JOINT STATE GOVERNMENT COMMISSION

General Assembly of the Commonwealth of Pennsylvania

MENINGITIS: IMMUNIZATIONS ON PENNSYLVANIA COLLEGE AND UNIVERSITY CAMPUSES

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REPORT

Meningitis: Immunizations on
Pennsylvania College and University Campuses

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The report is also available at http://jsg.legis.state.pa.us

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The Joint State Government Commission was created in 1937 as the primary and central non-partisan, bicameral research and policy development agency for the General Assembly of Pennsylvania.[1]

A fourteen-member Executive Committee comprised of the leadership of both the House of Representatives and the Senate oversees the Commission. The seven Executive Committee members from the House of Representatives are the Speaker, the Majority and Minority Leaders, the Majority and Minority Whips, and the Majority and Minority Caucus Chairs. The seven Executive Committee members from the Senate are the President Pro Tempore, the Majority and Minority Leaders, the Majority and Minority Whips, and the Majority and Minority Caucus Chairs. By statute, the Executive Committee selects a chairman of the Commission from among the members of the General Assembly. Historically, the Executive Committee has also selected a Vice-Chair or Treasurer, or both, for the Commission.

The studies conducted by the Commission are authorized by statute or by a simple or joint resolution. In general, the Commission has the power to conduct investigations, study issues, and gather information as directed by the General Assembly. The Commission provides in-depth research on a variety of topics, crafts recommendations to improve public policy and statutory law, and works closely with legislators and their staff.

A Commission study may involve the appointment of a legislative task force, composed of a specified number of legislators from the House of Representatives or the Senate, or both, as set forth in the enabling statute or resolution. In addition to following the progress of a particular study, the principal role of a task force is to determine whether to authorize the publication of any report resulting from the study and the introduction of any proposed legislation contained in the report. However, task force authorization does not necessarily reflect endorsement of all the findings and recommendations contained in a report.

Some studies involve an appointed advisory committee of professionals or interested parties from across the Commonwealth with expertise in a particular topic; others are managed exclusively by Commission staff with the informal involvement of representatives of those entities that can provide insight and information regarding the particular topic. When a study involves an advisory committee, the Commission seeks consensus among the members.[2] Although an advisory committee member may represent a particular department, agency, association, or group, such representation does not necessarily reflect the endorsement of the department, agency, association, or group of all the findings and recommendations contained in a study report.

[1] Act of July 1, 1937 (P.L.2460, No.459); 46 P.S. §§ 65–69.

[2] Consensus does not necessarily reflect unanimity among the advisory committee members on each individual policy or legislative recommendation. At a minimum, it reflects the views of a substantial majority of the advisory committee, gained after lengthy review and discussion.

Over the years, nearly one thousand individuals from across the Commonwealth have served as members of the Commission's numerous advisory committees or have assisted the Commission with its studies. Members of advisory committees bring a wide range of knowledge and experience to deliberations involving a particular study. Individuals from countless backgrounds have contributed to the work of the Commission, such as attorneys, judges, professors and other educators, state and local officials, physicians and other health care professionals, business and community leaders, service providers, administrators and other professionals, law enforcement personnel, and concerned citizens. In addition, members of advisory committees donate their time to serve the public good; they are not compensated for their service as members. Consequently, the Commonwealth receives the financial benefit of such volunteerism, along with their shared expertise in developing statutory language and public policy recommendations to improve the law in Pennsylvania.

The Commission periodically reports its findings and recommendations, along with any proposed legislation, to the General Assembly. Certain studies have specific timelines for the publication of a report, as in the case of a discrete or timely topic; other studies, given their complex or considerable nature, are ongoing and involve the publication of periodic reports. Completion of a study, or a particular aspect of an ongoing study, generally results in the publication of a report setting forth background material, policy recommendations, and proposed legislation. However, the release of a report by the Commission does not necessarily reflect the endorsement by the members of the Executive Committee, or the Chair or Vice-Chair of the Commission, of all the findings, recommendations, or conclusions contained in the report. A report containing proposed legislation may also contain official comments, which may be used to construe or apply its provisions.[3]

Since its inception, the Commission has published almost 400 reports on a sweeping range of topics, including administrative law and procedure; agriculture; athletics and sports; banks and banking; commerce and trade; the commercial code; crimes and offenses; decedents, estates, and fiduciaries; detectives and private police; domestic relations; education; elections; eminent domain; environmental resources; escheats; fish; forests, waters, and state parks; game; health and safety; historical sites and museums; insolvency and assignments; insurance; the judiciary and judicial procedure; labor; law and justice; the legislature; liquor; mechanics' liens; mental health; military affairs; mines and mining; municipalities; prisons and parole; procurement; state-licensed professions and occupations; public utilities; public welfare; real and personal property; state government; taxation and fiscal affairs; transportation; vehicles; and workers' compensation.

