

Public Health Perspective on Infectious Diseases on College Campuses

James C. Turner, MD
Professor of Internal Medicine
Executive Director
Department of Student Health
National Social Norms Institute
University of Virginia





Learning Objectives

- Reasons that infectious diseases are common among college students.
- Examples of infectious disease outbreaks on college campuses.
- Strategies for preventing or containing outbreaks.

Outbreaks of Infectious Diseases at the University of Virginia

- Smallpox 1800's
 - UVa students vaccinated against smallpox 1820's
- Typhoid fever
 - Killed many at UVa in 1850's. School closed.
 - Linked to living in lawn rooms: poorly ventilated, damp, no central plumbing or clean water.
 - Miasmatic vs. contagion theory of disease
- 1858 UVa built new infirmary for central heat, clean water, fresh air

Miasmatic Theory

- Florence Nightingale “Notes on Nursing”

“The very first canon of nursing, the first and last thing upon which a nurse’s attention must be fixed, the first essential to a patient, without which all the rest you can do for him is as nothing, with which I had almost said you may leave all the rest alone, is this: TO KEEP THE AIR HE BREATHES AS PURE AS THE EXTERNAL AIR WITHOUT CHILLING HIM.”

University of Virginia
Old Student Infirmary built 1858



University of Virginia
Old Student Infirmary built 1858
ca. 1901-1902 as fraternity.



University of Virginia
Varsity Hall
March 2008

Ref: JACH Nov/Dec 2008



College Outbreaks of Infectious Diseases

- 1800's to early 1900's: Typhoid fever, smallpox, measles, tuberculosis, pandemic flu
- Meningococcal disease 1990's
- Whooping cough 2002
- Measles 2004
- Mumps 2006
- H1N1 2009
- Seasonal influenza annually

Infectious Disease on Campus

- Living, learning, social density
 - Facilitates transmission of pathogens in respiratory or oral secretions
 - Clean water, sewerage treatment, modern plumbing and HVAC have eliminated many pathogens from the environment
 - Behavior likely a more important factor in transmission than physical density.
 - Opportunities to influence outbreaks through behavioral change and immunization.







