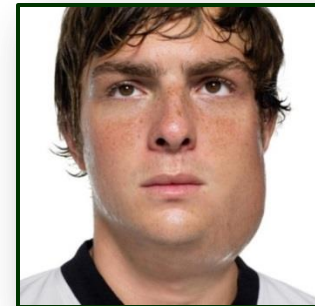




Massachusetts Department of Public Health  
Bureau of Infectious Disease and Laboratory Sciences



# MDPH Clinical Update Adult Coalition

1-9-2018

Susan M. Lett, MD, MPH  
Medical Director, Immunization Program  
MA Department of Public Health



# Outline

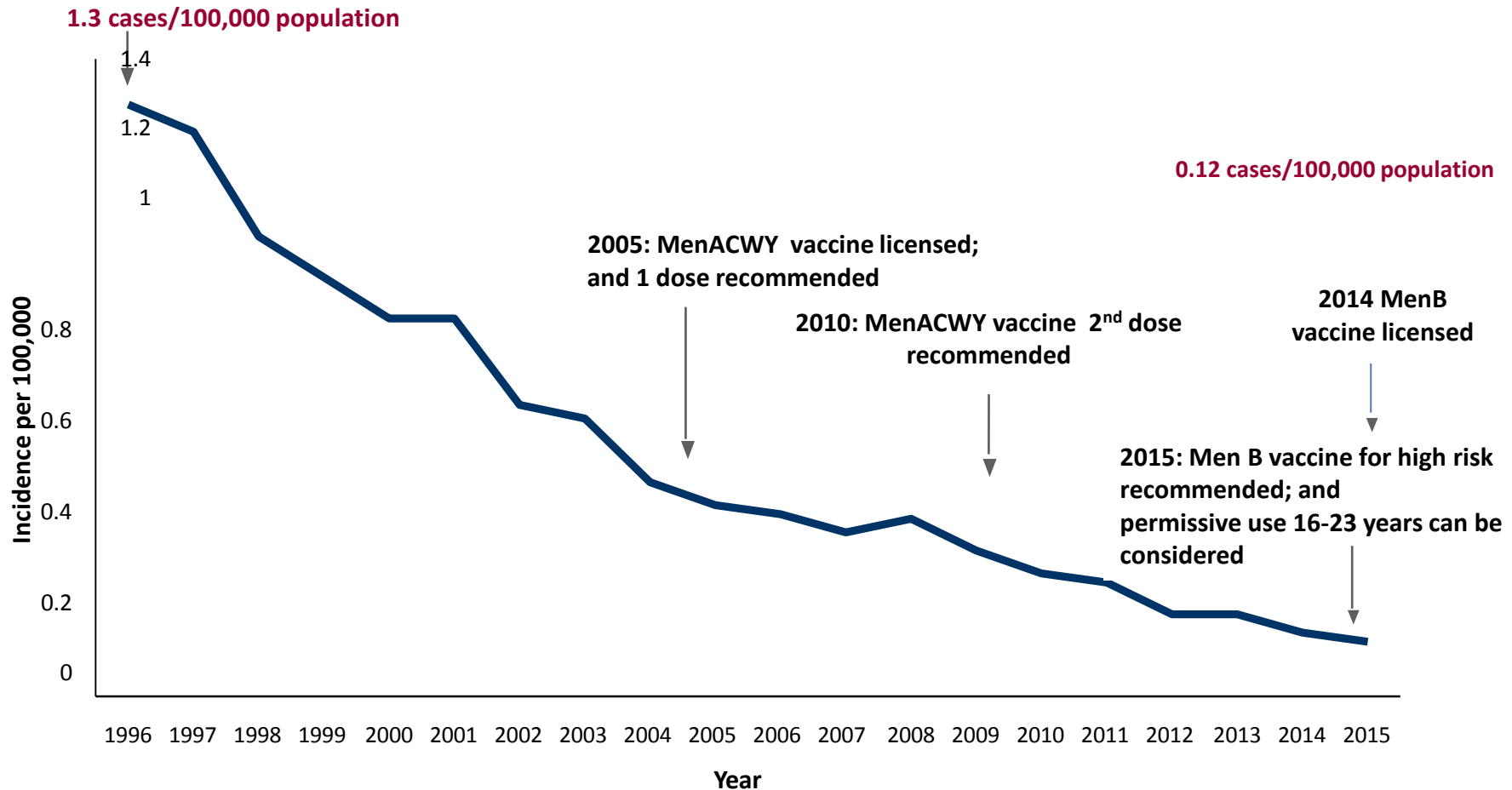
- Invasive Meningococcal Disease
- New Recommendations for Use of Mumps Vaccine During Outbreaks
- Shoulder Injury Related to Vaccination (SIRVA)

# Invasive Meningococcal Disease

- Epidemiology
- Invasive Meningococcal Disease at University of Massachusetts Amherst 2017