Following the completion of a report, subsequent action on the part of the Commission may be required, and, as necessary, the Commission will draft legislation and statutory amendments, update research, track legislation through the legislative process, attend hearings, and answer questions from legislators, legislative staff, interest groups, and constituents.

[3] 1 Pa.C.S. § 1939.

General Assembly of the Commonwealth of Pennsylvania
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April 2020

To the Members of the General Assembly of Pennsylvania:

We are pleased to release Meningitis: Immunizations on Pennsylvania College and University Campuses, as authorized by Senate Resolution 292 (Pr.'s No. 2023) of 2018. SR292 directed that the Joint State Government Commission conduct a study of immunization policies regarding meningococcal disease for students residing at Pennsylvania's institutions of higher education, conduct an analysis of compliance with the existing immunization requirements, examine the need for updating immunization policies, and suggest options for enhancing voluntary immunization rates.

The report includes comprehensive background on meningococcal diseases and vaccine development. It provides detailed descriptions of recommendations set forth by the CDC. There are in-depth descriptions and analyses of meningococcal disease outbreaks at U.S. colleges and consequent responses of the colleges, and local, state, and federal governments. Information on costs of the responses is also included insofar as it is available. Finally, the report includes recommendations grounded in evidence-based measures for increasing vaccination rates, for facilitating compliance with existing policies and statutes, and proposed legislation for the General Assembly's consideration.

The full report is available on our website at http://jsg.legis.state.pa.us.

Respectfully submitted,

Glenn J. Pasewicz
Executive Director

TABLE OF CONTENTS

INTRODUCTION

From the initial development of the smallpox vaccine through the current day race to develop vaccines to fend off emergent diseases, a significant role of healthcare providers and public health authorities has been to encourage and provide resources to protect against communicable diseases that pose significant threats. Consequently, vaccinations have become routine medical care for people during infancy and early childhood. A notable exception is vaccination against meningococcal diseases, which is administered more commonly to people during adolescence and early adulthood, the time period during which the disease is most likely to strike.

The threat of meningococcal disease is experienced acutely in the United States during outbreaks on college campuses. The U.S. Centers for Disease Prevention and Control (CDC), state governments, and colleges and universities have established guidelines, best practices, and laws and regulations to prevent outbreaks where possible, and to stop outbreaks when they occur. To gauge Pennsylvania's efforts to protect its population from meningococcal disease, the Senate of Pennsylvania directed that the Commission undertake a study of the Commonwealth's measures against the disease.

Authorization and Process

This report is authorized by 2018 Senate Resolution No. 292 which states the following:

> The Senate recognizes the seriousness of a meningococcal meningitis disease outbreak at colleges and universities through this Commonwealth …The College and University Student Vaccination Act requires students residing in housing at institutions of higher education to receive a one-time vaccination against meningococcal meningitis disease unless the student seeks an exception to the requirement; … The Advisory Committee on Immunization Practices (ACIP) within the Centers for Disease and Control prevention has revised its guidelines on meningococcal meningitis vaccine recommendations since the enactment of the College and University Student Vaccination Act.

The resolution calls for Joint State Government Commission to:

- evaluate compliance with the College and University Student Vaccination Act by Institutions of Higher Education (IHEs),
- report vaccination rates at each IHE for both Meningitis ACWY and Meningitis B,
- determine if IHEs are advising students of the need for booster doses of MenACWY and MenB and monitoring this,
- examine meningococcal outbreaks at IHEs throughout the US and report on the fiscal impact of these outbreaks, and
- evaluate potential measures to ensure higher voluntary vaccination rates for MenACWY and MenB.