Respiratory Droplet spread



Examples of Outbreaks

- Mumps
- H1N1
- Meningococcal disease

Mumps Outbreak Swells Across Midwest

Viral Infections Primarily Hit
College Students



April 7, 2006



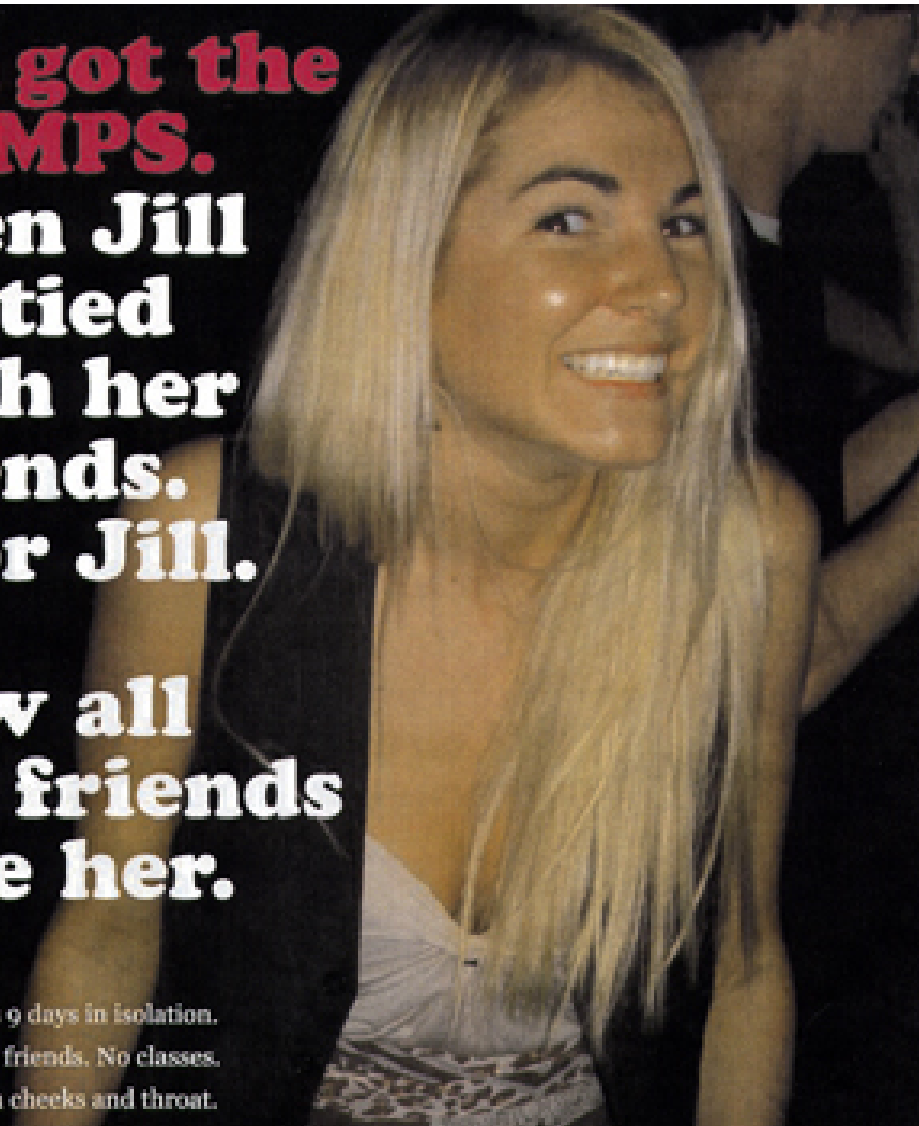
Washington Post 1957

**Jill got the
MUMPS.**

**Then Jill
partied
with her
friends.
Poor Jill.**

**Now all
her friends
hate her.**

Mumps means 9 days in isolation.
No parties. No friends. No classes.
Intense pain in cheeks and throat.



Midwest Mumps Outbreak 2006

- 5,000-6,000 cases
- Several outbreaks on college campuses
- 38% of cases among 18-24 yo's
- Highly disruptive
- Intense media attention

Contributing factors to mumps epidemic

- Living, learning and social density, as well as behavioral attributes
 - Facilitate transmission of pathogens in respiratory or oral secretions
- Importation of mumps onto campuses
- Lack of immunization uptake
- Vaccine efficacy minimally compromised

Mumps at UVa

- 60 cases 2006/2007
- 85% of the cases were women
- Concentrated in residence halls initially
- RA informed SH of “Cuddling Factor”



“Pringling”



Importation of Mumps onto Campuses

- Geographic diversity
- Domestic and international travel
- Major mumps outbreaks internationally
(Recently in UK and Canada)

Mitigation

- Isolation of cases for five days after symptoms started
 - Send home
 - Isolate in residence hall
 - Bedroom in apartment
- Hand washing, cough hygiene
- No sharing of drinking glasses
- Unrecognized disease in vaccinated patients results in active mumps returning to classes and socializing.
- Enhanced surveillance, alerting local ER and urgent care centers, other campuses in area

Prevention through vaccination

- Two doses MMR recommended all college students
- Only 25 states and the District of Columbia require 2 doses of MMR
- Two doses of MMR ~90% protective
 - Less effective in preventing asymptomatic or atypical disease than preventing parotitis.
 - Waning immunity
- Midwest college attack rate lower on campuses with very high vaccination rate
- Enforce pre-entrance 2 shot MMR immunization recommendations.



Ground Zero Swine Flu

H1N1 Outbreak on Campus



H1N1 College Campuses

- ACHA H1N1 Surveillance August 20, 2009-April 30, 2010
- 170 schools representing ~2 M students
- Peak attack rate 29 per 10,000 students late October 2009
- 95,600 cases for an attack rate of 5.6%
- 55% female, 91% 17-24 years old
- 172 hospitalizations 4 deaths
- 8% vaccination uptake nationally

