



VACCINE-PREVENTABLE DISEASES (VPDS): CURRENT TRENDS

**Adult Immunization Conference
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Presenter Disclosure Information



I, Steve Fleming, have been asked to disclose any significant relationships with commercial entities that are either providing financial support for this program or whose products or services are mentioned during our presentations.

I have no relationships to disclose.

I may/will discuss the use of vaccines in a manner not approved by the U.S. Food and Drug Administration.

But in accordance with ACIP recommendations.





Current trends: VPD Epidemiology in Massachusetts and the USA

- **MDPH Epidemiologists – Our Roles**
- **Healthcare Providers – Your Roles**
- **Impact of Vaccines on VPD Morbidity**
- **Mumps**
- **Influenza**
- **Invasive meningococcal disease**

COLLABORATIONS IN DISEASE SURVEILLANCE

REPORTING AND CONTROL



Healthcare Provider



LBOH 1



MDPH

LBOH 2



School



Sports Team

VPDs In MA: Comparison of 2017 with Pre-vaccine Era



	Maximum No. of Annual Cases in Pre-vaccine Era (year)	2017 Cases ¹	2017 Percent Change
Diphtheria	12,641 (1899)	0	-100.00
Measles ²	52,866 (1952)	0	-100.00
Mumps ²	18,709 (1957)	191	-98.98
Pertussis	13,333 (1937)	374	-97.19
Polio	3,950 (1955)	0	-100.00
Rubella ²	34,148 (1943)	1	-100.00
Tetanus	45 (1925)	0	-100.00
Hib (< 5 yrs of age)	147 (1987)	2	-98.64
Chickenpox ²	23,768 (1953)	385	-98.38

¹ 2017 data are preliminary as of March 6, 2018, and are subject to change.

² Includes probable and confirmed cases to better reflect disease burden.

Measles Worldwide 2018



Make Sure You're Protected against Measles before International Travel

Before any international travel—

- Infants 6 months through 11 months of age should receive one dose of MMR vaccine.[†]
- Children 12 months of age and older should receive two doses of MMR vaccine separated by at least 28 days.
- Teenagers and adults who do not have evidence of immunity* against measles should get two doses of MMR vaccine separated by at least 28 days.

[†] Infants who get one dose of MMR vaccine before their first birthday should get two more doses (one dose at 12 through 15 months of age and another dose at least 28 days later).

* Acceptable presumptive evidence of immunity against measles includes at least **one** of the following: written documentation of adequate vaccination, laboratory evidence of immunity, laboratory confirmation of measles, or birth in the United States before 1957.

Get Vaccinated and Prevent Measles



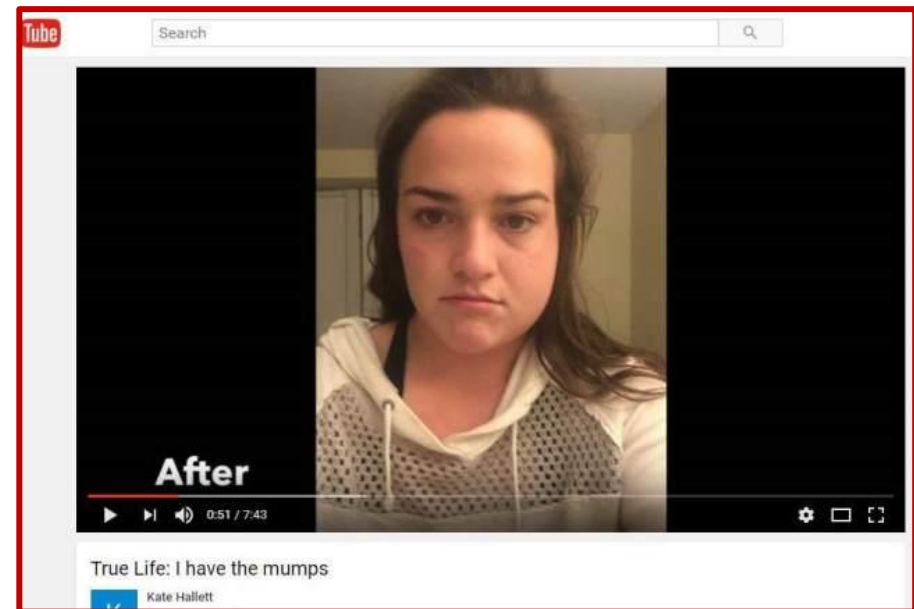
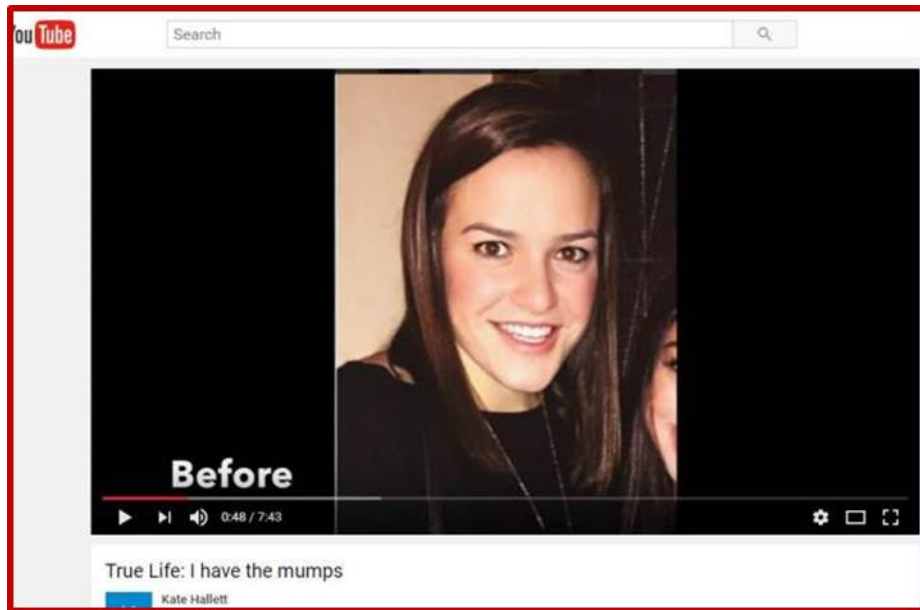
Travel Notices

Some U.S. travelers have become sick with measles after traveling abroad.