The JSGC reviewed literature focusing on medical journals and information prepared by the CDC. Commission staff reviewed those meetings of the ACIP that dealt with meningococcal disease over the past several years. A portion of literature in the past several years has focused specifically on meningococcal outbreaks on college campuses. To augment this information, staff conducted phone interviews with health directors and emergency responders from institutions of higher education throughout the United States that have dealt with meningococcal outbreaks since 2013. Commission staff also set up phone interviews with state and local health departments from the corresponding states. Commission staff interviewed 26 staff from universities, and state and local health departments that have navigated outbreaks.

A portion of the literature review touched on increasing vaccination rates. Commission staff reviewed relevant CDC information for guidance on this issue. Information was synthesized from phone surveys of staff at institutions that had experienced outbreaks.

Commission staff created a survey for IHEs within the Commonwealth that have student residential housing. The survey was tested with several institutions, rewritten based on their feedback and then sent to all of the institutions of higher education with student housing. Staff followed up with multiple rounds of e-mail and phone calls.

BACKGROUND

Microbiology

Meningitis is an inflammation (swelling) of the protective membranes covering the brain and spinal cord. The swelling associated with meningitis is typically caused by a bacterial or viral infection of the fluid surrounding the brain.[4] Other known causes of meningitis are injuries, cancer, certain drugs, and various other types of infections. There are several different types of meningitis including:

- Bacterial meningitis – This type can be deadly and requires immediate medical attention. Vaccines are available to protect against some kinds of bacterial meningitis.

- Viral meningitis – Viral meningitis is serious but usually less severe than bacterial meningitis. People with healthy immune systems can often recover on their own. There are vaccines available to protect against some kinds of viral meningitis.

- Fungal meningitis – Fungal meningitis is very rare, but individuals can acquire this by breathing in harmful fungal spores.

- Parasitic meningitis – This is caused by parasites, but is much less common than bacterial and viral meningitis.

- Amebic meningitis – Amebic meningitis, often referred to as Primary Amebic Meningoencephalitis (PAM) is a rare and very devastating infection of the brain caused by a free-living microscopic ameba that lives in warm water and soil known as *Naegleria fowleri*.

- Non-Infectious Meningitis – This is a catch-all category of meningitis that is sometimes caused by cancer, lupus, certain drugs, head trauma, and brain surgery.[5]

Meningococcal meningitis (meningitis), also known in the common medical nomenclature as "Meningococcal Disease," is a bacterial form of meningitis, called *Neisseria mengingitidis*[6] that

[4] "Meningitis," Centers for Disease Control and Prevention, last modified January 21, 2020, https://www.cdc.gov/meningitis/index.html.
[5] *Ibid.*
[6] Centers for Disease Control and Prevention, *Epidemiology and Prevention of Vaccine-Preventable Diseases*, Hamborsky J, Kroger A, Wolfe S, eds. 13th ed. (Washington D.C. Public Health Foundation, 2015), 231.

results in a serious infection of the thin lining surrounding the brain and spinal cord.[7] *Neisseria meningitidis* is a leading cause of serious bacterial infections often found in children and manifested in the form of meningitis or septicemia.[8]

According to the U.S. Centers for Disease Prevention and Control (CDC), there are at least 12 different types of *Neisseria meningitides* categorized into "serogroups." Serogroups A, B, C, W, and Y are responsible for causing almost all meningitis.[9] Common symptoms associated with meningitis are fever, headaches, and the presence of a stiff neck.[10] In recent years, *Neisseria meningitides* has been responsible for deadly epidemics of meningitis in sub-Saharan Africa.[11] In 2000, the World Health Organization (WHO) estimated that meningitis caused 171,000 deaths worldwide.[12]

Some individuals may find themselves more at risk than others for contracting meningitis. For example, those exposed to situational factors such as household crowding and active and passive smoking are at a higher risk.[13] Studies performed in the U.S. have demonstrated that African Americans and persons of low socioeconomic status are often at increased risk for contracting meningitis.[14] However, it should be noted that "race and low socioeconomic status are likely markers for differences in factors such as smoking and household crowding rather than risk factors."[15] In addition, young children and adolescents are also at a higher risk, as well as persons with antecedent viral infection.[16]

