologically linked to a confirmed case. A confirmed case can be asymptomatic if a mumps viral culture is positive. *Probable*: case that meets the clinical case definition but has noncontributory or no serologic or virologic testing and is not epidemiologically linked to a confirmed or probable case. *Suspect*: case with a positive IgM test result but no confirmation of the clinical definition.

§ Provisional data; cases being assessed for the week ending March 25, 2006.

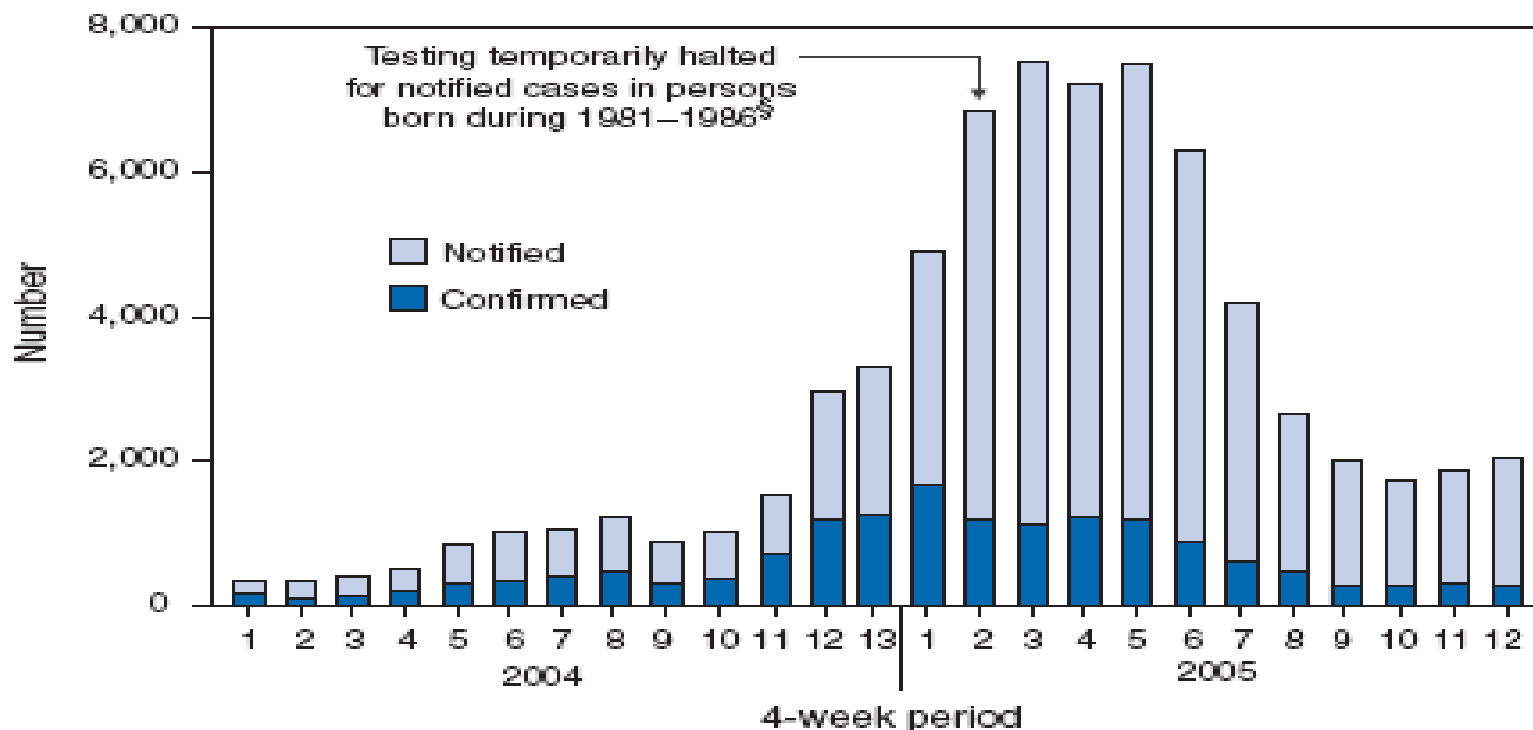
FIGURE 2. Number\* of mumps cases,† by age of patient — Iowa, 2006



\* N = 215; ages of four patients are unknown.