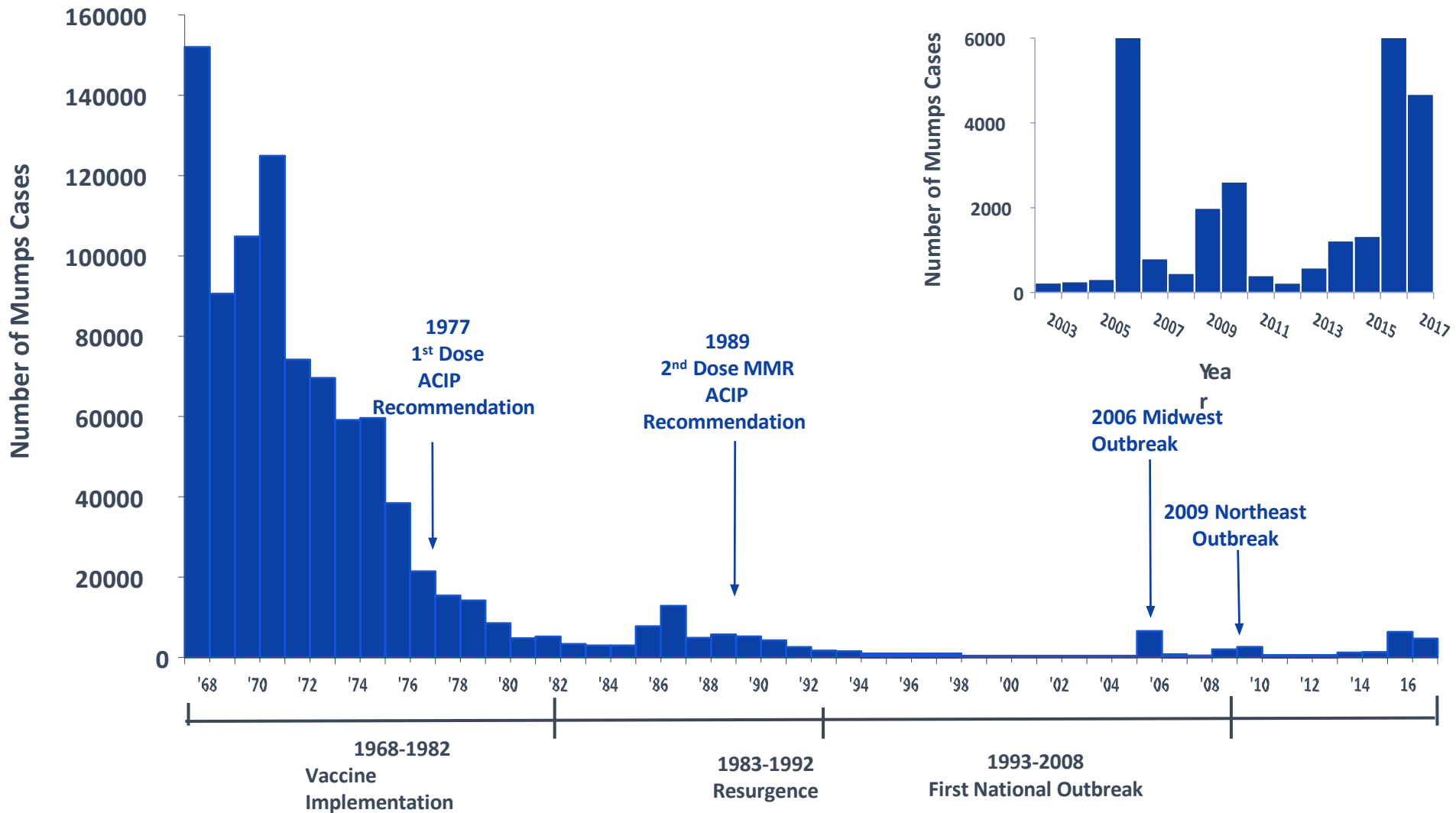
Before you leave on an international trip, check the CDC Travel Notices on measles.

- Travel Notice: Watch (Level 1):
[Measles in Democratic Republic of the Congo](#)
- Travel Notice: Watch (Level 1):
[Measles in England](#)
- Travel Notice: Watch (Level 1):
[Measles in Greece](#)
- Travel Notice: Watch (Level 1):
[Measles in Italy](#)
- Travel Notice: Watch (Level 1):
[Measles in Indonesia](#)
- Travel Notice: Watch (Level 1):
[Measles in Romania](#)
- Travel Notice: Watch (Level 1):
[Measles in Ukraine](#)

Mumps



Number of Reported Mumps Cases, United States – 1968 - 2017



Source: National Notifiable Diseases Surveillance System (passive surveillance); 2017 data as of October 7, 2017.