First Reported Discoveries

Many medical experts and historians alike believe that the discovery of meningitis was written about in ancient texts authored by Greek physician Hippocrates, a figure often referred to as the "Father of Modern Medicine."[17] Many also believe the disease was once again written about in the 16th century by Scottish physician Robert Whytt. However, experts tend to agree that the first formally reported description of the disease came about in 1805 in Geneva, Switzerland by physician Gaspard Vieusseux.[18] During his clinical observations, Vieusseux misunderstood the transmissibility of the disease, hypothesizing that meningococcal infection was spread through the

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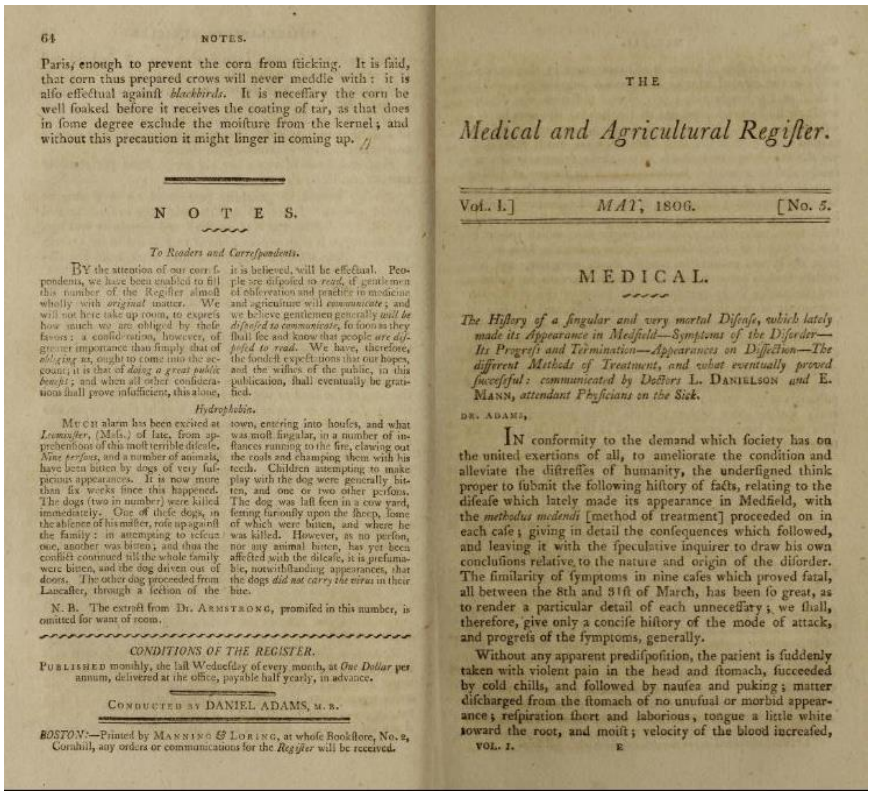
[7] "Meningococcal Meningitis," World Health Organization, accessed March 24, 2020, http://www.who.int/news-room/fact-sheets/detail/meningococcal-meningitis; "Meningococcal Disease," Centers for Disease Control and Prevention.
[8] *Ibid.*; Nadine G. Rouphael *et al*., "*Neisseria meningitides*: Biology, Microbiology, and Epidemiology," *Methods in Molecular Biology* 799 (September 2012): 1-20, doi: 10.1007/978-1-61779-346-21.
[9] "Meningococcal Meningitis," World Health Organization.
[10] *Ibid.*, 232.
[11] *Ibid.*, 231.
[12] *Ibid.*
[13] *Ibid.*, 233.
[14] *Ibid.*
[15] *Ibid.*
[16] *Ibid.*
[17] C. Yapijakis, "Hippocrates of Kos, the Father of Clinical Medicine, and Asclepiades of Bithynia, the Father of Molecular Medicine. Review," *In Vivo* 23, no. 4 (July-August 2009): 507-14.
[18] "Meningococcal Meningitis," World Health Organization.

air, rather than being transmitted through person-to-person contact as is conclusively understood by contemporary medical experts.[19] The first reported case within the U.S. occurred in Medfield, Massachusetts when, between March 8 and March 31 of 1806, nine individuals afflicted with the disease succumbed to it.[20] This epidemic was reported in the *Medical and Agricultural Register* by Drs. Danielson and Mann. In observing their afflicted patients, Danielson and Mann described their symptoms as follows:

> The patient is suddenly taken with violent pain in the head and stomach succeeded by cold chills and followed by nausea and puking…tongue a little white and moist…In a child of 15 months, a very violent pulsation was discovered at the fontanel…The eyes have a very vacant stare, and the heat of the skin becomes much increased.[21]

Medical and Agricultural Register – Drs. Danielson and Mann
Entries May 1806



64 NOTES.

Paris, enough to prevent the corn from ſticking. It is ſaid, that corn thus prepared crows will never meddle with: it is alſo effectual againſt *blackbirds*. It is neceſſary the corn be well ſoaked before it receives the coating of tar, as that does in ſome degree exclude the moiſture from the kernel; and without this precaution it might linger in coming up.