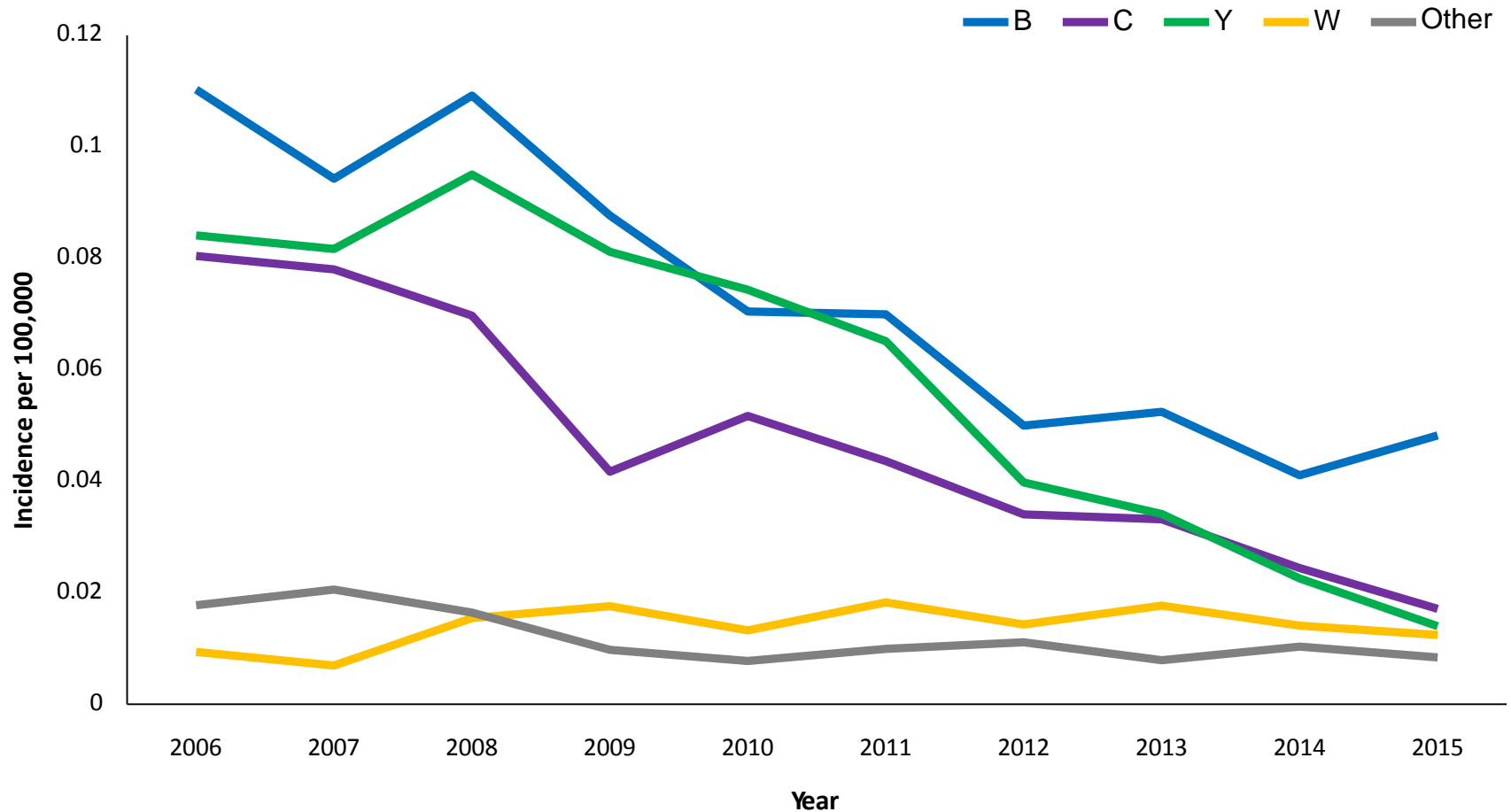


# Meningococcal Disease Incidence – United States, 1996-2015 All Serogroups



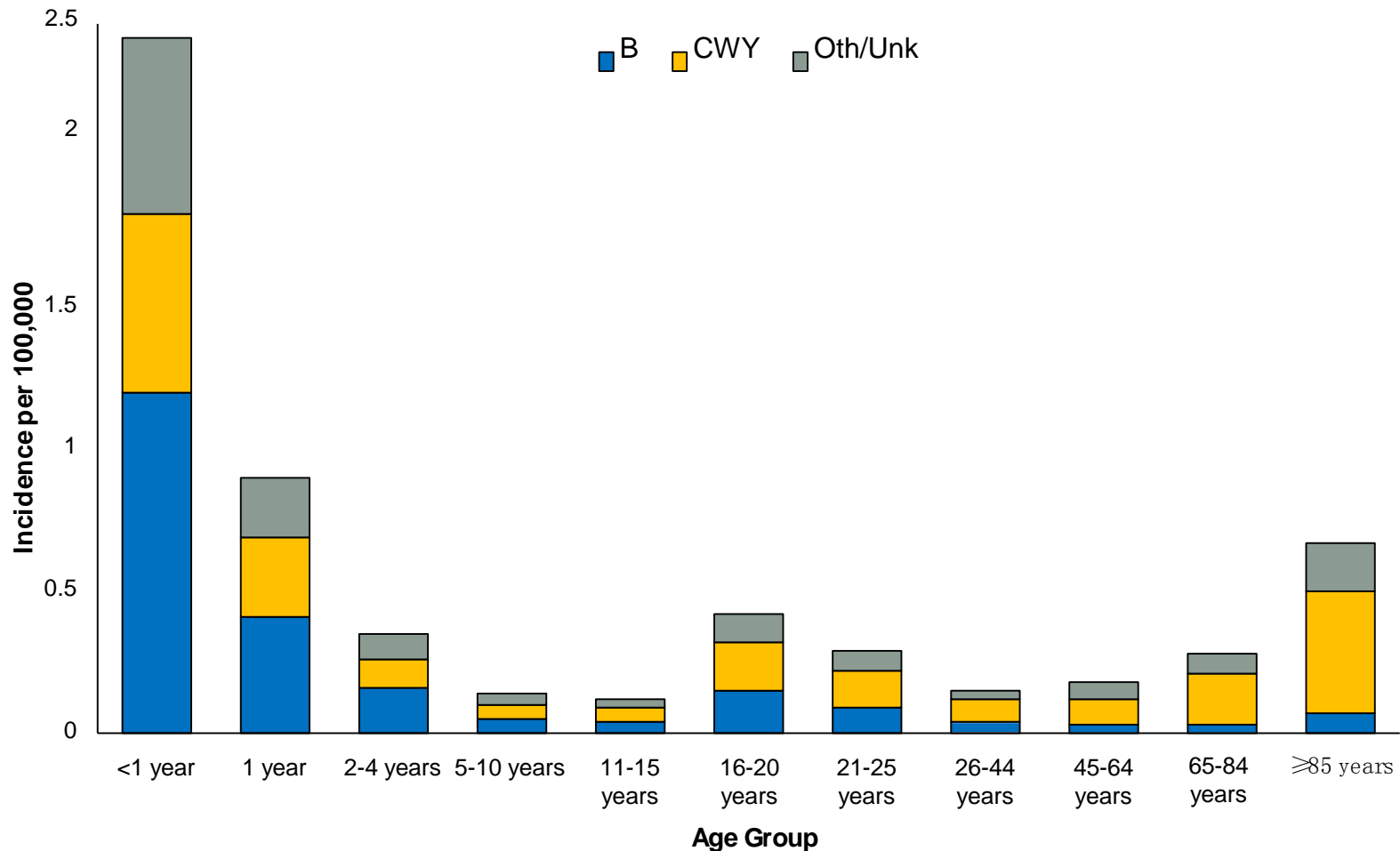
Abbreviations: MenACWY = quadrivalent conjugate meningococcal vaccine against serogroups A, C, W, Y; MenB vaccines = serogroup B meningococcal vaccines  
Source: 1996-2015 NNDSS Data

# Trends in Meningococcal Disease Incidence by Serogroup – United States, 2006-2015



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

# Average Annual Incidence by Age-Group and Serogroup—United States, 2006-2015



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

# Summary of Clusters/Outbreaks\* in the United States, 2009-2013

Type	Number	Max Cases	Median Cumulative Attack Rate‡
Community			
MSM#	2	22	12.4
Non-MSM#	20	14	1.0
Organization			
University	9	10	47.6
Other†	10	8	444
Total	41	22	8.3

\* Excludes clusters from Texas as different criteria for defining clusters was used.

# MSM = Men who have sex with men

‡ Among clusters with known population size

† Includes correctional facility, health-care facility, high-school, sports camp, etc.

# **Preliminary University Based Serogroup B Clusters/ Outbreaks, 2008-2017**

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	2	Oct – Nov 2017	20,000

\*Where CDC consulted; \*1 additional associated case identified after retrospective case review; \*\*1 additional patient with inconclusive laboratory results

2



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

- Rates of disease have declined from approximately 1 to 0.1 cases/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)
- Each cluster/outbreak is unique with wide range in number of cases, population size and characteristics, and duration.
  - Creates challenges in applying guidance for the control of meningococcal disease outbreaks.
- In recent years, several serogroup B outbreaks in universities and serogroup C outbreaks among MSM and other communities been reported.