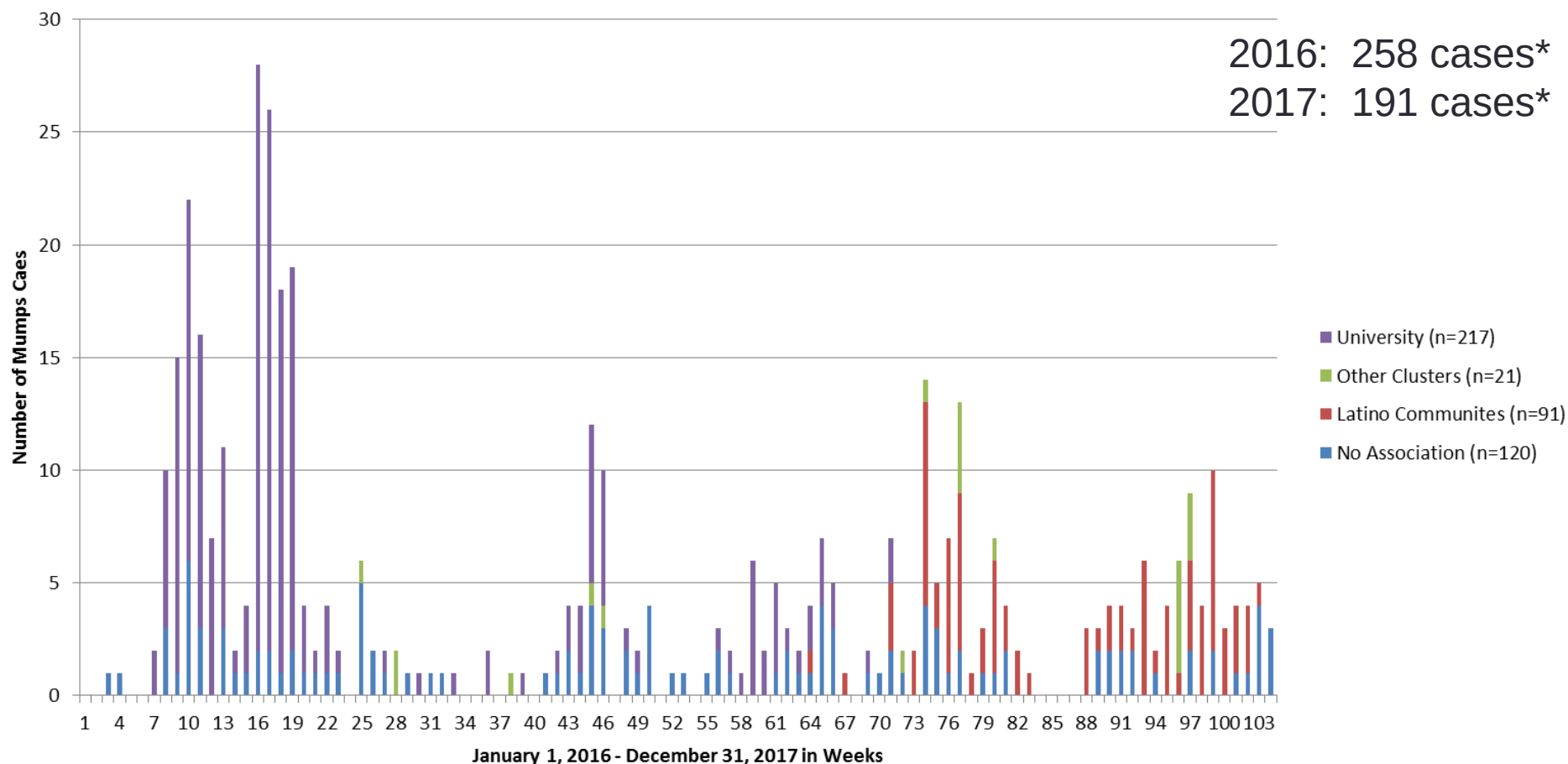
Presented by Dr. Mona Marin, CDC, ACIP Meeting 10-25-17

Mumps in Massachusetts 2016 - 2017



Disease	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018 YTD
Mumps	7	15	9	4	6	71	5	6	258	191	8

Confirmed and Probable Mumps Cases by Cluster Type - MA 2016-2017 (N=449)



*includes confirmed and probable to better reflect the burden of disease. 2017 data are preliminary and subject to change.

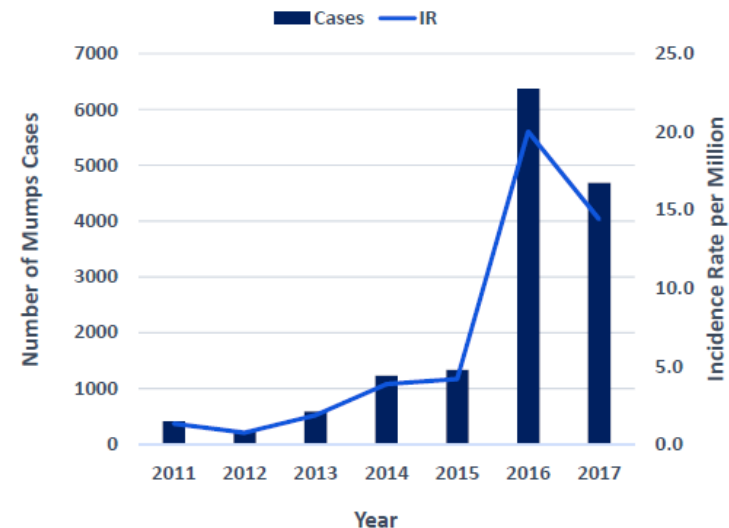
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Mumps Cases & Outbreak (OB) Related Data – USA, 2011 - 2017



	2011	2012	2013	2014	2015	2016	Oct 2017
Case Count	404	229	584	1223	1329	6366	4677
Incidence rate	1.3	0.7	1.9	3.8	4.2	20.0	14.4
OB Cases	128	3	313	747	836	4975	3120
% of OB Cases	32	1.3	54	61	63	78	67
Jurisdictions w/OB cases	9	3	11	15	14	32	33

Mumps Cases and Incidence by Year, January 2011 - Oct 2017



- In recent years outbreaks largely confined to universities and other **close contact settings**, including teams, clubs, schools, other work places, prisons and the Marshallese community
- Median age 21
- Half of the outbreaks had <10 cases; half of the outbreaks occurred in colleges/universities
- A small number of outbreaks (13%) with ≥ 50 cases accounted for 83% of all outbreak related cases
- Current **2-dose schedule sufficient for control in general population**
- But **not** in intense exposure settings with increased force of infection

Source: National Notifiable Disease Surveillance System (passive surveillance); 2017 data as of October 7, 2017.

CDC. MMWR 2018;67(1):33.

Presented by Dr. Mona Marin, CDC, ACIP Meeting 10-25-17

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Mumps Vaccine During Outbreaks



Mumps outbreaks have been increasing in recent years

- In part due to **waning immunity of the 2 dose series** in the settings of an increased force of infection (close, prolonged contact). 2 dose vaccine effectiveness: 88% (range of 31-95%). 2 dose schedule sufficient for control in general population.
- Data limited and insufficient at this time to fully characterize the impact of MMR3 on reducing the size or duration of an outbreak. Studies are ongoing.
- Data do support use of a third dose of a mumps-containing vaccine for **improving an individual's** protection against mumps disease and its complications during an outbreak.