† Includes confirmed, probable, and suspect cases. Case definitions were modified from Council of State and Territorial Epidemiologists/CDC mumps case definitions for use in this outbreak. *Confirmed*: case that meets the clinical case definition (i.e., unilateral or bilateral tender, self-limited, swelling of the parotid or other salivary gland, lasting >2 days and without other apparent cause) and is laboratory confirmed (i.e., by a positive IgM test result or positive viral culture) or epidemiologically linked to a confirmed case. A confirmed case can be asymptomatic if a mumps viral culture is positive. *Probable*: case that meets the clinical case definition but has noncontributory or no serologic or virologic testing and is not epidemiologically linked to a confirmed or probable case. *Suspect*: case with a positive IgM test result but no confirmation of the clinical definition.

**FIGURE 1. Number of notified\* cases of mumps and proportion of cases that were laboratory confirmed† — England and Wales, 2004–2005**

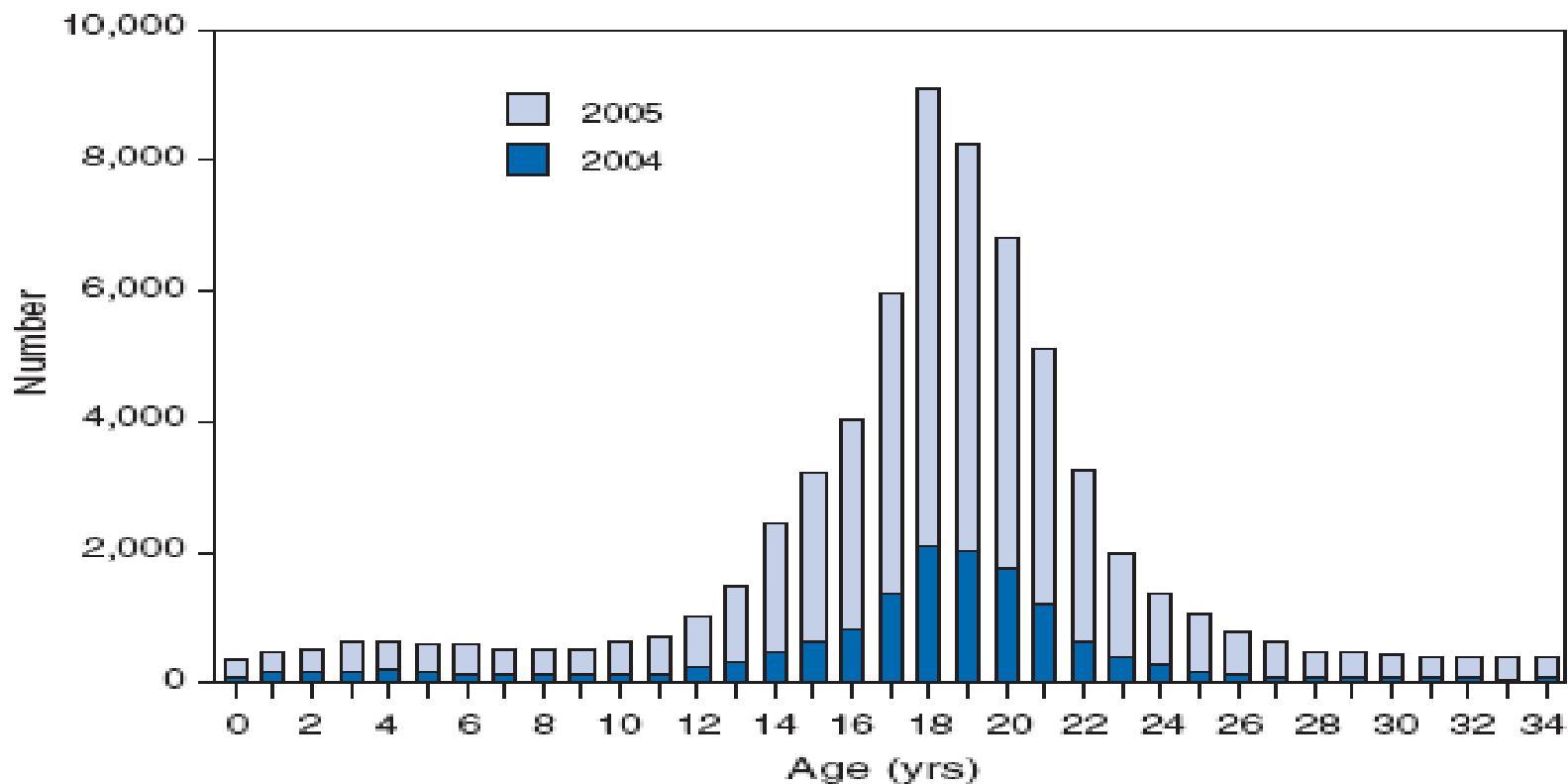


\* Clinically diagnosed cases of mumps reported by general practitioners.