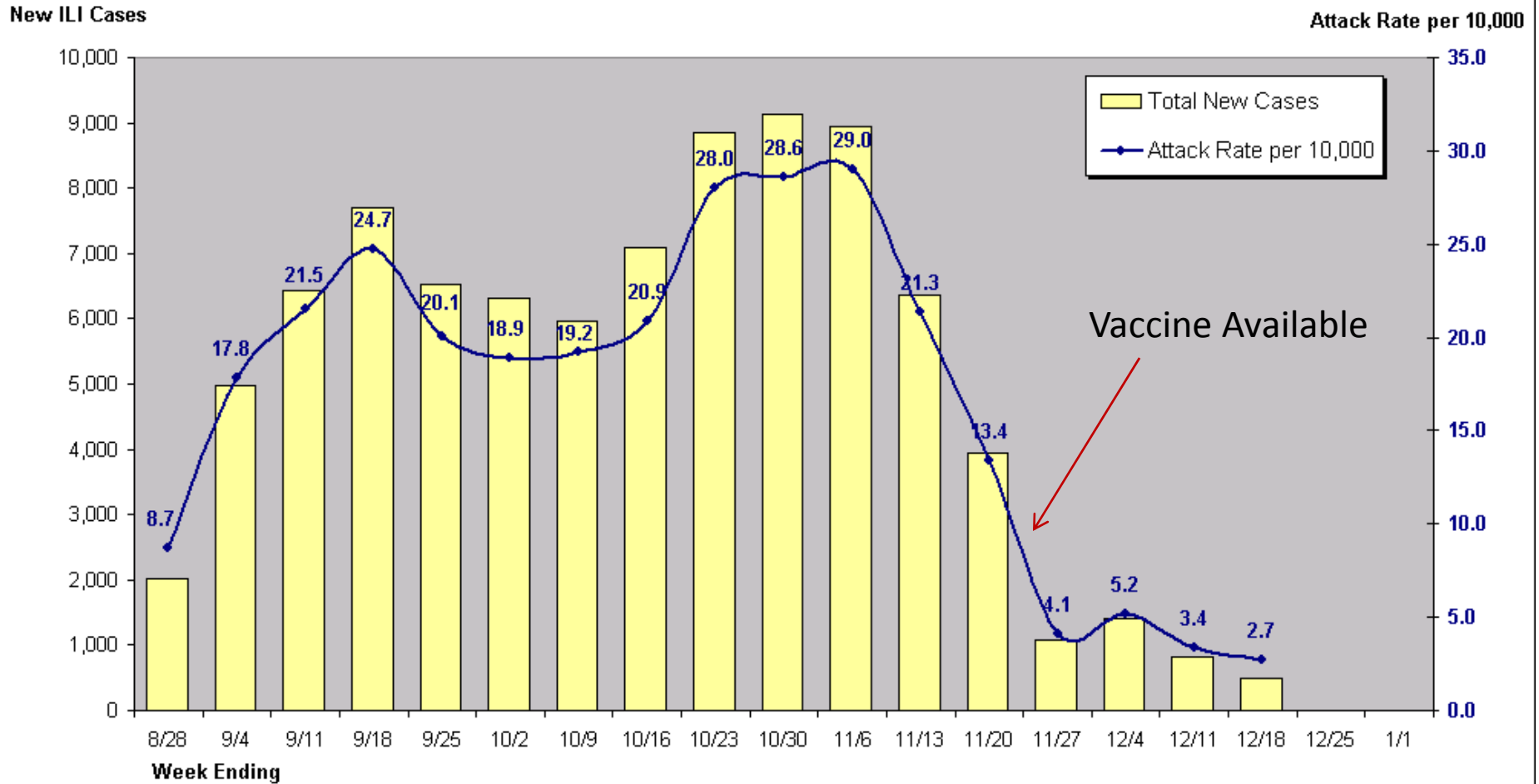
H1N1 New York Colleges

- 6,764 cases
- Peak attack rate 46 per 10,000 in late October
- 11.5% vaccine uptake
- NYSCHA school experiences??

National Epicurve

August 22-December 18, 2009

Fall 2009 - College Influenza Like Illness (ILI) Incidence Epicurve



 American College Health Association

Limitations: Case counts and rates do not represent the complete incidence of ILI in the population, nor the incidence of ILI among all institutions of higher education. The case counts and rates only represent those institutions of higher education that participate in the ACHA surveillance

College Student Survey Regarding Flu

- 6% of students reported having H1N1 during the preceding academic year
- Biggest concern was missing class
- 43% knew H1N1 vaccine was recommended
- 28% received H1N1 vaccine
- Facilitators of being vaccinated included recommendation from HCW, sense of social responsibility to avoid spreading to others, exposure to positive media messages.