Morbidity and Mortality Weekly Report

Recommendation of the Advisory Committee on Immunization Practices for Use of a Third Dose of Mumps Virus-Containing Vaccine in Persons at Increased Risk for Mumps During an Outbreak

Mona Meier, MD¹; Mariel Marlow, PhD¹; Kelly L. Moore, MD^{1,2}; Manisha Patel, MD¹

A substantial increase in the number of mumps outbreaks and outbreak-associated cases has occurred in the United States since late 2015 (1,2). To address this public health problem, the Advisory Committee on Immunization Practices (ACIP) reviewed the available evidence and determined that a third dose of mumps, measles, rubella (MMR) vaccine is safe and effective at preventing mumps. During its October 2017 meeting, ACIP recommended a third dose of a mumps virus-containing vaccine* for persons previously vaccinated with 2 doses who are identified by public health authorities as being part of a group or population at increased risk for acquiring mumps because of an outbreak. The purpose of the recommendation is to improve protection of persons in outbreak settings against mumps disease and mumps-related

Despite this recommendation, mumps outbreaks continued to be reported throughout the United States, particularly in settings where persons have close, prolonged contact (e.g., universities and close-knit communities). To assist state and local health departments in responding to mumps outbreaks, CDC issued guidance on use of a third dose of MMR vaccine in the 2012 *Manual for the Surveillance of Vaccine-Preventable Diseases*.³ The guidance was based on limited data and provided criteria for health departments regarding when to consider use of a third dose in specifically identified target populations. Additional evidence on effectiveness and safety of the third dose of MMR vaccine recently became available and was presented to ACIP during 2017. This report summarizes the evidence considered by ACIP regarding use of a third dose of a mumps

CDC. MMWR 2018;67(1):33.

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A Third Dose:

- CDC reviewed three studies regarding the use of a 3rd dose.
- All studies reported lower attack rates among persons who received the third dose during the outbreak compared with persons who had received 2 doses before the outbreak.
- Incremental vaccine effectiveness of 2 doses vs. 3 doses ranged from 61% to 88%, with one estimate statistically significant at 78.1% VE (CI = 60.9 - 87.8%).
- This study also found students who had received MMR2 ≥ 13 years prior had a 9-fold increased risk.
- **Appears safe**
- **Duration of protection is unknown**
 - Limited immunologic evidence suggest antibody titers decline within 1 year after the 3rd dose.
- **3rd dose should be deployed strategically in certain outbreaks as determined by public health authorities**

3rd Dose of MMR Recommendation



Persons previously vaccinated with 2 doses of a mumps virus—containing vaccine who are **identified by public health authorities as being part of a group or population at increased risk for acquiring mumps in certain outbreak settings** should receive a 3rd dose of a mumps virus—containing vaccine to improve an **individual's** protection against mumps disease and related complications.

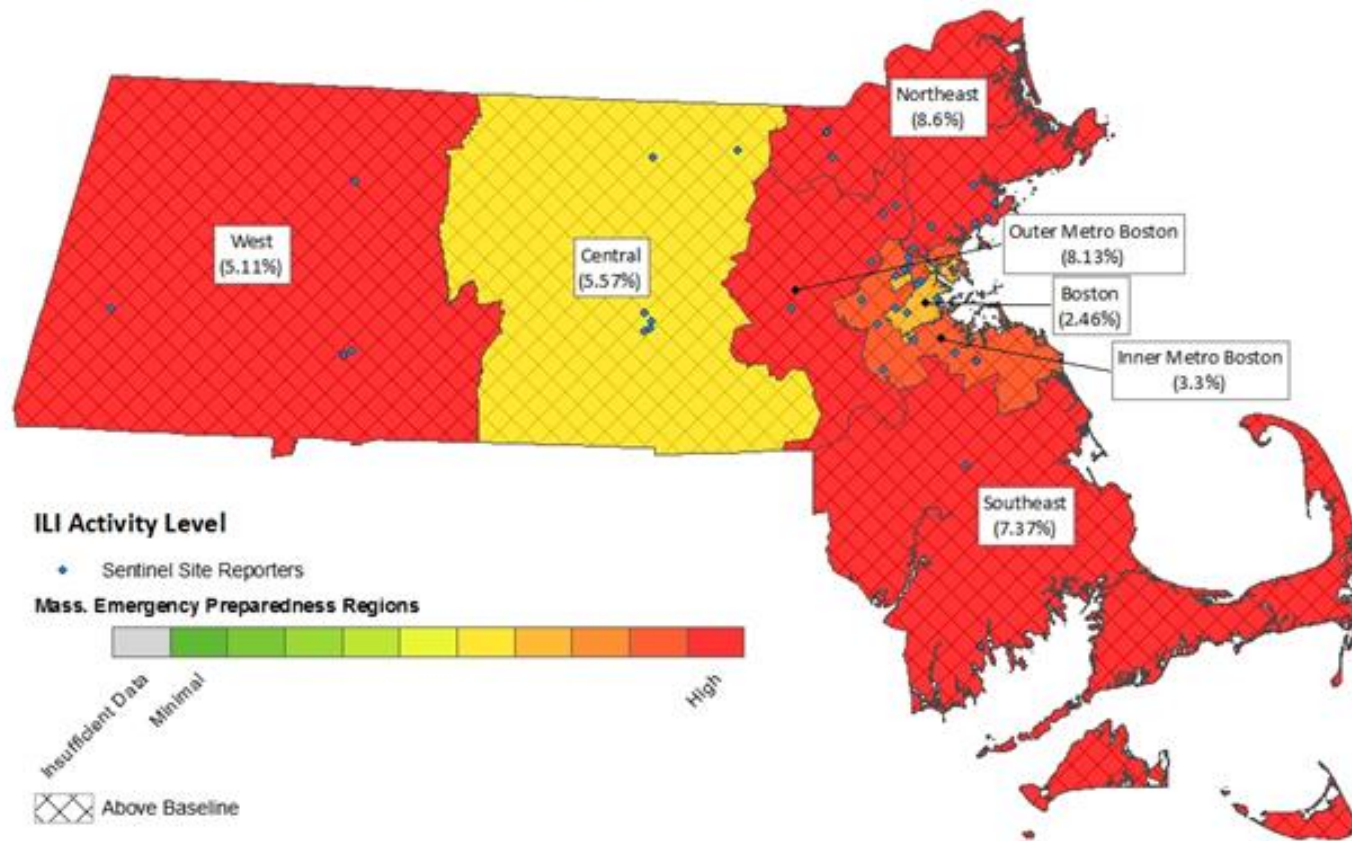
Factors to be considered:

- Size of target population
- Mumps incidence/number of cases
- MMR3 vaccine coverage needed to impact the outbreak
- Timing of MMR3 vaccination
- Social networks
- Intensity and duration of close contact

Call MDPH Division of Epidemiology and Immunization at
617-983-6800 for consultation.

