A UNIVERSITY’S RESPONSE TO AN OUTBREAK OF MENINGITIS

Students who have received the meningitis B vaccine on campus are likely protected from getting sick, but can still spread the bacteria to others.

Bacterial meningitis is contagious and is generally spread through:
- Coughing
- Sharing drinks, utensils or smoking materials
- Kissing
It is not spread through casual contact such as shaking hands or sitting next to a person.

Helpful precautions for students and visitors to campus:
- Don’t share drinking glasses, smoking materials, eating utensils, cosmetics or lip balm.
- Always cough into a sleeve or tissue.
- Wash hands frequently.
- Use hand sanitizer often.
- Don’t drink from a共同 source such as a punch bowl.

YOU can help prevent the spread of bacterial meningitis.

For more information, send email to response@princeton.edu or visit www.bit.ly/EHSips.

Jacqueline Wagner, Princeton University
Topics

- Review of Cases and a Timeline
- Vaccination
- Health Education Campaign
- Concerns
- Lessons Learned
Princeton University - The Basics

- **Student Population**
  - 5200 undergraduates
  - 2700 graduate students
  - 1200 faculty
  - 11,500 staff (5500 FTE)

- 180 buildings on 500 acres
- 99% undergraduate residency
- 70% grad student residency
- Students from >100 countries
- 185 Principal Investigators
- 600 Laboratories

- **Eating Clubs**
  - center of student social life
Princeton University – The Basics

- No professional (medical, vet, dental) schools

- University Health Services provides health care for:
  - Students
  - Staff/faculty – occupational health services
  - Small in-patient unit

- Management of Public Health Emergencies and Communicable Disease Events
  - Medical Director, University Medical Services
  - Director of Environmental Health and Safety

Some experience with communicable disease outbreaks on campus:

<table>
<thead>
<tr>
<th>Disease</th>
<th>Year</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norovirus</td>
<td>2012</td>
<td>305 cases</td>
</tr>
<tr>
<td>H1N1</td>
<td>2009 (fall)</td>
<td>579 cases</td>
</tr>
<tr>
<td>Pertussis</td>
<td>2009</td>
<td>4 confirmed, 33 suspected</td>
</tr>
<tr>
<td>Salmonella</td>
<td>2008</td>
<td>85+</td>
</tr>
</tbody>
</table>
Student had been off-campus 9 days, became symptomatic and went straight to ER

Prospective student visiting from another state, with undergrads for 3 days

Student on campus. **NJ DOH finds connection, declares cluster**

Student leaving campus after exams. **NJ DOH declares outbreak**

Student on study abroad trip in Greece

Student on campus

Drexel student had close contact with Princeton students off-campus

Princeton vs. Meningitis video featuring 4 survivors

Open forums with CDC

Vaccine clinics based on experience with Flu Fest

Post-vaccination lectures

Second dose “Half isn’t enough” campaign
With 9th case, concluded that carriage persisted despite the vaccine.

University cancels on-campus overnight stays for Princeton Preview

“Stop the Spread” campaign; Posters, wallet cards to all guests staying on campus during reunions

Vaccinations clinics Freshman Scholars, Athletes, Incoming Freshmen

Princeton researcher initiates serum study to evaluate immunogenicity of vaccine in college-aged students.

New round of public health messaging
Serogroup B

- Prior to 2005, most outbreaks on college campuses caused by serogroup C
- Approximately 30% of all meningococcal disease cases and 25% of outbreaks caused by serogroup B in U.S.
- Accounts for 85-90% of meningococcal disease in the UK
Serogroup B

Incidence by Serogroup and Vaccine Coverage – 1993-2012

ABCs cases from 1993-2012 estimated to the U.S. population with 18% correction for under reporting.
National Immunization Survey – Teen; 2006-2012
Serogroup B

- Not covered by conjugate vaccine
  - No licensed vaccine for B in US
  - Licensed vaccine in Europe and Australia, now Canada
- Lives in nose and throat
- 15% death rate
- 20% of survivors serious sequelae
- Causes 30-40% of disease in U.S. and up to 80% in Europe.

Serogroup B

Transmission – large droplet

2-4 days

Illness

Asymptomatic carrier Colonizes the nasopharynx
Meningococcal Carriage

- Few carriage studies in literature
- Range reported from 5% to 25%
- Relation between disease incidence and carriage is unclear.
- Carriage is transient and varies by age and setting
  - Household contacts of persons with disease
  - Military personnel
- Review article examining carriage of all serogroups:
  - Most important factor is age
    - Peak at 19 years old
- Social behavior and carriage in British teenagers:
  - Risk for carriage:
    - Attendance at pubs
    - Intimate kissing
    - Cigarette smoking

Source: www.webmd.com

Does Vaccination Affect Carriage Rates?