Ref: H1N1 Survey of College Students. 1201 students surveyed April/May 2010. American Institutes for Research. Oak Ridge Institute for Science and Education and the Centers for Disease Control and Prevention. Chapel Hill, NC. July 28, 2010.

College Student Rating of Importance of Preventive Measures for Flu

Strategy	Very Important
• Washing hands	• 87%
• Not sharing cups at parties	• 77%
• Using hand sanitizer	• 68%
• Not playing drinking games	• 43%
• Getting H1N1 vaccine	• 41%

Ref: H1N1 Survey of College Students. 1201 students surveyed April/May 2010. American Institutes for Research. Oak Ridge Institute for Science and Education and the Centers for Disease Control and Prevention. Chapel Hill, NC. July 28, 2010.

Influenza Prevention

- Universal influenza vaccination for all persons over 6 months in the US as of February 2010.
- Vaccine supplies are plentiful.
- Industry has improved productivity.
- Influenza vaccine includes A H2N3, B, and the 2009 H1N1.
- Mitigation strategies similar to other respiratory diseases

Meningococcal Infection On Campus

Meningitis panic sweeps B'klyn HS

Kids sent home as pal fights for life

Health officials say hysteria is un-
precedented as they have never seen the public so
frenzied and children crowd into clinics and

Vicious virus: Many questions, few answers

We're doing what parents want

MENINGITIS ANATOMY OF AN OUTBREAK

Old weapon takes on fight

Army-developed vaccine used to combat local meningitis outbreak

Meningitis likely cause of woman's death

Officials: Some aspects
of meningitis unknown

U.S. officials
scrutinize
Joplin cases
of meningitis

There's a whole other
microscopic world out there.
—Harold Higgins

Meningitis outbreak remains a puzzle

■ **Meningitis:** The death of
another prisoner had little to do
with the massive response at the
Castaic facility. Federal officials

CDC to
ET to s
mening

University Of South Florida Student Dies Of Bacterial Meningitis

Monday, September 24, 2007 10:04:09 PM

A University of South Florida student in Tampa who contracted bacterial meningitis has died, according to University Health Community Hospital. Dozens of students who may have come in contact withrushed to the Student Health Center at the USF Monday morning after officials confirmed Futterman's illness.



University of Pennsylvania

University of South Florida

Sacramento State University

West Virginia University

Hartwick College

Northern Arizona University

Colorado State University

University of Houston

Texas A+M

University of Kentucky

University of South Carolina

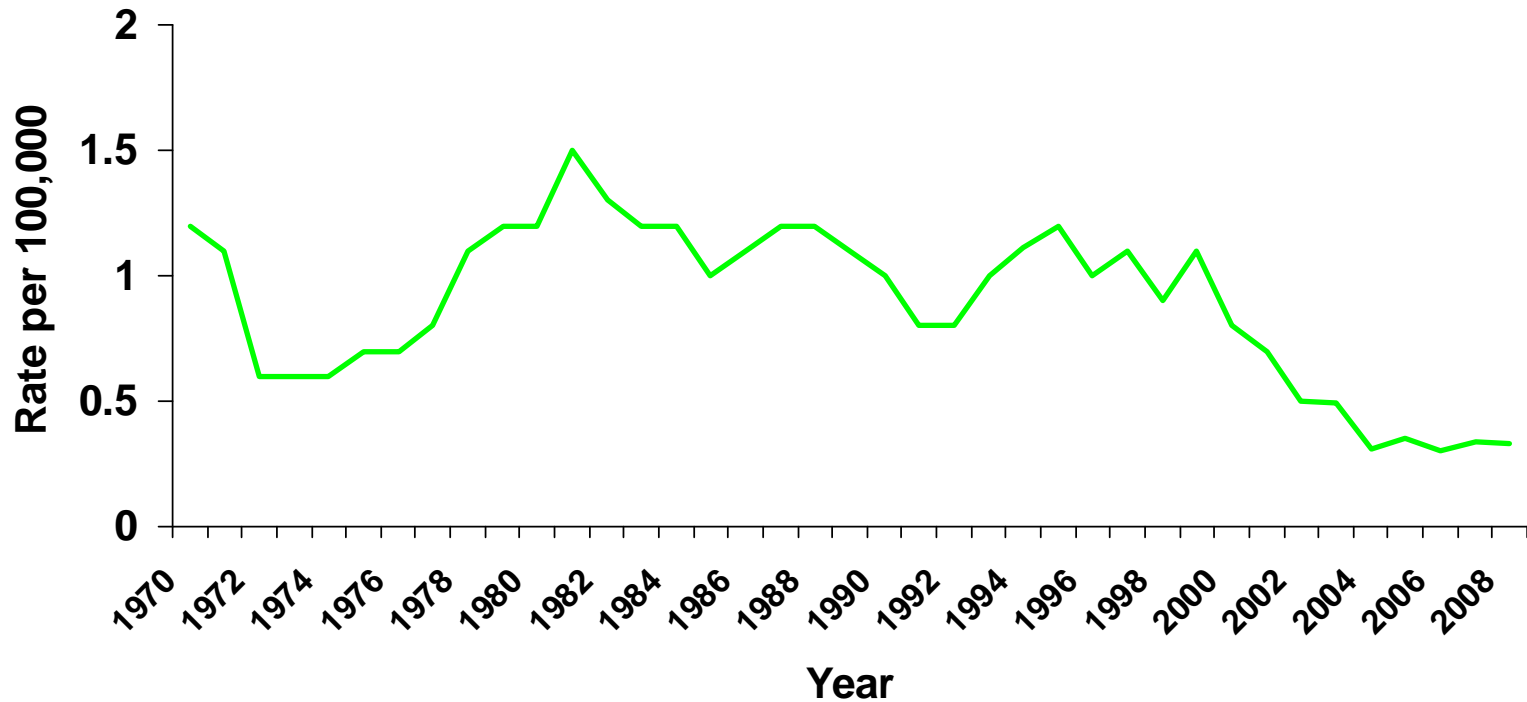
University of North Carolina-Chapel Hill