Influenza

Figure 2: Percent ILI Activity Level Reported Weekly by Massachusetts Sentinel Sites



Influenza-like illness activity in Massachusetts was widespread at high intensity, for the week ending February 3, 2018. Adult Immunization Conference 2018

Influenza Season 2017 - 2018



- Severe season
- A lot of media attention
- Started building early but did not peak early (mid-February)
- Influenza A/H3N2 predominated
- A/H3N2 tends to impact older adults disproportionately
- Record year for hospitalizations nationally
- Resources taxed and stressed (hospital beds, EDs, provider offices, vaccines, antivirals, IV bags, rapid tests)
- Moderate to low vaccine effectiveness based on interim estimates (36% overall, 25% against H3N2, 67% against H1N1, and 42% against B strains.)
- Better performance than expected
- 1 pediatric flu-related death in MA*

Flu vaccine works better than feared, but it's still not great

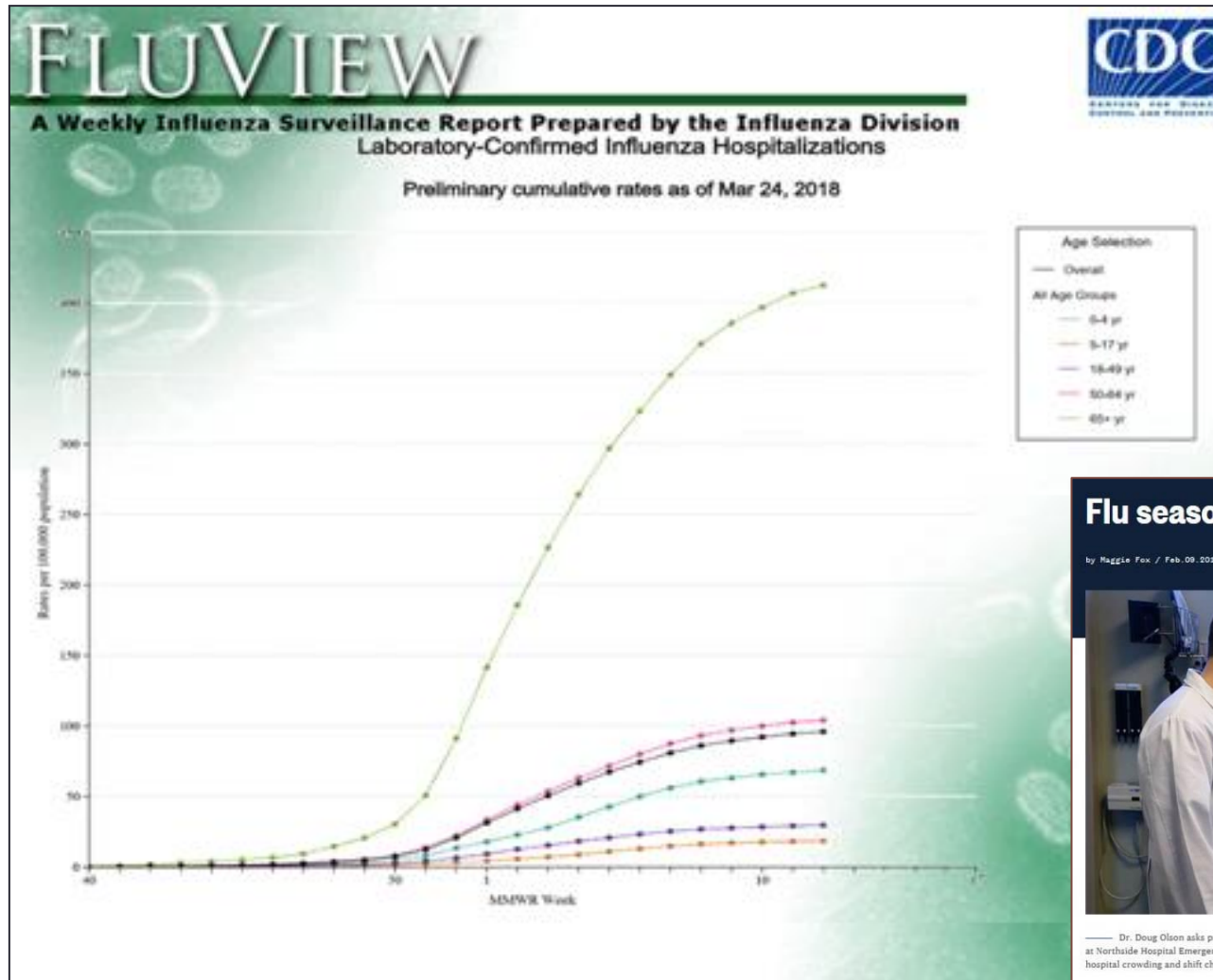
Children ages 8 and under are well protected against the most common strain, CDC finds

by Maggie Fox / Feb. 16, 2018 / 1:24 PM ET



*data are preliminary and subject to change

Lab-Confirmed Influenza Hospitalizations in the United States



Flu season is breaking records, CDC says

by Maggie Fox / Feb. 09, 2018 / 1:27 PM ET / Updated Feb. 12, 2018 / 7:58 AM ET



— Dr. Doug Olson asks patient William Ness, 70, how he is feeling after his wife drove him to the emergency room and he was diagnosed with flu at Northside Hospital Emergency Room in Cumming, Georgia, on Jan. 29, 2018. Olson says the hospital has been flooded with flu patients, prompting hospital crowding and shift changes to accommodate the traffic. Robert Ross / AP

Overall hospitalization rates (all ages) as well as the 3 adult age groups are the highest ever recorded in the CDC surveillance system, breaking the previously recorded highs recorded during 2014-2015; a high severity H3N2-predominant season.



Vaccine Strain Selection: 2018-2019 Influenza Season

Vaccine Strain Selection: 2018-2019 Influenza Season – U.S. Influenza Vaccine Composition: The World Health Organization (WHO) has recommended two new vaccine viruses for the 2018-2019 influenza season.

2017-2018

- A/Michigan/45/2015 (H1N1)pdm09-like virus
- A/Hong Kong/4801/2014 (H3N2)-like virus
- B/Brisbane/60/2008-like (B/Victoria lineage) virus
- B/Phuket/3073/2013-like (B/Yamagata lineage) virus.