† Cases confirmed by measure of mumps-specific IgM in oral fluid samples only.

§ The number of confirmed cases is artificially low from the second 4-week period in 2005 through the end of the year because of this temporary change in the oral fluid testing program.

**FIGURE 2. Number of notified\* cases of mumps, by patient age — England and Wales, 2004–2005†**



\* Clinically diagnosed cases of mumps reported by general practitioners.

† Excludes 200 cases in 2004 and 784 in 2005 with patient date of birth unknown and 1,162 cases in 2004 and 4,404 in 2005 in persons aged >35 years.

# MUMPS

CLINICAL DISEASE:  
RECOGNITION AND MANAGEMENT

# MUMPS: CLINICAL FEATURES

- Incubation period: 16-18 days (range, 12-25 days)
- Symptoms:
  - ~30% asymptomatic
  - Nonspecific prodrome (common): Fever, headache, myalgias, fatigue, and anorexia
  - Parotid swelling: Most common in children 2-9
- Signs: Parotitis, orchitis
- Mortality: 1.6 – 3.8 per 10,000

# MUMPS



# MUMPS

- CSF (with meningitis)
  - Common: <500 cells/mm<sup>3</sup>
  - Uncommon: >1000 cells/mm<sup>3</sup> with PMN predominance
  - Protein usually normal or slightly elevated
  - Glucose may be slightly low
  - May mimic bacterial picture

# MUMPS: COMPLICATIONS

## Common

- Parotitis (after puberty, 30-70%)
- Orchitis (after puberty, 20-30%)
- Mastitis (after puberty, 20-30%)
- CSF pleocytosis (>50%)
- Aseptic meningitis (<10%)

## Rare

- Orchitis  $\Rightarrow$  sterility
- Arthritis
- Encephalitis (~0.01%-0.02%)
- Thyroiditis, pancreatitis (4%)
- Oophoritis
- Glomerulonephritis
- Myocarditis
- Thrombocytopenia
- Transverse myelitis
- Deafness (0.005%)
- Spontaneous abortion, 1<sup>st</sup> trimester infection (~25%)

# MUMPS

- Diagnosis
  - Virus can be cultured from throat washing, urine, or spinal fluid
  - Serology: Elevated IgM titer may be diagnostic (not offered by NC State Lab)
  - Serology: Acute and convalescent titers (4-fold rise)
  - PCR (may be offered by some labs)
  - Avoid skin tests (not reliable)
- Treatment
  - Supportive

# MUMPS:

## DIAGNOSIS, NC HEALTH DEPARTMENT

(note – this slide is state specific)

- Perform diagnostic testing regarding of immunization history
- Perform viral culture and serology
- Culture (NC State Lab)
  - Obtain oral swab (buccal and/or throat swab) and urine
- Serology (NC State Lab)
  - Obtain acute and convalescent titers (IFA) – obtain blood samples as soon after onset of disease as possible and after 14 days of illness – send both sample to lab at same time
- NC Lab = (919) 733-7544

**MUMPS**

**PREVENTION**


# VACCINES INTRODUCED INTO US

● Smallpox	1798+	● Meningococcal	1975*
● Rabies	1885+	● Pneumococcal	1977*
● Typhoid	1896+	● Adenovirus (D/C)	1980*
● Cholera (D/C)	1896+	● Hepatitis B	1981*
● Plague	1897+	● <i>H. influenzae</i> b	1985*
● Diphtheria	1923+	● Japanese encephalitis	1992*
● Tetanus	1927+	● Hepatitis A	1995*
● Tuberculosis	1927+	● Varicella	1995*
● Influenza	1945*	● Pertussis acellular	1996*
● Yellow fever	1953*	● <i>H. influenzae</i> b conjugate	1997*
● Poliomyelitis	1955*	● Lyme (NA)	1998*
● Measles	1963*	● Rotavirus (D/C)	1998*
● Mumps	1967*	● Pneumococcal conjugate	2000*
● Rubella	1969*	● Meningococcal conjugate	2005*
● Anthrax	1970*	● Tdap	2005*