University of Illinois

Meningococcal Disease on College Campuses

- 1990's increase outbreaks (1-3) on campuses.
- Increased activity in disease nationally.
- Studies in UK and USA confirmed increased risk of disease among residents of dormitories, freshmen, drinkers, and among persons with upper respiratory infections.
- Deadly disease, intense media attention, fear.

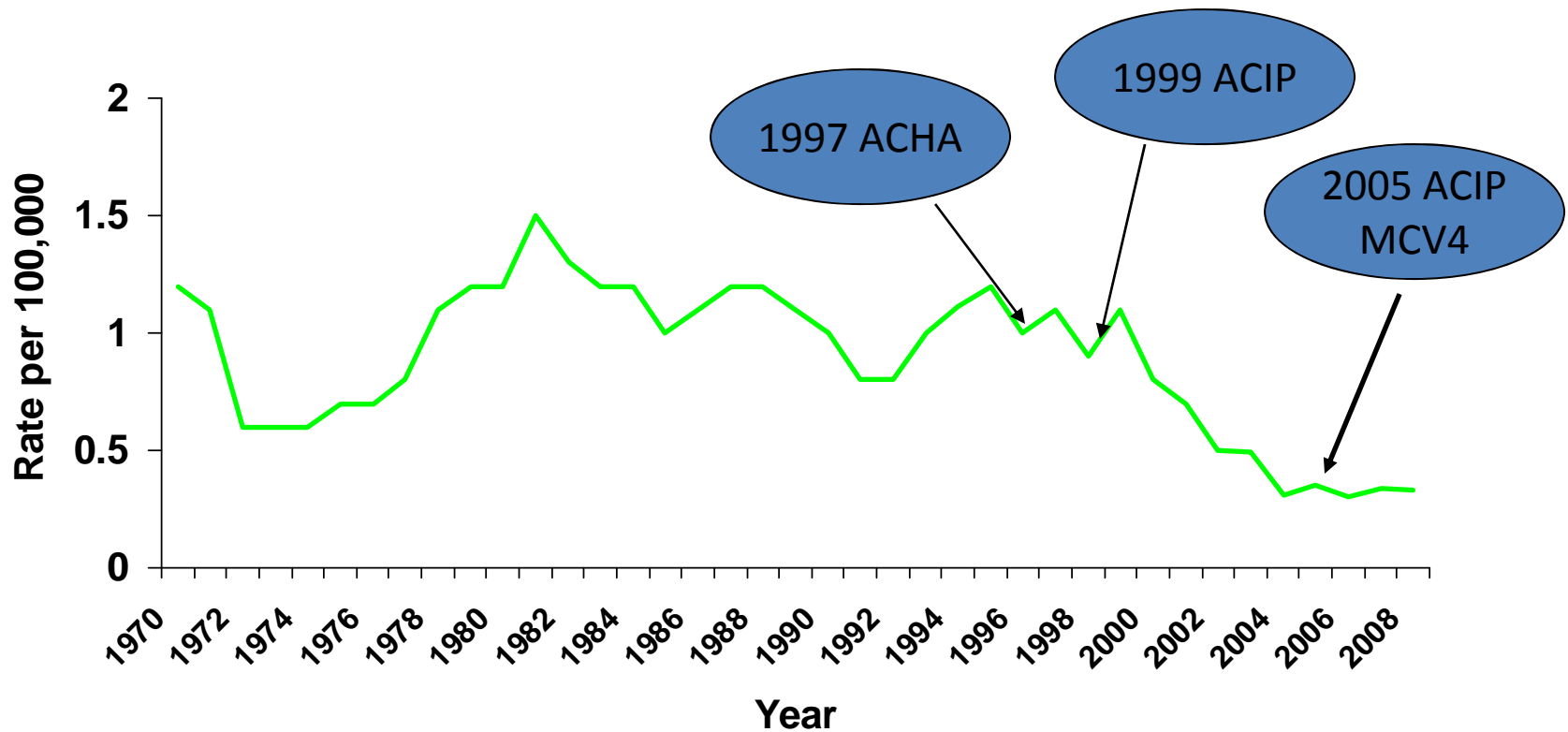
Summary: Meningococcal Disease Incidence, United States, 1970-2008