+ Christenson et al, 2010
++ MacLennan et al, 2006
Limited experience with meningococcal disease outbreaks caused by serogroup B on University campus settings

**University A**

21,000 students

- 13 reported cases
- 1 fatality

January 2008 to November 2010

- No single location associated with transmission

- Factors significantly associated with disease:
  - Greek society membership
  - >1 kissing partner
  - attending bars

Mandal et al, 2013
Attack Rates

Princeton’s Outbreak
- Largest in recorded history based on population size
- Most outbreaks stop after 4 cases
- High attack rate
- Cases continued after end of 2013 academic calendar year
- Novel strain – not seen before in the U.S.

Comparison of Attack Rates

Princeton University | UCSB | University A | Outbreak
---|---|---|---
Cases per 100,000 | | | |
Vaccines

No licensed vaccines for serogroup B in U.S.

Novartis: Bexsero® Recombinant MenB
- Licensed outside of the U.S.
- 2 dose series in adolescents
- Used in vaccine campaigns at Princeton University and UC Santa Barbara

Pfizer: MenB vaccine in development
- 3 dose series in adolescents

Breakthrough Therapy Designation – expedites review of drug

Expect vaccines to be licensed by Spring 2015
Is vaccine effective?

Vaccine for Serogroup B is not expected to be protective against all strains:

- predicted that 66% of MenB strains circulating in U.S. covered by Bexsero

Bexsero: effective against strain circulating at Princeton University

After two doses of the vaccine:

- at least one month apart and up to six months apart
- 99-100% of adolescents are seroprotected by bactericidal antibodies.

Adverse Events: In trials, generally well tolerated when compared to placebo

- Injection site pain, redness, swelling, malaise, myalgia and headache

The Vaccine – Who Gets It?

Determined by CDC after a week-long, on-campus epidemiological study in October 2013

No patterns involving student residence, social activities, sports teams identified during study

CDC recommends vaccine for the following groups:

- All undergraduate students
  (All Princeton cases were undergraduates living in dorms.)

- All graduate students who live in dormitory settings
  - Dorm living is a risk factor, most grad students in dorms were <25 years
  - Intimate partners of grad students who share a dorm room.

- Faculty, staff and students with spleen problems or a specific, rare autoimmune disease
Process of Obtaining the Vaccine

- Submission of IND protocol – November 2013

- CDC used the FDA Investigational New Drug (IND) process
  IND: off-label and unlicensed uses of drugs

- CDC developed:
  - safety monitoring plan
  - consents
  - vaccine information sheets
  - data collection instruments

- Approved by CDC IRB and FDA in November 2013

- Princeton was required to identify a local co-investigator and participate in safety follow-up activities.

- Princeton University President accepted CDC’s recommendation to offer the vaccine.

Considered a Treatment Protocol, not a Drug Trial.
Obtaining the Vaccine

Regular (3xweekly) conference calls:
- Princeton Team
- Novartis
- NJ Department of Health
- CDC

Expert Consultants
- Vaccine expert – Princeton professor, former chair of Merck vaccines
- Meningitis expert from U.S.
- Chair of meningitis vaccine committee at U.K.

Vaccine Procurement
Vaccine Storage/Cold Chain
Clinic Logistics
Legal
Carriage Study
Vaccine Clinic Logistics – Get Screened
Fill out consent forms and talk to CDC if you have questions...
Get your vaccine
Wait 15 minutes to assess for reactions
Hand in your form.....
# Vaccine Acceptance Rates

<table>
<thead>
<tr>
<th>Constituency</th>
<th>First Dose</th>
<th>Second Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>96% (1266)</td>
<td>4% (59)</td>
</tr>
<tr>
<td>2017</td>
<td>99% (1285)</td>
<td>94% (1220)</td>
</tr>
<tr>
<td>2016</td>
<td>98% (1321)</td>
<td>92% (1238)</td>
</tr>
<tr>
<td>2015</td>
<td>98% (1300)</td>
<td>91% (1201)</td>
</tr>
<tr>
<td>2014</td>
<td>96% (1232)</td>
<td>91% (1170)</td>
</tr>
<tr>
<td>Graduate Students</td>
<td>82%</td>
<td>67%</td>
</tr>
<tr>
<td>Faculty/Staff/Other</td>
<td>100% (17)</td>
<td>82% (14)</td>
</tr>
</tbody>
</table>