# Meningococcal B Vaccine Recommendations

MMWR June 12, 2015/64(22);608-612

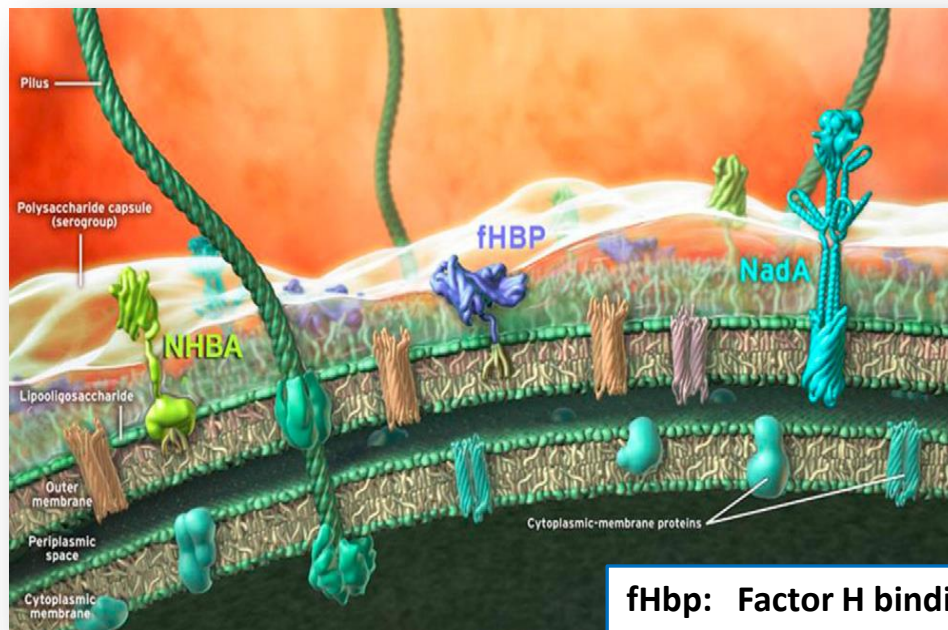
<https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6422a3.htm>

MMWR 2015 October 23, 2015/64(41);1171-1176

<https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6441a3.htm>

MMWR May 19, 2017/66(19);509-513.

<https://www.cdc.gov/mmwr/volumes/66/wr/mm6619a6.htm>



**fHbp: Factor H binding protein**

**Subfamily A (variant 2,3) or subfamily B (variant 1)**

**Nhba: Neisserial heparin binding antigen**

**NadA: Neisserial adhesin A**

# ACIP MenB Recommendations

## High Risk Groups

- MenB should be administered as either a 2-dose series of MenB-4C (0,  $\geq 1$  month); or a 3-dose series of MenB-FHbp (0, 1-2, 6 months) to certain persons aged  $\geq 10$  years\* who are at increased risk for meningococcal disease. These persons include:
  - Persons with persistent complement component deficiencies, or taking eculizumab (Soliris)
  - Persons with anatomic or functional asplenia (including sickle cell)
  - Microbiologists routinely exposed to isolates of *Neisseria meningitidis*
  - Persons identified as at increased risk because of a serogroup B meningococcal disease outbreak

\*ACIP off-label recommendation . MMWR June 12, 2015/64(22);608-612

# MenB for **Healthy** Adolescents and Young Adults (Permissive Recommendation)

- A MenB vaccine series may be administered to adolescents and young adults aged 16–23 years to provide short-term protection against most strains of serogroup B meningococcal disease\*
- The preferred age for MenB vaccination is 16–18 years
- Students can receive 2 doses of MenB-4-C administered at 0 and  $\geq 1$  month or MenB-FHbp administered at 0 and 6 months\*\*

\* (Category B) MMWR October 23, 2015/64(41);1171-1176.

\*\* MMWR May 19, 2017/66(19);509-513.

# Meningococcal B Vaccines

Product Name ACIP Abbreviation	ACIP Age Indication	Dose/ Route /Schedule
Trumenba MenB-FHbp	$\geq 10$ years*	<ul style="list-style-type: none"> <li>• 2 or 3 doses – 0.5 mL</li> <li>• IM</li> <li>• <u>High Risk</u>: 0,1-2 and 6 months<sup>1</sup>; <u>OR</u></li> <li>• <u>Healthy Adolescents and adults</u> (aged 16-23): 0, 6 months<sup>2</sup></li> </ul>
Bexsero MenB-4C	$\geq 10$ years*	<ul style="list-style-type: none"> <li>• 2 doses – 0.5 mL</li> <li>• IM</li> <li>• 0, <math>\geq 1</math> month for both high risk and healthy (aged 16-23)</li> </ul>

<sup>1</sup> When a three dose schedule is planned: If the 2<sup>nd</sup> dose of MenB-FHbp is given at an interval of  $\geq 6$  months, a 3<sup>rd</sup> dose does not have to be given

<sup>2</sup> When a two dose schedule is planned: If the 2<sup>nd</sup> dose of MenB-FHbp is given <6 months after the 1<sup>st</sup> dose, a 3<sup>rd</sup> dose should be administered at  $\geq 4$  months after the 2<sup>nd</sup> dose

- The **same** vaccine product should be used for all doses
- May be administered concomitantly with other vaccines\*
- No product preference

\* ACIP off-label recommendation . MMWR June 12, 2015/64 (22);608-612

•MMWR October 23, 2015/64(41);1171-1176. MMWR May 19, 2017/66(19);509-513

# Invasive Meningococcal Disease serogroup B at UMASS Amherst Fall 2017

## Meningitis Outbreak Declared At UMass Amherst

November 29, 2017

By Michael P. Norton, State House News Service

Share →



With its Amherst campus filled with students who just returned from Thanksgiving break, University of Massachusetts officials on Tuesday said they



# Invasive Meningococcal Disease at UMass/Amherst

- Two cases of invasive meningococcal disease occurred at U/Mass Amherst (onsets ~10/24 and 11/11)
- Rapid identification of close contacts for antimicrobial chemoprophylaxis occurred for both cases (over 160 were prophylaxed)
- Multiple communications from University Health Services to the campus community, including information on risk reduction and surveillance
  - Two UMass advisories
- Isolates identified as serogroup B. Whole genome sequencing (WGS):
  - Isolates linked by sequencing and belong to a hyper-invasive lineage
- Two MDPH clinical advisories statewide
- Vaccination of target groups began and expanded





## The Commonwealth of Massachusetts

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Department of Public Health  
Bureau of Infectious Disease and Laboratory Sciences  
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[www.mass.gov/dph/imm](http://www.mass.gov/dph/imm)

MARYLOU SUDDERS  
Secretary

MONICA BHAREL, MD, MPH  
Commissioner

Tel: 617-624-6000  
[www.mass.gov/dph](http://www.mass.gov/dph)

November 30, 2017

TO: Healthcare Providers in Massachusetts

FROM: Alfred DeMaria, Jr., MD  
Medical Director and State Epidemiologist  
Bureau of Infectious Disease and Laboratory Sciences

RE: Update: Invasive Meningococcal Cases at the University of Massachusetts (UMass) Amherst

New!

Two students at UMass Amherst have been diagnosed with invasive meningococcal disease serogroup B within the past several weeks. An [update](#) describing planned vaccination clinics at UMass Amherst was issued on 11/28/2017. This is an update to the MDPH advisory of November 16, 2017. There have been no additional cases to date.

New!

Following discussions with UMass and the CDC, and informed by the results of whole genome sequencing which demonstrated that the isolates from the two patients are indistinguishable, the cases at UMass are now considered an outbreak. At the current time, serogroup B meningococcal vaccine (MenB) is now highly recommended for the following groups at UMass Amherst:

- All undergraduate students;
- Students living in undergraduate housing; and
- Persons with medical conditions that place them at high risk for invasive disease (asplenia, sickle cell disease, complement deficiencies, microbiologists routinely working with isolates, and those taking the medication eculizumab [Soliris]).

State-supplied MenB vaccine may be used for students under the age of 19.

#### ACTIONS REQUESTED OF ALL CLINICIANS:

1. Be alert for cases compatible with meningococcal disease (see below) in UMass Amherst students and their close contacts. Prompt recognition and antibiotic treatment of meningococcal disease is critical.
2. Immediately report all suspect cases of meningococcal disease to the MDPH at (617) 983-6800 (Suspect cases in Boston should be reported to the Boston Public Health Commission at (617) 534-5611). Do not wait for laboratory confirmation to report a clinically suspected case.
3. Obtain blood and CSF cultures prior to administration of antibiotics, if possible, to enhance detection of *N.meningitidis*.