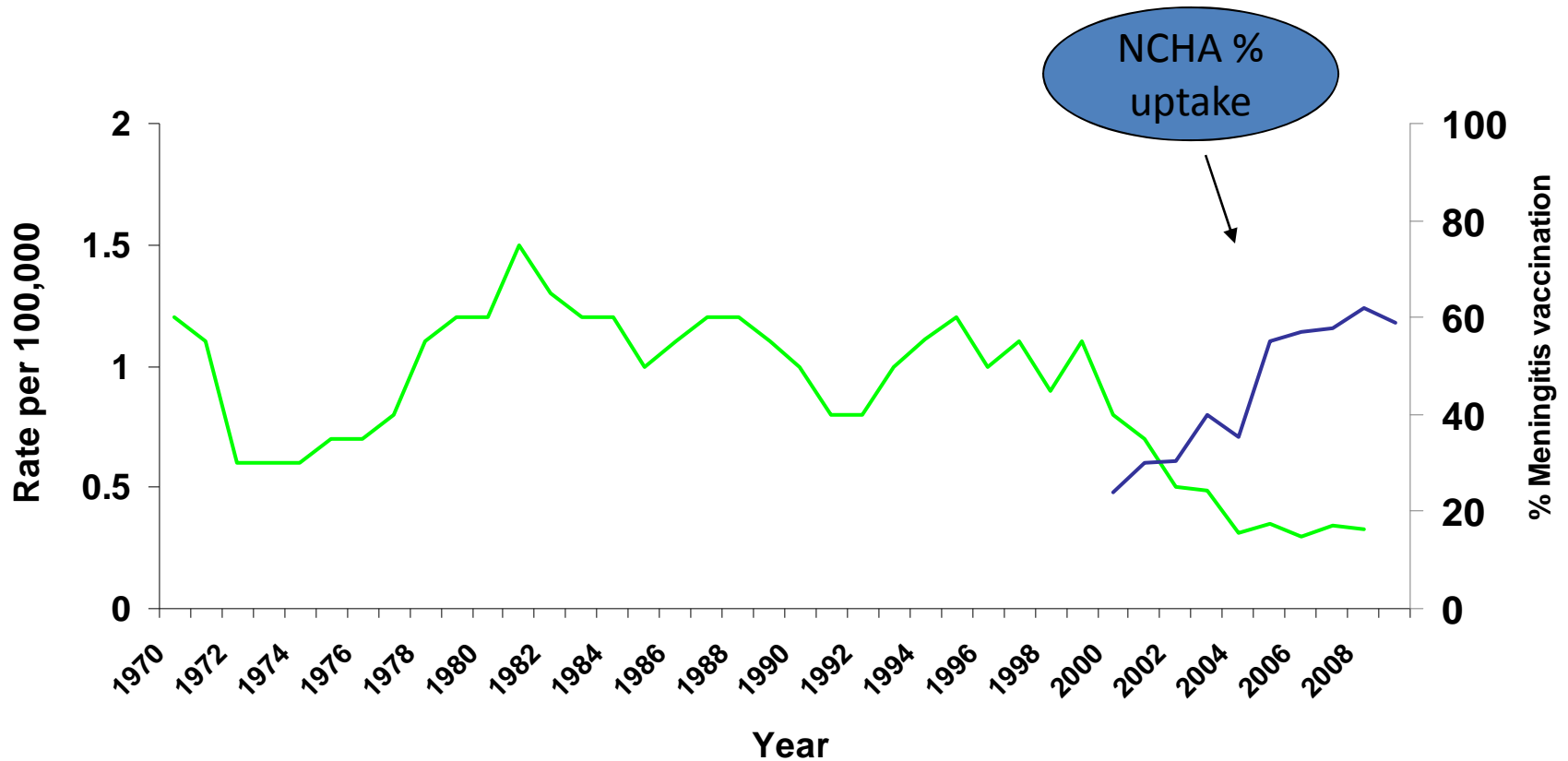
Meningococcal Disease

- ACHA recommendation in 1997 to educate students about meningococcal disease and vaccine
- ACHA co-sponsorship of surveillance study discovered increase risk in among sub-population of college students which results in ACIP permissive recommendation 1999.
- ACHA sponsored an educational program for college health: toolkit, speaker's program, national meeting presentations funded by Sanofi Pasteur
- ACIP recommendation once new vaccine product licensed in 2005.

Summary: Meningococcal Disease Incidence, United States, 1970-2008



Summary: Meningococcal Disease Incidence, United States, 1970-2008



ACHA

- Meningococcal vaccination
 - Few if any outbreaks of vaccine preventable disease reported on college campuses in five years.
 - Lowest incidence of disease in decades
 - ACHA meningococcal survey 09/10
 - Changing epidemiology with vaccine preventable strains becoming much less common.
 - 60% vaccine uptake may have prevented
 - 300-360 cases and 35-40 deaths 2005-2009 among college students nationally
 - Excludes herd immunity



Preventing Additional Cases

Public Health Response

- Close contacts have highest risk of developing disease
 - Household and intimate contacts
 - ??classmates??
 - Fellow party attendees
- Antibiotics (e.g. Cipro) prescribed to eliminate carrier state and prevent further cases.
- Mitigation strategies for preventing spread of respiratory pathogens (cough hygiene, hand washing, not sharing drinking glasses).