**Undergraduate Student Vaccine Acceptance Rates:**

- **First Dose**: 98%
- **Second Dose**: 75%*

*Most incoming freshmen won’t be eligible for second dose until October, 2014.*
Communications Campaign

Initial Campaign – Spring, Summer 2013
- Behaviors that result in transmission
- Recognition/early reporting of symptoms
- Strain circulating on campus not covered by vaccine

Campaign for First Vaccine Clinic (Nov 2013)
- Who
- Where
- When
- Why

Second Dose Vaccine Clinic (January-April 2014)
- Importance of Second Dose

After 9th case:
- Symptom Recognition
- Can still spread disease even if vaccinated
The Communications Campaign

- Website
- Emails (parents, students)
- Pamphlets
- Posters
- Table tents
- Videos
- Text messages
- Open forums for students to meet with CDC representatives
- Student newspaper (Daily Princetonian)
Initial Campaign Message

- Transmission
- Not protected by vaccine required for incoming students
- Symptoms of concern

Most effective placement of posters:

Inside every dormitory bathroom stall
'Mine. Not Yours': Princeton University hands out red cups to curb meningitis, promote safe drinking

PRINCETON — In an effort to avoid a repeat of a bacterial meningitis outbreak that hit Princeton University’s campus last spring, the university is distributing 5,000 red, 16-ounce cups emblazoned with a message for students to not share their beverages.

The cups read, “Mine. Not Yours.” and include markings for the standard alcoholic drink size for liquor, wine and beer, along with the phone number for the university’s department of public safety. They are intended to help curb the spread of meningitis and
Student Involvement

Student Video: Princeton Against Meningitis
Student Involvement – Second Dose Campaign

HALF ISN'T ENOUGH.
GET THE SECOND SHOT.

MENINGITIS B VACCINE CLINIC
FEBRUARY 17 - 20
12 - 8 PM
FRIST CAMPUS CENTER
B LEVEL
TWO DOSES ARE NEEDED FOR MAXIMUM PROTECTION

FREE for all undergraduate students, and eligible graduate students and eligible employees
Bring your PUID

All eligible individuals must sign consent form
Students under 18 years old must bring permission form signed by a parent/guardian

HALF WON'T PROTECT YOU.
GET THE SECOND SHOT.

MENINGITIS B VACCINE CLINIC
FEBRUARY 17 - 20
12 - 8 PM
FRIST CAMPUS CENTER
B LEVEL
TWO DOSES ARE NEEDED FOR MAXIMUM PROTECTION

FREE for all undergraduate students, and eligible graduate students and eligible employees
Bring your PUID

All eligible individuals must sign consent form
Students under 18 years old must bring permission form signed by a parent/guardian
First or second dose available
For information about eligibility visit: bit.ly/Mq83I
Student Involvement – 2\textsuperscript{nd} Dose Campaign
Students who have received the meningitis B vaccine on campus are likely protected from getting sick, but can still spread the bacteria to others.

Students, alumni and visitors:
- Don’t share drinking glasses, smoking materials, eating utensils, cosmetics or lip balm.
- Always cough into a sleeve or tissue.
- Wash hands frequently.
- Use hand sanitizer often.
- Don’t drink from a common source such as a punch bowl.

PRINCETON UNIVERSITY

If you feel sick:
- Anyone with a high fever should seek medical attention immediately.
- Students should immediately report to or call University Health Services at 609-258-3141.

Remember: You may become ill with meningitis even if you have not been in contact with someone who is sick.

Wallet Cards Handed to everyone who Visited during Reunions and Lawn Parties
Symptom Recognition and Carriage Awareness Campaign – Spring 2014

STOP THE SPREAD!

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YOU can help prevent the spread of bacterial meningitis.

For more information, send email to response@princeton.edu or visit www.bit.ly/EHS0p5.
Fall, 2014 Awareness Campaign – Student Messages

Aimed at students as they return to campus

Now that the litter has joined the pack,

let's keep the meng from coming back!