MDPH Meningitis Advisory Update

November 30, 2017

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# MDPH Advisories to Massachusetts Healthcare Providers November 16 & 30 2017



# Vaccination Clinics Announced

November 28 2017

BULLETIN NEWS ARTS & LEISURE COMMENTARY CLASSIFIEDS CONTACT

## Two cases of meningitis B at UMass labeled an outbreak; university to hold mass-vaccination clinics

BREAKING NEWS

TWO SEPARATE CASES OF  
MENINGITIS AT UMASS AMHERST



**GET YOUR MENINGITIS  
VACCINE FROM UHS!**

More Info: [umass.edu/meningitis](http://umass.edu/meningitis)



**DATES**



Nov. 30, Dec. 1, Dec. 4  
and Dec. 5

**HOURS**



Noon - 6 p.m.

**LOCATION**



Cape Cod Lounge,  
Student Union



# Outcome of Clinics

BREAKING NEWS - MASSLIVE.COM

## More than 7,000 UMass Amherst students inoculated against meningitis

Updated Dec 6; Posted Dec 6



'It's important to come and get your vaccination': UMass holds meningitis shot clinic

**Follow-up clinics planned when students return.**

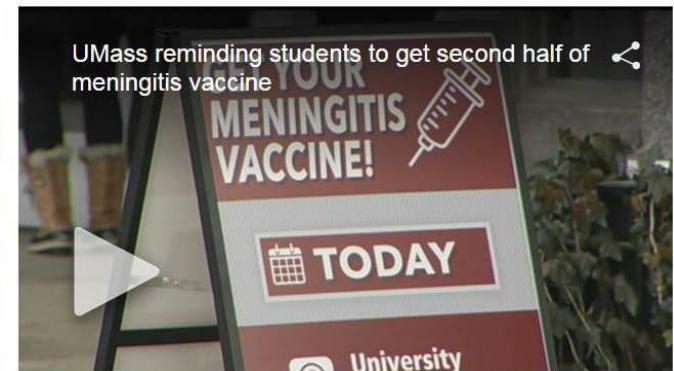
22 WWLP.COM  
NEWS WORKING FOR YOU

## UMass reminding students to get second half of meningitis vaccine

The last vaccination clinic of the semester will be Tuesday, December 19th

By Tashanea Whitlow

Published: December 13, 2017, 6:00 pm | Updated: December 13, 2017, 7:21 pm



AMHERST, Mass. (WWLP) - More than 7,000 UMass students have been vaccinated

**Additional clinics held on at UMass: 12/13, 12/14, 12/15, 12/18.**

**Follow-up clinics planned when students return.**

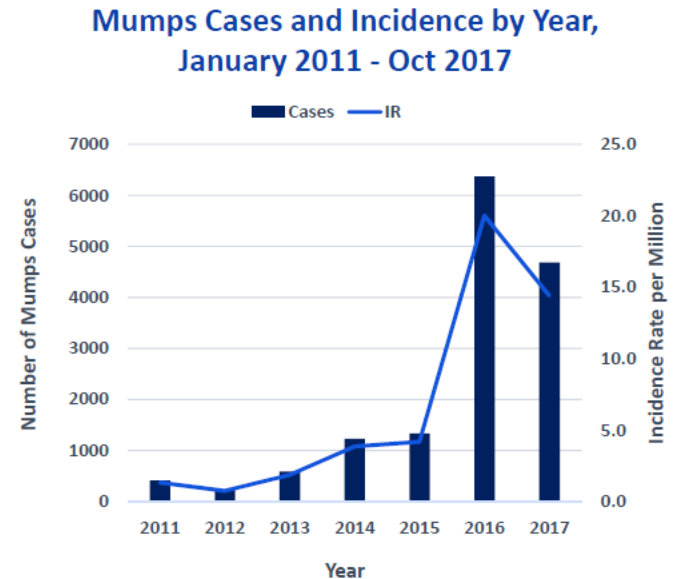
# Mumps Vaccine During Outbreaks

- 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
- Data limited and insufficient at this time to fully characterize the impact of MMR3 on reducing the size or duration on 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



# Mumps Cases and Outbreak (OB) Related Data – 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



- 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
- Over half of the outbreaks had less than 10 cases and did not occur in colleges
- Outbreaks with  $\geq 50$  cases accounted for 83% of all outbreak related cases

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

Adapted from Dr. Mona Marin ACIP Meeting 10-25-17



# Vaccine Effectiveness of MMR3

Study population	No. of subjects (# studies)	No. of MMR3 vaccinated subjects	No. of MMR3 vaccinated case-patients	AR in MMR2 (cases/1000 person-yr)	AR in MMR3 (cases/1000 person-yr)	VE of MMR3 (95% CI), 7 days	VE of MMR3 (95% CI), 21–28 days
University students	20,496 (1)	5,110	34	14.5	6.7	60% (38–74%)*†	78% (61–88%)*†
School children aged 11–17 years	2,178 (1)	1,723	1	4.8	0.6		88% (–32–99%)
School children aged 9–14 years	3,239 (1)	1,068	1	2.3‡	0.9		61% (–243–95%)§

\*P value <.001

†Calculated as  $(1 - \text{HR}) \times 100$ ; adjusted for 28 days post-vaccination and time since MMR2

‡Includes case-patients with <2 MMR doses

§Calculated by reviewers; not reported in article

- Appears safe
- Duration of protection is unknown

# October 2017 Preliminary ACIP Mumps Recommendation\*

- Persons previously vaccinated with two doses of a mumps-containing vaccine who are identified by **public health authorities** as at increased risk for mumps because of an outbreak should receive a third dose of a mumps-containing vaccine to **improve** an individual's protection against mumps disease and related complications

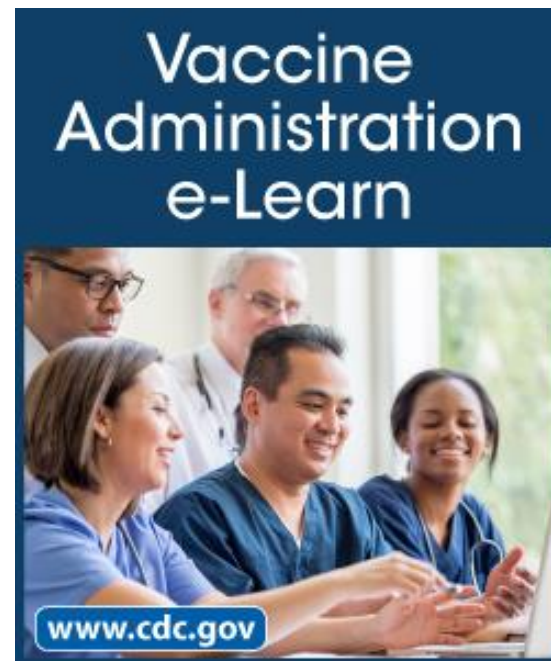
\* Not published yet

# CDC Guidance for Mumps Outbreak Control

- CDC will update guidance for use of MMR3 during mumps outbreaks with input from WG and other stakeholders
- Factors to be considered:
  - Size of target population
  - Mumps incidence/no. of cases
  - MMR3 vaccine coverage needed to impact the outbreak
  - Timing of MMR3 vaccination
  - Social networks
  - Intensity and duration of close contact