+ Date vaccine developed; \* Date vaccine licensed in US

FIGURE. Recommended childhood and adolescent immunization schedule, by vaccine and age — United States, 2006

Vaccine ▼	Age ►	Birth	1 month	2 months	4 months	6 months	12 months	15 months	18 months	24 months	4-6 years	11-12 years	13-14 years	15 years	16-18 years
Hepatitis B <sup>1</sup>	HepB		HepB	HepB <sup>1</sup>	HepB			HepB Series							
Diphtheria, Tetanus, Pertussis <sup>2</sup>				DTaP	DTaP	DTaP		DTaP			DTaP	Tdap	Tdap		
<i>Haemophilus influenzae</i> type b <sup>3</sup>			Hib	Hib	Hib <sup>3</sup>	Hib									
Inactivated Poliovirus			IPV	IPV	IPV						IPV				
Measles, Mumps, Rubella <sup>4</sup>						MMR					MMR	MMR			
Varicella <sup>5</sup>						Varicella					Varicella				
Meningococcal <sup>6</sup>												MCV4			MCV4
Pneumococcal <sup>7</sup>				PCV	PCV	PCV	PCV				PCV		PPV		
Influenza <sup>8</sup>						Influenza (yearly)					Influenza (yearly)				
Hepatitis A <sup>9</sup>						HepA series					HepA series				

This schedule indicates the recommended ages for routine administration of currently licensed childhood vaccines, as of December 1, 2005, for children through age 18 years. Any dose not administered at the recommended age should be administered at any subsequent visit, when indicated and feasible.  Indicates age groups that warrant special effort to administer those vaccines not previously administered. Additional vaccines might be licensed and recommended during the year. Licensed combination vaccines may be used whenever any components of the combination

are indicated and other components of the vaccine are not contraindicated and if approved by the Food and Drug Administration for that dose of the series. Providers should consult respective Advisory Committee on Immunization Practices (ACIP) statements for detailed recommendations. Clinically significant adverse events that follow vaccination should be reported through the Vaccine Adverse Event Reporting System (VAERS). Guidance about how to obtain and complete a VAERS form is available at <http://www.vaers.hhs.gov> or by telephone, 800-822-7967.

 Range of recommended ages


 Catch-up immunization


 Assessment at age 11-12 years

FIGURE 1. Recommended adult immunization schedule, by vaccine and age group — United States, October 2005–September 2006

Vaccine	Age group (yrs)		
	19–49	50–64	≥65
Tetanus, diphtheria (Td) <sup>1*</sup>	1-dose booster every 10 yrs		
Measles, mumps, rubella (MMR) <sup>2*</sup>	1 or 2 doses	1 dose	
Varicella <sup>3*</sup>	2 doses (0, 4–8 wks)	2 doses (0, 4–8 wks)	
Influenza <sup>4*</sup>	1 dose annually	1 dose annually	
Pneumococcal (polysaccharide) <sup>5,6</sup>	1–2 doses		1 dose
Hepatitis A <sup>7*</sup>	2 doses (0, 6–12 mos, or 0, 6–18 mos)		
Hepatitis B <sup>8*</sup>	3 doses (0, 1–2, 4–6 mos)		
Meningococcal <sup>9</sup>	1 or more doses		

- - - Vaccines below broken line are for selected populations - - -

 For all persons in this category who meet the age requirements and who lack evidence of immunity (e.g., lack documentation of vaccination or have no evidence of prior infection)


 Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indications)


\* Covered by the Vaccine Injury Compensation Program.

NOTE: These recommendations must be read along with the footnotes, which can be found on pages Q2–Q4 of this schedule.

**FIGURE 2. Recommended adult immunization schedule, by vaccine and medical and other indications — United States, October 2005–September 2006**