- Don't share cups, utensils, & cosmetics
- Cough into a sleeve or tissue
- Know that kissing poses a risk
- Wash or sanitize your hands often
- Get both doses of the vaccine
Spontaneous Student Messages

WASH YOUR MUGS

Thanks from: Murray-Dodge Cafe

Remember - Only YOU can

PREVENT MENINGITIS

WOULD HAVE BEEN MENINGITIS A AT HARVARD
University Leadership and the Team

President Eisgruber

High Level Decision Makers Authorized by University President

Operational Leader Director, EHS

External Partners
- CDC
- NJDOH

Medical Adviser
Medical Director, UHS

Communications/ Health Education

Vaccine Campaign

Legal Concerns
Training

- Large events staff
- Dining Services
- Building Services (janitors)
- Public Safety
- Athletics
  - Coaches and trainers
- Eating Club managers
- Camp Counselors
- Food Contractors
- Outdoor Action/Community Action Leaders
- RCAs
- Peer Health Advisers
- SHAB (Student Health Advisory Board)
Challenges

End of Academic Year

- Large Events on Campus
- Students Leaving Campus for Areas not Familiar with Outbreak
- Summer Camps on campus
Challenges

Meeting End of Year Challenges

- Teams
  Communications

- Reunions/Large Events Liaison Team

- Summer Camps Team

- Ongoing Outreach
Overview

COMMENCEMENT 2014
Welcome to Princeton University's 267th Commencement Web pages. This information focuses on events for all seniors and advanced degree candidates and is updated throughout the year. Please check with your student about activities that he or she is involved with and that might be planning special events around commencement. (Departmental receptions for seniors will be posted this spring.) Key event dates for 2014 are:

Sunday, June 1
- Baccalaureate. 2:00 p.m. Held in the Chapel with seating for guests in simulcast locations near the Chapel, this interfaith service features a guest speaker.

Monday, June 2
- For seniors
  - Class Day. 10:30 a.m. This event is focused on the senior class and includes a guest speaker. If weather permits, it is held on Cannon Green with a picnic lunch to follow (severe weather location is Jadwin Gymnasium).
  - Departmental receptions for majors in the afternoon.
- For Advanced Degree candidates
  - Dean's brunch at the Graduate College.
  - Hooding Ceremony. 5:00 p.m. Held on Cannon Green, weather permitting (rain location which requires tickets is McCarter Theatre).

Tuesday, June 3
Commencement. 11:00 a.m. (guests must be seated by 10:20 a.m.). Granting of degrees and address by President Tilghman. Distribution of diplomas in the Residential Colleges for seniors follows.

A Note of Caution: Meningitis
Challenges

Large Events
Reunions – 25,000 alumni on campus
Alcohol!

CDC/NJDOH: Do not cancel/curtail events

- Make hand sanitizers available
- Make tissues available
- No self-serve ice
- No reusing cups
- Plenty of hands-free trash receptacles
Challenges

Summer Camps
- Sports Camps
- Rec camps
- Academic camps

Athletics
- Watering Systems
- Sharing Bottles
### Challenges

#### Students Leaving to Study/Travel Abroad
- Approximately 800 students
- Remote travel locations, access to quality health care not always available

#### Response
- Letter to all travelers
- Scripted advice for healthcare providers
- Cipro prescription
Concerns – Carriage and Prophylaxis

- **Close** contacts of Princeton cases received one dose of Cipro
- Pressure to provide Cipro to everyone on campus to address carriage
- Princeton has followed guidance from CDC and NJ DOH
  - Advise against mass prophylaxis to stop carriage
- UHS Medical Director consulted with public health and meningitis experts around the world on issue of antibiotic prophylaxis:
  - No right answers
Advisory Committee on Immunization Practices (June, 2014)

- Literature review:
  - Limited data available
  - Some studies show decrease in carriage, but can return over time
  - Does it prevent additional cases?

- Mass chemoprophylaxis for meningococcal outbreaks
  - Small/closed populations
  - Easy to administer antibiotic quickly to entire population
  - Closed population

- Challenges - many
  - Costs
  - Side effects, drug interactions
  - Antibiotic resistance
  - Covering the population at risk quickly
  - Who is the at-risk population?
What We Learned From Students

Despite messaging:
• 42% thought subgroup B was covered by vaccine or didn’t know.
• Thought meningitis was no more dangerous than the flu or norovirus.

Focus groups facilitated by Kathy Wagner, UHS

- E-mail is best, but “If the information isn’t at the top, we probably won’t see it.”
- Avoid “wall of text.” Use bullets, keep it short.
- Give the most important info in the first two sentences, even if it seems awkward.
- Posters in the bathrooms get most attention.
- Use social media sparingly.
- Use text messages only when an immediate action is expected.
- Table tents can be effective, but in conjunction with emails and posters.
- Giveaways get attention.
Lessons Learned

- Need University Leadership engaged and involved

- Student involvement was key to success of vaccine campaigns

- Clarify roles when setting up teams and assigning tasks.

- Seek advice from external experts.
Acknowledgements

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Sara Ingraffia, Director, Employee Health, University Health Services