2018-2019

- A/Michigan/45/2015 (H1N1)pdm09-like virus
- **A/Singapore/INFIMH-16-0019/2016 (H3N2)-like virus**
- **B/Colorado/06/2017-like virus (B/Victoria lineage)**
- B/Phuket/3073/2013-like virus (B/Yamagata lineage)

New
New



Invasive Meningococcal Disease (IMD)



Epidemiology of Meningococcal Disease Among College Students – United States, 2014-2016. Sarah Meyer, MD, MPH, Division of Bacterial Diseases, Centers for Disease Control and Prevention.



Vaccine rushed to Boston's homeless after a death

By Felice J. Freyer | GLOBE STAFF FEBRUARY 20, 2016

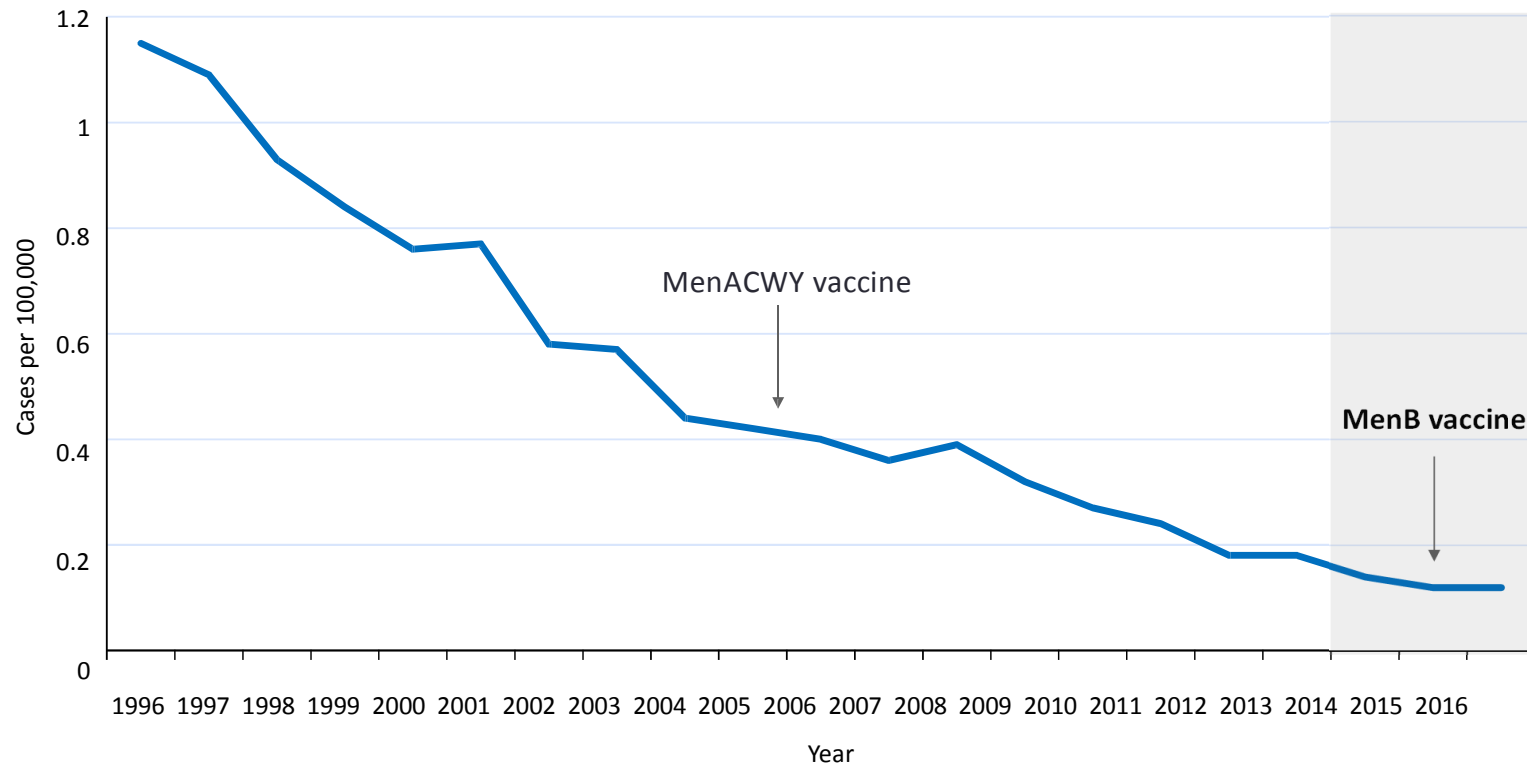
Boston health officials are vaccinating hundreds of homeless people against a severe bacterial infection that can kill within hours, after a homeless man died Monday from the disease.

The victim was among three homeless men who recently came down with meningococcemia, which occurs when certain bacteria get into the bloodstream. The fatal case appears to be unrelated to the other two, which occurred in late January and involved a different strain of the bacteria, said Dr. Denise De Las Nueces, medical director of the Boston Health Care for