Call MDPH Immunization Program 617-983-6800 for consultation

# Shoulder Injury Related to Vaccination Administration: SIRVA





# Background: shoulder injury following vaccination<sup>1</sup>

- Shoulder injury related to vaccine administration (SIRVA) manifests as shoulder pain and limited range of motion occurring after the administration of a vaccine intended for intramuscular administration in the upper arm
- These symptoms are thought to occur as a result of unintended injection of vaccine antigen or trauma from the needle into and around the underlying bursa of the shoulder resulting in an inflammatory reaction
- **[By definition] SIRVA is caused by an injury to the musculoskeletal structures of the shoulder** (e.g. tendons, ligaments, bursae, etc.)
- **SIRVA is not a neurological injury** and abnormalities on neurological examination or nerve conduction studies (NCS) and/or electromyographic (EMG) studies would not support SIRVA as a diagnosis (even if the condition causing the neurological abnormality is not known)

<sup>1</sup>Reference: Vaccine Injury Table (<https://www.hrsa.gov/sites/default/files/vaccinecompensation/vaccineinjurytable.pdf>)

# Anatomy of the Upper Arm

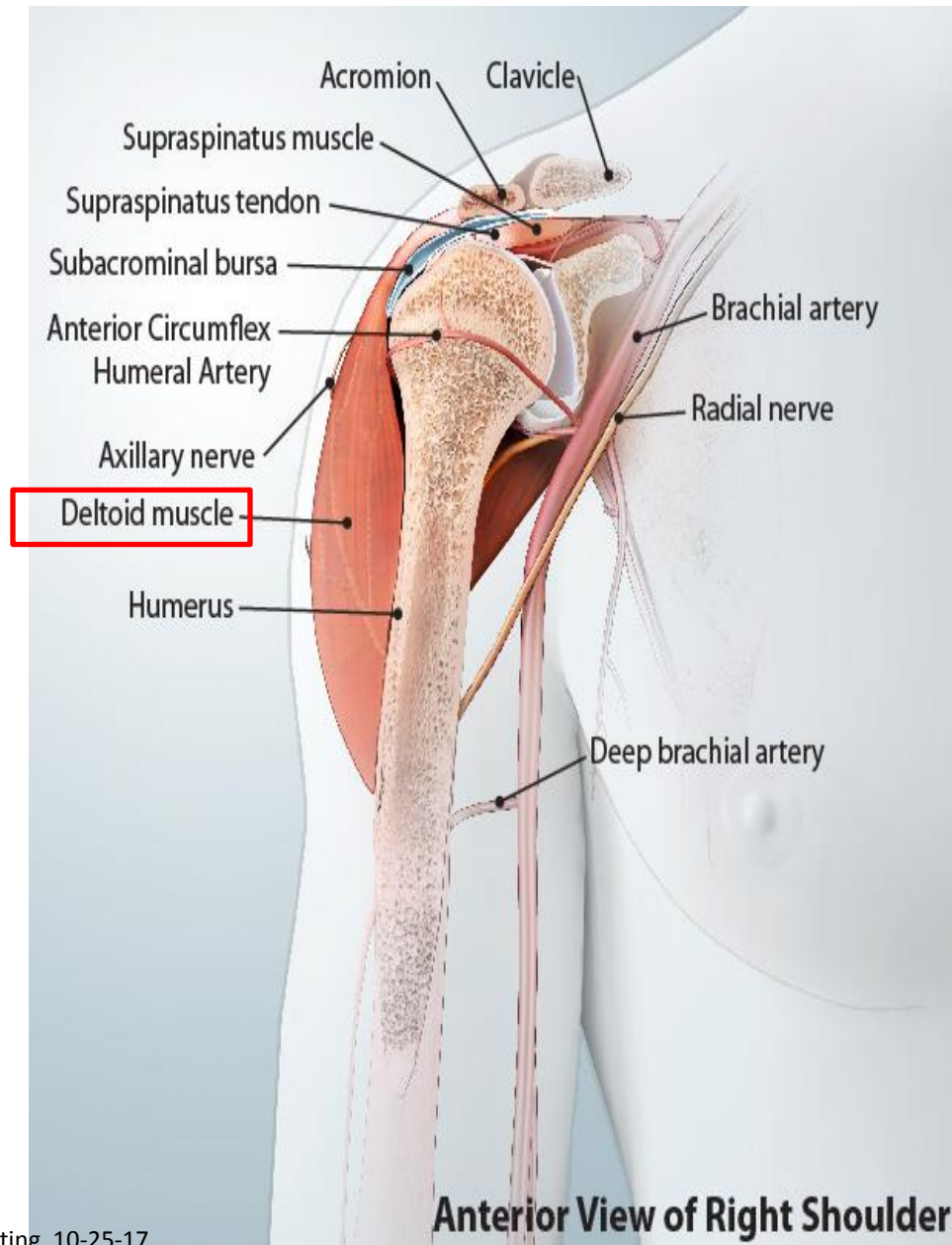
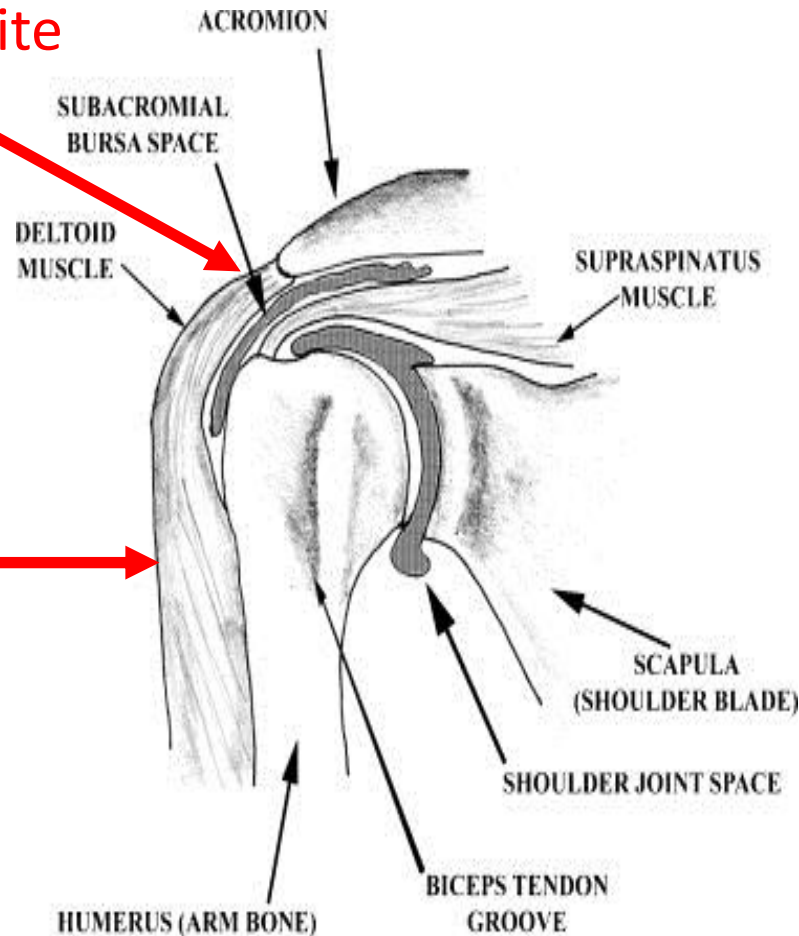