- Outbreak of 3 or more cases in a community or school may require mass vaccination.

ACHA Guidelines

Recommendations for Institutional Prematriculation Immunizations

VACCINE	VACCINATION SCHEDULE	MAJOR INDICATIONS
Meningococcal Tetravalent (A,C,Y,W-135)		
- <i>Conjugate (Preferred)</i>	11-55 years (data for revaccination pending).	Populations at increased risk, including freshmen living in dormitories/residence halls, persons with terminal complement deficiencies or asplenia, laboratory personnel with exposure to aerosolized meningococci, and travelers to hyperendemic or endemic areas of the world. Non-freshmen college students under 25 years of age may choose to be vaccinated to reduce their risk of meningococcal disease. [†]
- <i>Polysaccharide (Acceptable alternative if conjugate not available)</i>	Over 2 years of age, repeat every 3-5 yrs if increased risk continues.	

http://www.acha.org/info_resources/

ACIP Meningococcal Conjugate Vaccine Recommendation

- All adolescents 11-19 years of age.
- College freshmen living in dormitories.
- Certain travelers.
- Laboratory workers.
- Outbreak settings.
- Military recruits.
- Persons with increased susceptibility.

Prevention of Infectious Diseases

- Education of students can work
 - Examples of successful alcohol education.
 - Education regarding hand washing and not sharing drinking glasses.
- Pre-entrance immunization recommendations or requirements.
- Opportunities to improve uptake of influenza vaccine with new universal recommendation.