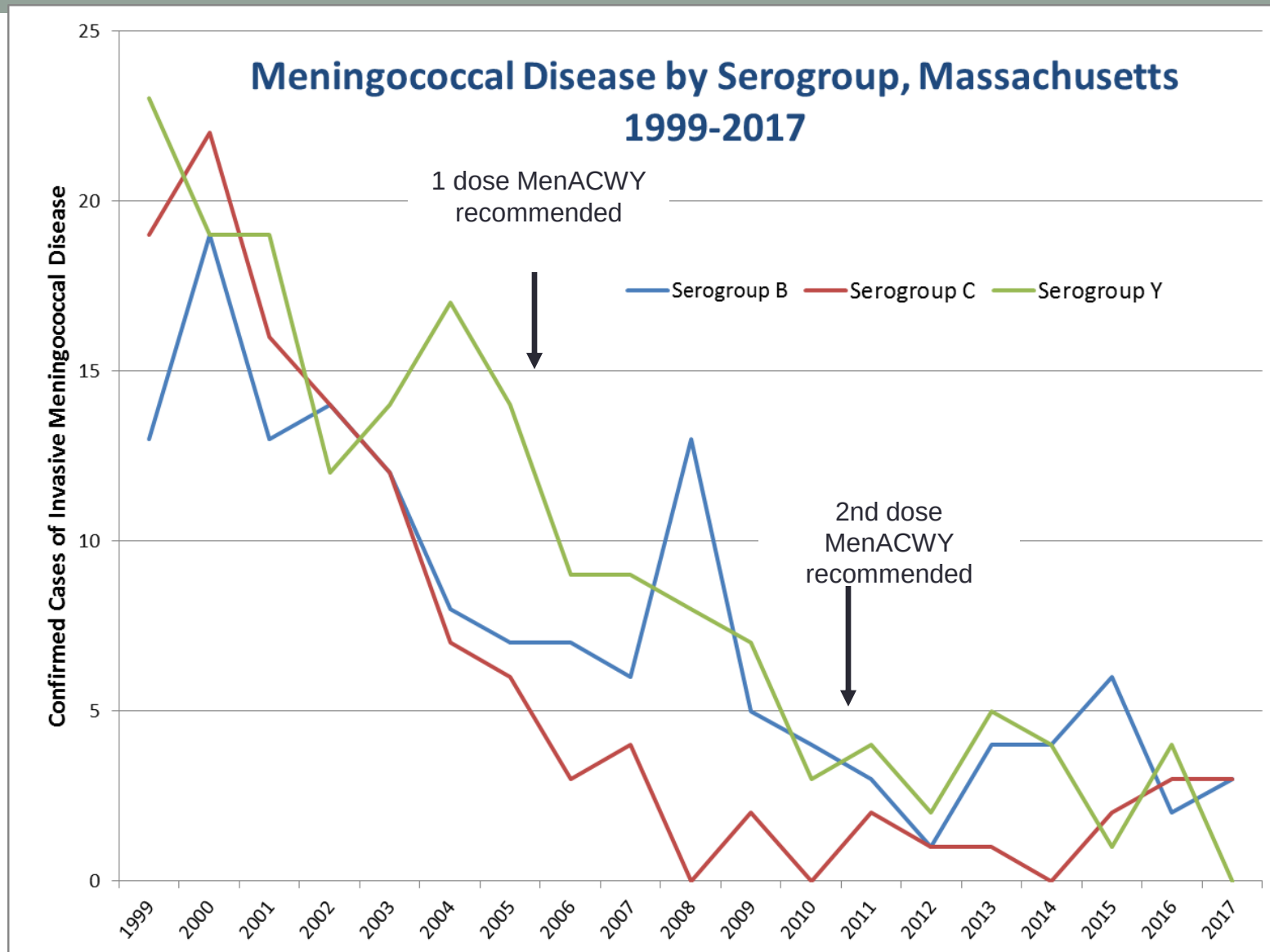
Top 10 Trending Articles

- | Most Viewed | Most Commented | Most Shared |
|--|----------------|-------------|
| Silent protest by Bill Belichick at NFL owners meetings? | | |
| HubSpot book is unflattering portrait of Cambridge company | | |
| Trump threatens to 'spill the beans' on Cruz's wife | | |
| Chang proposes starting school before Labor Day, scrapping Feb. break | | |
| Donald Trump renews call for torture after Brussels bombings, contrasting Hillary Clinton's more measured response | | |
| Blocking Garland, GOP plays another losing hand | | |

Incidence of meningococcal disease – United States, 1996-2016



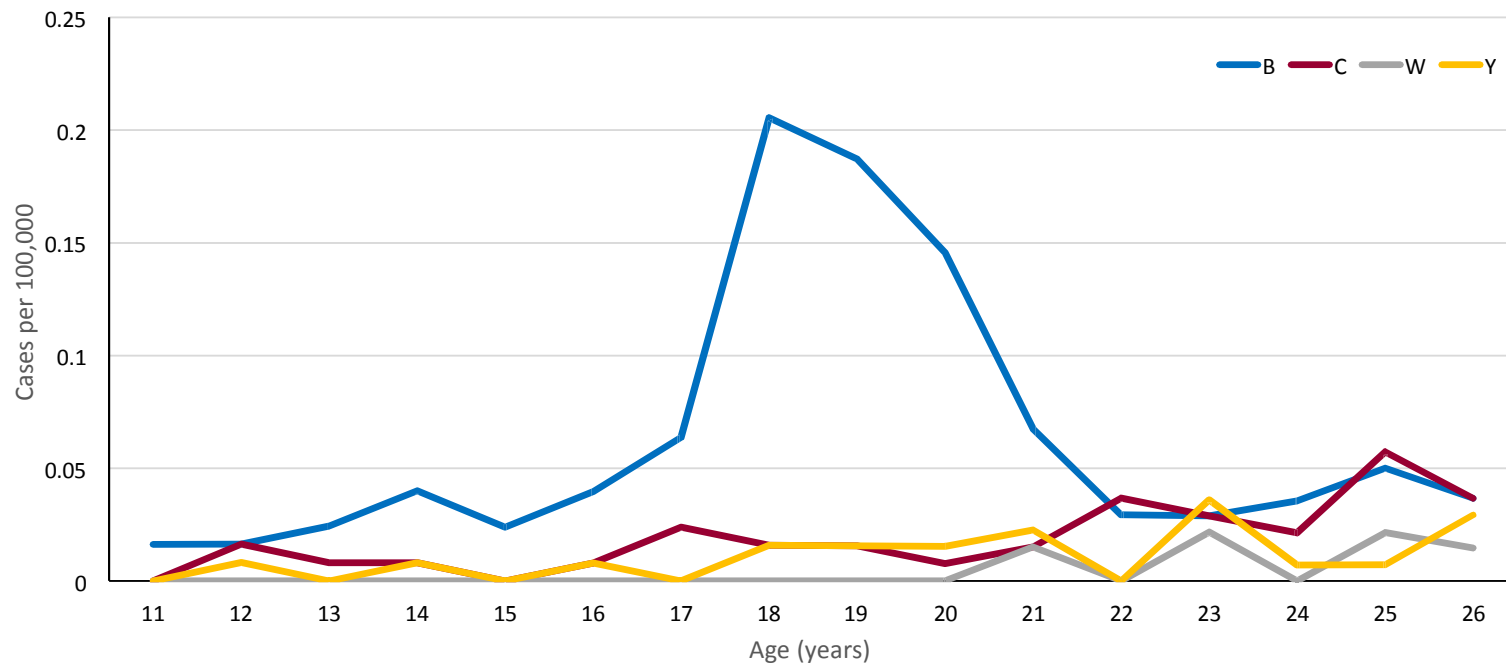
Source: National Notifiable Diseases Surveillance System



Data are current as of 12/13/2017 and are subject to change.