Vaccine	Indication						
	Pregnancy	Congenital immunodeficiency, leukemia, <sup>10</sup> lymphoma, generalized malignancy, therapy with alkylating agents, antimetabolites, cerebrospinal fluid leaks, radiation, or large amounts of corticosteroids	Diabetes, heart disease, chronic pulmonary disease, or chronic liver disease, including chronic alcoholism	Asplenia <sup>10</sup> (including elective splenectomy and terminal complement component deficiencies)	Kidney failure, end-stage renal disease, or recipients of hemodialysis or clotting factor concentrates	Human immunodeficiency virus (HIV) infection 2, <sup>10</sup>	Health-care workers
Tetanus, diphtheria (Td) <sup>1*</sup>	1-dose booster every 10 yrs						
Measles, mumps, rubella (MMR) <sup>2*</sup>	1 or 2 doses		1 or 2 doses				
Varicella <sup>3*</sup>	2 doses (0, 4–8 wks)		2 doses (0, 4–8 wks)			2 doses	2 doses
Influenza <sup>4*</sup>	1 dose annually			1 dose annually	1 dose annually		
Pneumococcal (polysaccharide) <sup>5,6</sup>	1–2 doses	1–2 doses					1–2 doses
Hepatitis A <sup>7*</sup>	2 doses (0, 6–12 mos, or 0, 6–18 mos)						
Hepatitis B <sup>8*</sup>	3 doses (0, 1–2, 4–6 mos)				3 doses (0, 1–2, 4–6 mos)		
Meningococcal <sup>9</sup>	1 dose			1 dose	1 dose		

 For all persons in this category who meet the age requirements and who lack evidence of immunity (e.g., lack documentation of vaccination or have no evidence of prior infection)

 Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indications)

 Contraindicated

\* Covered by the Vaccine Injury Compensation Program.

NOTE: These recommendations must be read along with the footnotes, which can be found on pages Q2–Q4 of this schedule.

# VACCINES\* RECOMMENDED FOR HCWs

- Diphtheria (Tdap)
- Tetanus (Tdap)
- Pertussis (Tdap)
- Measles (MMR or MMRV)
- Mumps (MMR or MMRV)
- Rubella (MMR or MMRV)
- Varicella (or MMRV)
- Hepatitis B (OHSAs required)
- Influenza (annual)
- Vaccinia (?)



\* Should be provided by healthcare facility

# MUMPS VACCINE

- Universal vaccine (attenuated virus vaccine)
  - Ages 12-15 months; follow-up MMR at 4-6 years
- Immunity (HCWs)
  - Birth before 1957 (endemic setting), MD diagnoses disease, positive serology, 2 doses of vaccine (>1 month apart)
- Efficacy
  - 1 dose = 80% (range, 60-90%); 2 doses = 90%
- Administration
  - 0.5 mL SC

# MMR VACCINE

- Adverse reactions
  - Mild: Fever (~15%), Rash (~5%), swelling of glands (rare)
  - Moderate: Seizures (~0.03%), transient joint pain (25%), temporary low platelets (0.003%)
  - Severe (rare): Serious allergic reaction (<0.0001%)
- Contraindications and precautions
  - Immunoglobulin receipt (wait >3 months)
  - Pregnancy (wait till >4 weeks postpartum)
  - Allergies to gelatin, neomycin, or previous dose of vaccine
  - Immunosuppression: HIV, chemotherapy, organ transplant, steroids (>20 mg prednisone/day)

# MUMPS

## INFECTION CONTROL ISSUES

# MUMPS: INFECTION CONTROL ISSUES

- Pre-exposure prophylaxis: Vaccine (MMR or MMRV)
  - In the setting of an outbreak, immunize persons born before 1957 unless they have evidence of immunity (i.e., positive serology or MD diagnosed disease)
- Post-exposure prophylaxis: None
- Period of infectivity: 3 days before symptoms appear until 9 days after onset of symptoms
  - Asymptomatic infected persons may be infectious

# MUMPS: INFECTION CONTROL ISSUES

- Isolation: Droplet
  - Duration = 9 days after onset of parotid swelling
  - Private room
  - HCWs and visitors should wear mask when entering room
- Report all cases to county health department

# MANAGEMENT OF EXPOSED HEALTHCARE WORKERS

- Develop line list of persons exposed
- Define “true” exposures (contact respiratory secretions or within 3 feet of patient)
- Management of exposed HCWs if asymptomatic
  - Furlough nonimmune exposed persons from 12 days after first exposure to 26 days after last exposure
- Management of ill HCWs
  - Furlough until 9 days after onset of parotid swelling

# MUMPS: SUMMARY

- A large outbreak centered in the midwest is currently occurring
  - Most cases have occurred among young adults
  - Most cases have had at least one dose of mumps vaccine
- Infection control issues
  - Be alert to the possibility of mumps
  - Place patients with known or suspected mumps on droplet precautions
  - Assure that all HCWs have had two doses of vaccine