NOTES.

To Readers and Correſpondents.

BY the attention of our correſpondents, we have been enabled to fill this number of the Regiſter almoſt wholly with *original* matter. We will not here take up room, to expreſs how much we are obliged by theſe favors: a conſideration, however, of greater importance than ſimply that of *obliging* us, ought to come into the account; it is that of *doing a great public benefit*; and when all other conſiderations ſhall prove inſufficient, this alone, it is believed, will be effectual. People are diſpoſed to *read*, if gentlemen of obſervation and practice in medicine and agriculture will *communicate*; and we believe gentlemen generally *will be diſpoſed to communicate*, ſo ſoon as they ſhall ſee and know that people *are diſpoſed to read*. We have, therefore, the fondeſt expectations that our hopes, and the wiſhes of the public, in this publication, ſhall eventually be gratified.

Hydrophobia.

MUCH alarm has been excited at *Leominſter*, (Maſs.) of late, from apprehenſion of this moſt terrible diſeaſe. *Nine perſons*, and a number of animals, have been bitten by dogs of very ſuſpicious appearances. It is now more than ſix weeks ſince this happened. The dogs (two in number) were killed immediately. One of theſe dogs, in the abſence of his maſter, roſe up againſt the family: in attempting to reſcue one, another was bitten; and thus the conflict continued till the whole family were bitten, and the dog driven out of doors. The other dog proceeded from Lancaſter, through a ſection of the town, entering into houſes, and what was moſt ſingular, in a number of inſtances running to the fire, clawing out the coals and champing them with his teeth. Children attempting to make play with the dog were generally bitten, and one or two other perſons. The dog was laſt ſeen in a cow yard, ſeeming furiouſly upon the ſheep, ſome of which were bitten, and where he was killed. However, as no perſon, nor any animal bitten, has yet been affected with the diſeaſe, it is preſumable, notwithſtanding appearances, that the dogs *did not carry the virus* in their bite.

N. B. The extract from DR. ARMSTRONG, promiſed in this number, is omitted for want of room.

CONDITIONS OF THE REGISTER.

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THE

Medical and Agricultural Regiſter.

Vol. I.] *MAY*, 1806. [No. 5.

MEDICAL.

The Hiſtory of a ſingular and very mortal Diſeaſe, which lately made its Appearance in Meiſfield—Symptoms of the Diſorder—Its Progreſs and Termination—Appearances on Diſſection—The different Methods of Treatment, and what eventually proved ſucceſsful: communicated by Doctors L. DANIELSON *and* E. MANN, *attendant Phyſicians on the Sick.*