MDPH, 2017

Incidence of meningococcal disease among adolescents and young adults by serogroup, 2014-2016 (United States)



Source: National Notifiable Diseases Surveillance System (NNDSS) data with additional serogroup data from Active Bacterial Core surveillance (ABCs) and state health departments
Unknown serogroup and other serogroups excluded

Summary: Epidemiology of Meningococcal Disease in the U.S.



- **Rates of disease have declined from approximately 1 to 0.1 cases per 100,000 population in the past 20 years.**
 - Decline seen in all serogroups, including serogroup B.
 - **Outbreaks are rare** (only 2-3 out of every 100 cases).
 - In recent years, several serogroup B outbreaks in universities and serogroup C outbreaks among MSM and other communities have been reported.
- Incidence of serogroup B meningococcal disease in college students is low (20 cases per year out of nearly 9 million students 18-21 enrolled in college, with 2-4 outbreaks reported annually); however, college students aged 18-21 years are at increased risk compared to non-college students.
- Incidence of serogroups C, W, and Y disease in this age group is even lower and similar in college students and non-college students, likely in part due to the adolescent MenACWY program.



University Based Serogroup B Clusters/Outbreaks[†], 2008–2018

State of University	Cases (deaths)	Outbreak Period	# Undergraduates
Ohio	13 (1)	Jan 2008 – Nov 2010	24,000
Pennsylvania	4	Feb – Mar 2009	10,000
Pennsylvania	2	Nov 2011	5,000
New Jersey	9 (1)	Mar 2013 – Mar 2014	5,000
California	4 [*]	Nov 2013	18,000
Rhode Island	2	Jan – Feb 2015	4,000
Oregon	7 (1)	Jan – May 2015	20,000
California	2 ^{**}	Jan – Feb 2016	5,000
New Jersey	2	Mar – Apr 2016	35,000
Wisconsin	3	Oct 2016	30,000
Oregon	5	Nov 2016 – Nov 2017	25,000
Massachusetts	3	Oct 2017 – Feb 2018	30,000
Pennsylvania	2 ^{***}	Nov 2017	3,600

[†]Where CDC consulted; ^{*}1 additional associated case identified after retrospective case review; ^{**}1 additional patient with inconclusive laboratory results; ^{***}Cases were close contacts
Preliminary Data Dr. Sarah Meyer, CDC, March 2018

Summary: Epidemiology of Meningococcal B Disease in the U.S. - Challenges



- Every cluster is unique, with a wide range in number of cases, population size and characteristics, and duration. This creates challenges in applying guidance for the control of outbreaks.
- Achieving high vaccine uptake has been challenging, especially at large universities (>20,000), with even lower coverage for 2nd or 3rd doses.
- Outbreaks create significant anxiety and major logistical/financial challenges.
- Further study needed with regard to vaccine effectiveness and duration of protection.

Guidance for the Evaluation and Public Health Management of Suspected Outbreaks of Meningococcal Disease, CDC, November 2017,
<https://www.cdc.gov/meningococcal/downloads/meningococcal-outbreak-guidance.pdf>

Groups at Increased Risk for *N. meningitidis*



MenACWY	MenB
Complement deficiency, or taking eculizumab (Soliris)	Complement deficiency, or taking eculizumab (Soliris)
Anatomic/Functional asplenia	Anatomic/Functional asplenia
Outbreak setting	Outbreak setting
Microbiologist	Microbiologist
HIV Infection	
Traveler to hyperendemic area	
First year college student	
Military Recruit	

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MA College Requirement for Meningococcal Vaccine



New for fall of 2018:

- All newly enrolled full-time students 21 years of age and younger will be required to show documentation of a dose of MenACWY vaccine administered on or after their 16th birthday, regardless of housing status.
- Meningococcal B vaccine does not fulfill this requirement.
- Previously was “One dose for newly enrolled full-time residential students.”

Invasive Meningococcal Disease in Massachusetts: Recent Outbreaks



Invasive Meningococcal Disease serogroup B at UMass Amherst and Smith College Fall 2017 – Spring 2018



Meningitis Outbreak Declared At UMass Amherst

November 28, 2017 By Michael F. Horton, State House News Service



THE MASSACHUSETTS
DAILY COLLEGIAN

Update: Smith College Meningitis case confirmed as same serogroup as UMass outbreak

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IMD serogroup C Among People Experiencing Homelessness, Greater Boston, 2016 - 2018



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Executive Office of Health and Human Services
Department of Public Health
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305 South Street, Jamaica Plain, MA 02130
Bureau of Infectious Disease and Laboratory Sciences

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TO:
FROM:
DATE:
RE:

Healthcare Providers in Greater Boston
Alfred DeMaria, Jr., MD
Medical Director and State Epidemiologist
Bureau of Infectious Disease and Laboratory Sciences
February 26, 2018
Invasive Meningococcal Disease among People Experiencing Homelessness

Two individuals experiencing homelessness in Greater Boston have been diagnosed with invasive meningococcal disease (IMD) serogroup C within the past three weeks. Both cases presented with fever, arthralgias, and malaise and were found to have meningitis. Neither individual appeared to have received meningococcal vaccine (MenACWY).

Background: An outbreak of IMD among people experiencing homelessness in Greater Boston, with five cases identified within the first two months of the outbreak, and a sixth case identified subsequently. Three cases were identified as having disease caused by strains of serogroup Y. There were two deaths among serogroup Y cases. Subsequently, a fourth case in a person experiencing homelessness was identified during the summer of 2017. Identification and antimicrobial chemoprophylaxis of close contacts, outreach and increased vaccination of shelter populations with MenACWY vaccine.

Prompt recognition and antibiotic treatment of meningococcal disease is critical. Symptoms of meningococcal disease may include fatigue, nausea, vomiting, cold hands and feet, chills, severe muscle aches or abdominal pain, rapid breathing, diarrhea, and a petechial or purpuric rash. Meningococcal meningitis may present with sudden onset of fever, headache, and stiff neck, accompanied by nausea, vomiting, photophobia.

Vaccination for homeless in Boston underway after infection leaves One dead

By EIR 22, 2018. Foreign Press



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Questions?