Image by Alissa Eckert, CDC Division  
of Communication Services

# Shoulder Anatomy Related to SIRVA

Incorrect IM  
Administration Site

Correct IM  
Administration Site



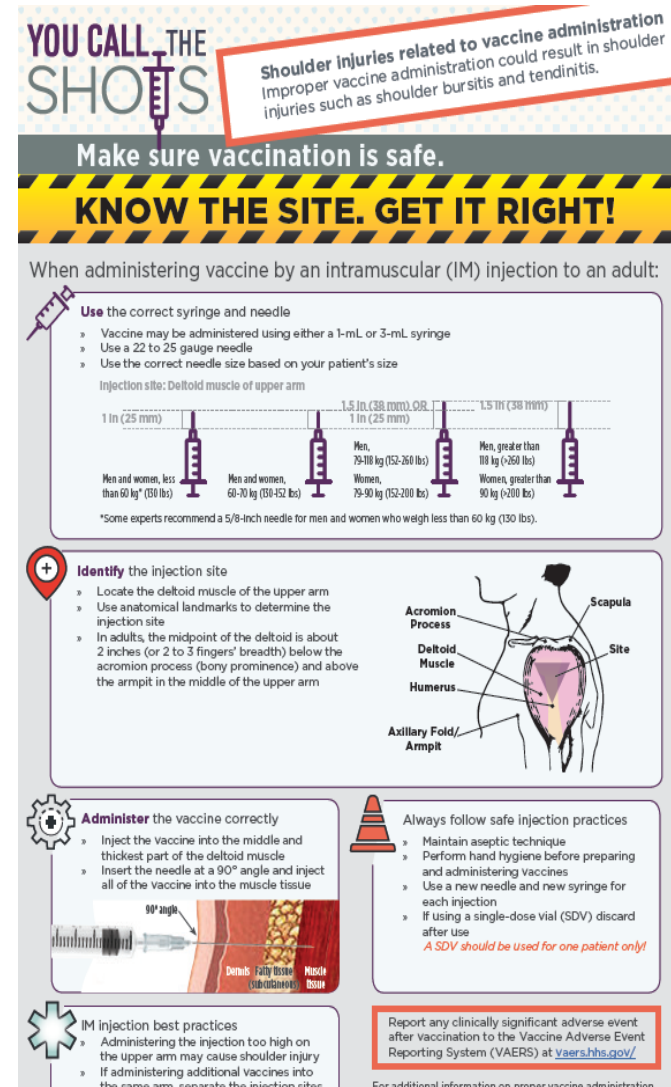
# Summary

- Reports to VAERS of shoulder dysfunction following IIV ranged from 128-223 during the six influenza seasons from 2010-2011 to 2015-2016
  - During that period around 130 million doses of IIV were distributed each influenza season in the United State
  - There does not appear to be an increase in reports to VAERS over these time periods (~ 2%)
  - Shoulder injury is rare
- There was a higher percentage of reports of shoulder dysfunction following IIV among females when compared to non-shoulder dysfunction reports
- Most (70%) reports were in the age group 19-59 years; few were in individuals 0-18 years (<1%)
- The most common place of vaccination documented in reports was in pharmacies/drug stores and doctor's offices/hospitals
- When possible contributing factors were described, vaccination given too high on the arm was most commonly reported
- Proper administration technique is important

# Clinical Resources for Shoulder Injury Related to Vaccine Administration

- CDC Vaccine administration webpage for information and materials for health care personnel including
  - IM demonstration video
  - Job aids and infographics

[www.cdc.gov/vaccines/hcp/admin/admin-protocols.htm](http://www.cdc.gov/vaccines/hcp/admin/admin-protocols.htm)



# MDPH Immunization Program

## Contact Information



### Immunization Program Main Number

For questions about immunization recommendations, disease reporting, etc.

- **Phone:** 617-983-6800
- **Fax:** 617-983-6840
- **Website:** [www.mass.gov/dph/imm](http://www.mass.gov/dph/imm)

### MIIS Help Desk

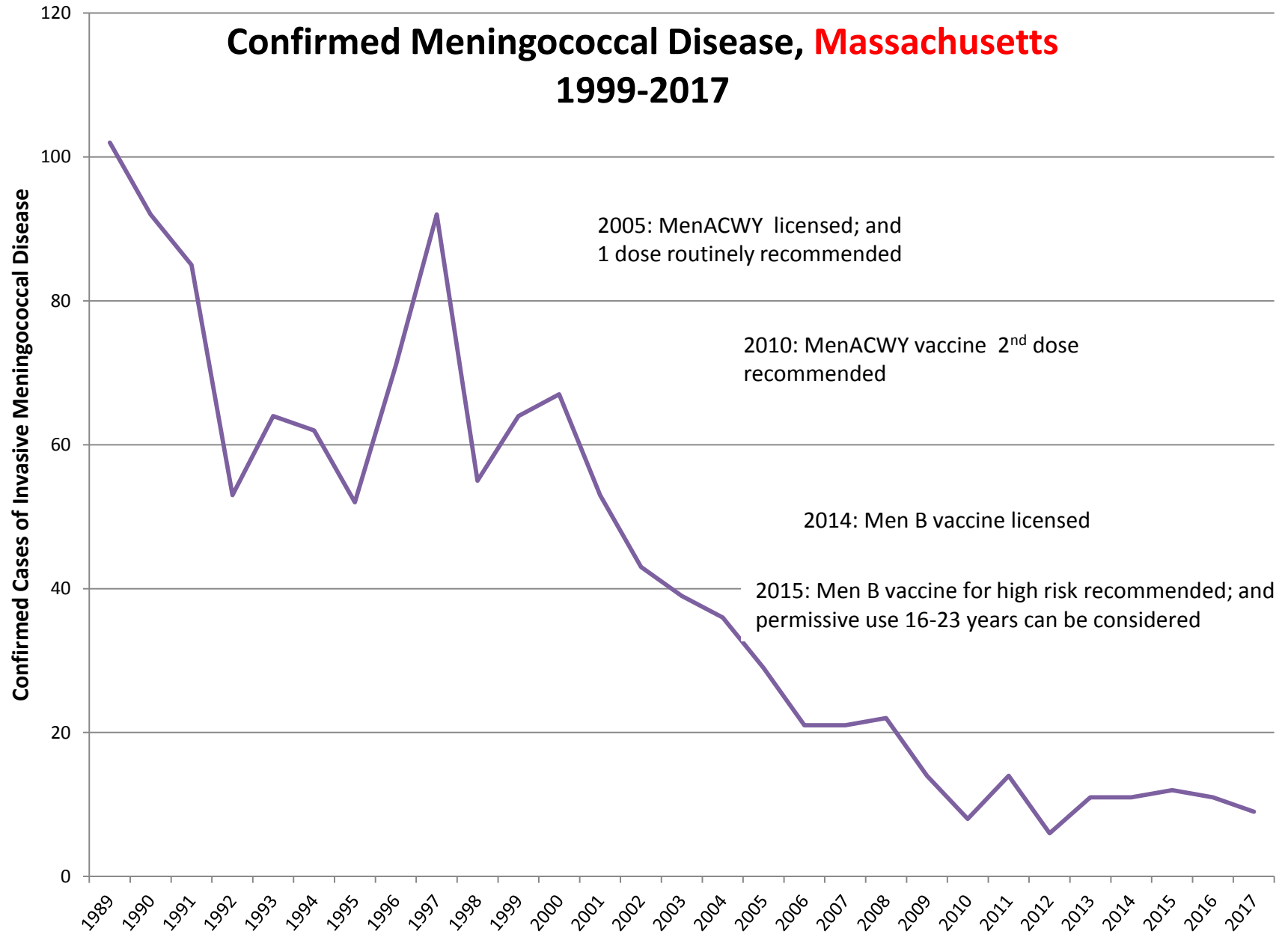
- **Phone:** 617-983-4335
- **Fax:** 617-983-4301
- **Email:** [miishelpdesk@state.ma.us](mailto:miishelpdesk@state.ma.us)
- **Websites:** [www.contactmiis.info](http://www.contactmiis.info) | [www.mass.gov/dph/miis](http://www.mass.gov/dph/miis)