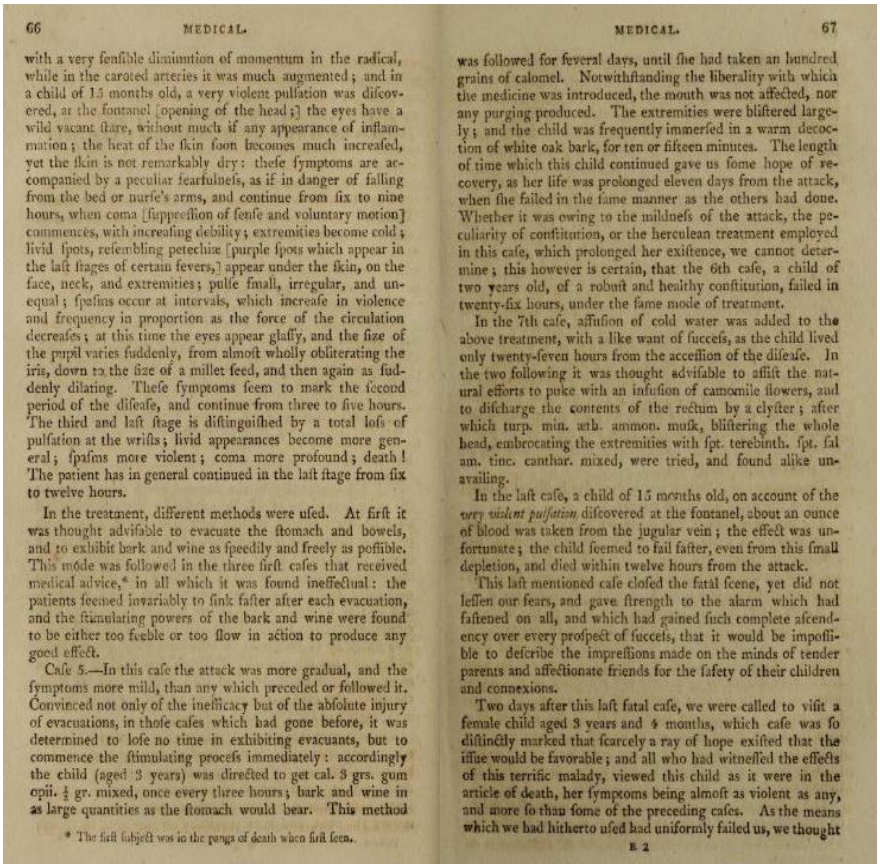
DR. ADAMS,

IN conformity to the demand which ſociety has on the united exertions of all, to ameliorate the condition and alleviate the diſtreſſes of humanity, the underſigned think proper to ſubmit the following hiſtory of facts, relating to the diſeaſe which lately made its appearance in Medfield, with the *methodus medendi* [method of treatment] proceeded on in each caſe; giving in detail the conſequences which followed, and leaving it with the ſpeculative inquirer to draw his own concluſions relative to the nature and origin of the diſorder. The ſimilarity of ſymptoms in nine caſes which proved fatal, all between the 8th and 31ſt of March, has been ſo great, as to render a particular detail of each unneceſſary; we ſhall, therefore, give only a conciſe hiſtory of the mode of attack, and progreſs of the ſymptoms, generally.

Without any apparent prediſpoſition, the patient is ſuddenly taken with violent pain in the head and ſtomach, ſucceeded by cold chills, and followed by nauſea and puking; matter diſcharged from the ſtomach of no unuſual or morbid appearance; reſpiration ſhort and laborious, tongue a little white toward the root, and moiſt; velocity of the blood increaſed,

VOL. I. E

[19] Alexandre Leite de Souza *et al*., "Two Centuries of Meningococcal Infection: From Vieussuex to the Cellular and Molecular Basis of Disease," *Journal of Medical Microbiology* 57 (2008): 1313-1321, doi: 10.1099/jmm.0.47599-0.
[20] Frank J. Grady, "Some Early American Reports on Meningitis with Special Reference to the *Inaugural Dissertation* of Nathan Strong," *Journal of the History of Medicine and Allied Sciences* XX, (January 1, 1965): 27-32, doi: 10.1093/jhmas/XX.1.27.
[21] *Ibid. citing* Danielson L., and Mann E, "The History of a Singular and Very Mortal Disease Which Lately Made its Appearance in Medfield," *Medical and Agricultural Register* no. 1 (1806): 65.



66 MEDICAL.

with a very ſenſible diminution of momentum in the radical, while in the caroted arteries it was much augmented; and in a child of 15 months old, a very violent pulſation was diſcovered, at the fontanel [opening of the head;] the eyes have a wild vacant ſtare, without much if any appearance of inflammation; the heat of the ſkin ſoon becomes much increaſed, yet the ſkin is not remarkably dry: theſe ſymptoms are accompanied by a peculiar fearfulneſs, as if in danger of falling from the bed or nurſe's arms, and continue from ſix to nine hours, when coma [ſuppreſſion of ſenſe and voluntary motion] commences, with increaſing debility; extremities become cold; livid ſpots, reſembling petechiæ [purple ſpots which appear in the laſt ſtages of certain fevers,] appear under the ſkin, on the face, neck, and extremities; pulſe ſmall, irregular, and unequal; ſpaſms occur at intervals, which increaſe in violence and frequency in proportion as the force of the circulation decreaſes; at this time the eyes appear glaſſy, and the ſize of the pupil varies ſuddenly, from almoſt wholly obliterating the iris, down to the ſize of a millet ſeed, and then again as ſuddenly dilating. Theſe ſymptoms ſeem to mark the ſecond period of the diſeaſe, and continue from three to five hours. The third and laſt ſtage is diſtinguiſhed by a total loſs of pulſation at the wriſts; livid appearances become more general; ſpaſms more violent; coma more profound; death! The patient has in general continued in the laſt ſtage from ſix to twelve hours.