### MDPH Vaccine Unit

- **Phone:** 617-983-6828
- **Fax:** 617-983-6924
- **Email:** [dph-vaccine-management@state.ma.us](mailto:dph-vaccine-management@state.ma.us)
- **Website:** [www.mass.gov/dph/imm](http://www.mass.gov/dph/imm) (click on Vaccine Management)

**EXTRAS**

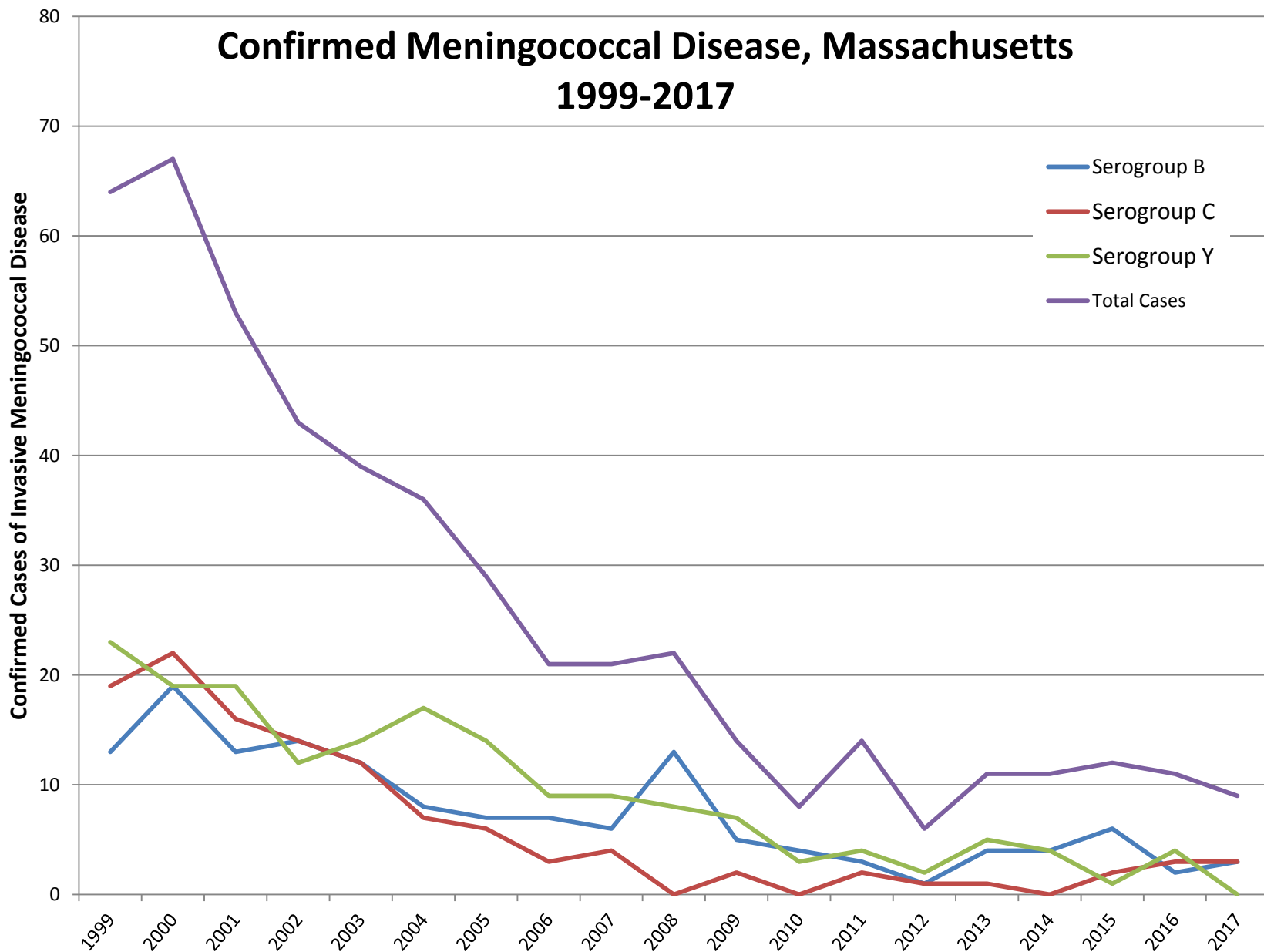
## Confirmed Meningococcal Disease, **Massachusetts** 1999-2017



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

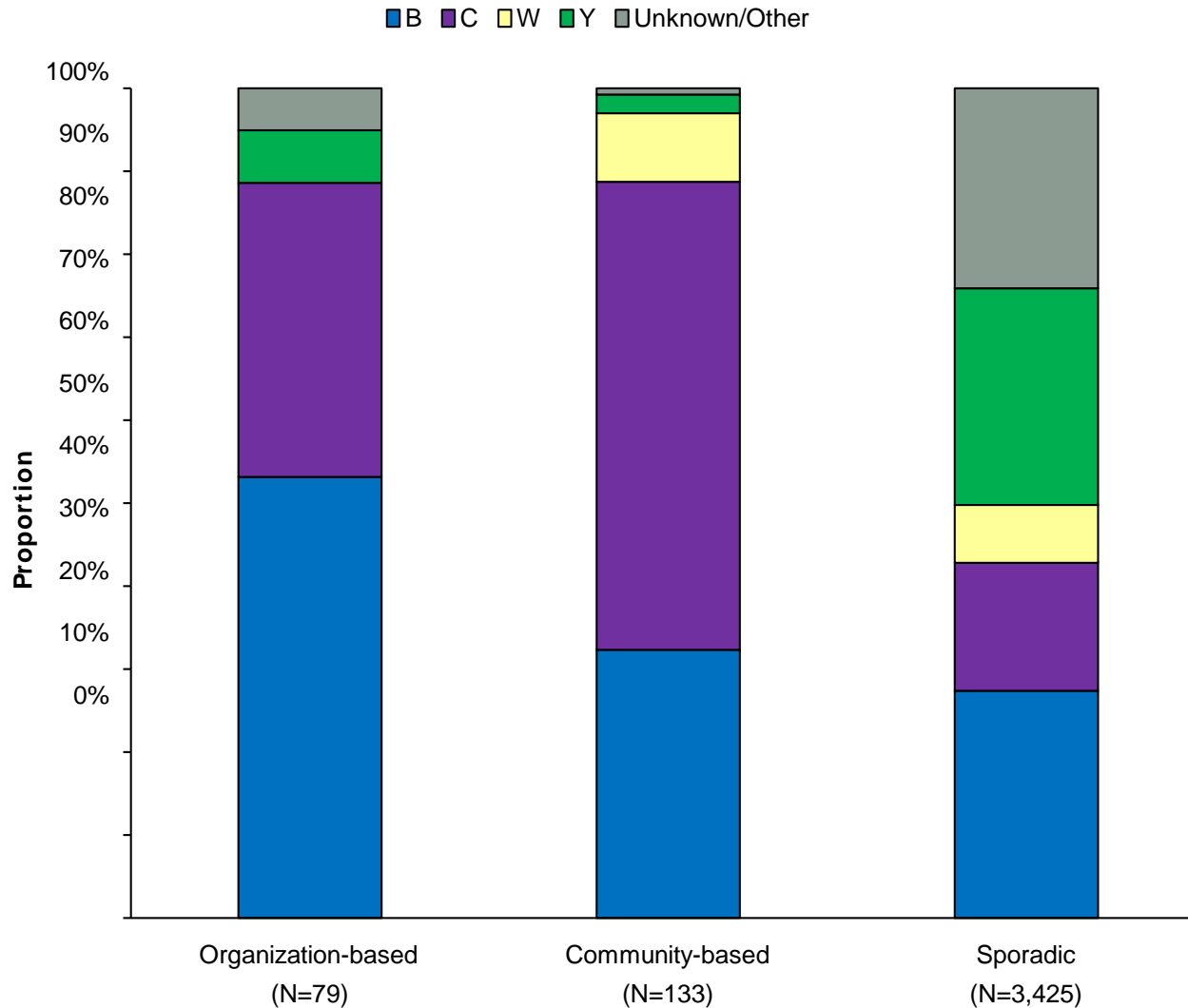


## Confirmed Meningococcal Disease, Massachusetts 1999-2017



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

# Serogroup Distribution of Organization-Based Cluster/Outbreak-Associated vs. Sporadic Meningococcal Disease Cases, 2009-2013



# ACIP MenB Recommendations, cont.

- Certain other groups included in MenACWY (MCV4) recommendations for persons at increased risk, are **NOT** in this recommendation
- MenB – **NOT** currently recommended for:
  - Children aged 2 months – 9 years of age
  - Persons who travel to or reside in countries where meningococcal disease is hyperendemic or epidemic because risk is generally not caused by serogroup B
  - Routine use in first-year college students living in residence halls, military recruits, or all adolescents


# Use of 2- and 3-Dose Schedules of MenB-FHbp (**Trumenba**) Meningococcal Serogroup B Vaccine

- For persons at increased risk for meningococcal disease and for use during serogroup B outbreaks, **3 doses** of MenB-FHbp should be administered at 0, 1-2, 6 months
  - If the 2<sup>nd</sup> dose of MenB-FHbp is given at an interval of  $\geq 6$  months, a 3<sup>rd</sup> dose does not have to be given
- When given to healthy adolescents who are not at increased risk for meningococcal disease, **2 doses** of MenB-FHbp should be administered at 0 and 6 months\*
  - If a 2<sup>nd</sup> dose of MenB-FHbp is given  $< 6$  months after the 1<sup>st</sup> dose, a 3<sup>rd</sup> dose should be administered at  $\geq 4$  months after the 2<sup>nd</sup> dose

# 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	

# College Students Have Lower/Equal Risk Of MenB Than Non-College Students in Those 18-23 Years of Age\*

College Students	0.09/100,000
 Non-College Students	0.21/100,000
All	0.14/100,00

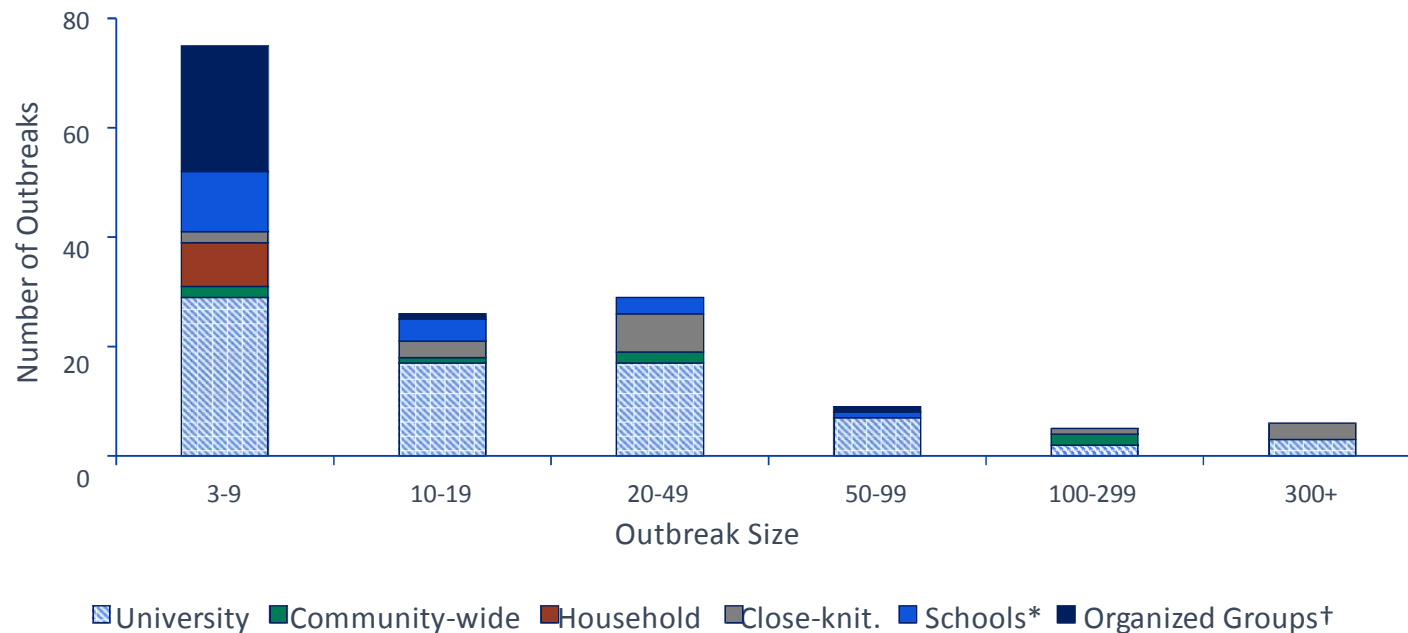
\* 50-60 cases and 5-10 deaths per year in this age group and 30-60% occur in persons **not** attending college.

# Summary of Different MenB Series

## Cost-Effectiveness Strategies

	Cases Prevented	Deaths Prevented	NNV to Prevent 1 Case	NNV to Prevent 1 Death	Cost QALY
<b>At 11 yr</b>	15	2	203,000	1,512,000	\$8,700,000
<b>At 16 yr</b>	28	5	107,000	788,000	\$4,100,000
<b>At 18 yr</b>	29	5	102,000	638,000	\$3,700,000
<b>All college students</b>	9	1	368,000	2,297,000	\$9,400,000

## Mumps Outbreaks by Size and Setting, United States, January 2016 - June 2017



\* Schools: k-12, dance hall and an other school that is not a university

†Organized groups: workplace, theater groups, parties, fitness centers, other.



# Policy Question: Should a 3<sup>rd</sup> Dose of MMR Vaccine Be Administered to Persons at Increased Risk for Mumps Because of an Outbreak?

Factor	WG Interpretation
Problem	Persons at increased risk for mumps because of an outbreak are a public health priority for the mumps vaccination program; waning immunity in the setting of increased force of infection typical of outbreaks contributes to this risk
Benefits and harms	Benefits outweigh the risks; evidence type is 4 for effectiveness and 2 for safety
Values	WG considered that persons in outbreak settings value prevention of: mumps, mumps complications, and loss of productivity
Acceptability	MMR3 vaccination was considered acceptable to students, parents, universities/schools, and health departments
Implementation	Providers and the target population have experience with MMR vaccination. Public health should be involved in identifying target groups at increased risk for mumps
Summary	WG agreement that a 3 <sup>rd</sup> dose of MMR vaccine would improve protection for persons at increased risk for mumps because of an outbreak