In the treatment, different methods were uſed. At firſt it was thought advifable to evacuate the ſtomach and bowels, and to exhibit bark and wine as ſpeedily and freely as poſſible. This mode was followed in the three firſt caſes that received medical advice,* in all which it was found ineffectual: the patients ſeemed invariably to ſink faſter after each evacuation, and the ſtimulating powers of the bark and wine were found to be either too feeble or too ſlow in action to produce any good effect.

Caſe 5.—In this caſe the attack was more gradual, and the ſymptoms more mild, than any which preceded or followed it. Convinced not only of the ineffiicacy but of the abſolute injury of evacuations, in thoſe caſes which had gone before, it was determined to loſe no time in exhibiting evacuants, but to commence the ſtimulating proceſs immediately: accordingly the child (aged 3 years) was directed to get cal. 3 grs. gum opii. ½ gr. mixed, once every three hours; bark and wine in as large quantities as the ſtomach would bear. This method

* The firſt ſubject was in the pangs of death when firſt ſeen.

MEDICAL. 67

was followed for ſeveral days, until ſhe had taken an hundred grains of calomel. Notwithſtanding the liberality with which the medicine was introduced, the mouth was not affected, nor any purging produced. The extremities were bliſtered largely; and the child was frequently immerſed in a warm decoction of white oak bark, for ten or fifteen minutes. The length of time which this child continued gave us ſome hope of recovery, as her life was prolonged eleven days from the attack, when ſhe failed in the ſame manner as the others had done. Whether it was owing to the mildneſs of the attack, the peculiarity of conſtitution, or the herculean treatment employed in this caſe, which prolonged her exiſtence, we cannot determine; this however is certain, that the 6th caſe, a child of two years old, of a robuſt and healthy conſtitution, failed in twenty-ſix hours, under the ſame mode of treatment.

In the 7th caſe, affuſion of cold water was added to the above treatment, with a like want of ſucceſs, as the child lived only twenty-ſeven hours from the acceſſion of the diſeaſe. In the two following it was thought adviſable to aſſiſt the natural efforts to puke with an infuſion of camomile flowers, and to diſcharge the contents of the rectum by a clyſter; after which turp. min. æth. ammon. muſk, bliſtering the whole head, embrocating the extremities with ſpt. terebinth. ſpt. ſal am. tinc. canthar. mixed, were tried, and found alike unavailing.

In the laſt caſe, a child of 15 months old, on account of the *very violent pulſation* diſcovered at the fontanel, about an ounce of blood was taken from the jugular vein; the effect was unfortunate; the child ſeemed to fail faſter, even from this ſmall depletion, and died within twelve hours from the attack.

This laſt mentioned caſe cloſed the fatal ſcene, yet did not leſſen our fears, and gave ſtrength to the alarm which had faſtened on all, and which had gained ſuch complete aſcendency over every proſpect of ſucceſs, that it would be impoſſible to deſcribe the impreſſions made on the minds of tender parents and affectionate friends for the ſafety of their children and connexions.

Two days after this laſt fatal caſe, we were called to viſit a female child aged 3 years and 4 months, which caſe was ſo diſtinctly marked that ſcarcely a ray of hope exiſted that the iſſue would be favorable; and all who had witneſſed the effects of this terrific malady, viewed this child as it were in the article of death, her ſymptoms being almoſt as violent as any, and more ſo than ſome of the preceding caſes. As the means which we had hitherto uſed had uniformly failed us, we thought

E 2

Source: Daniel Adams, *Medical and Agricultural Register,* (1807), 65-67, https://archive.org/details/medicalagricultu01adam/page/66.

In 1887, Austrian doctor Anton Weichselbaum was the first to identify and report the isolation of the *Neisseria meningitides* bacterium within the spinal fluid in one of his patients.[22] Weichselbaum referred to the bacterium as *Diplococcus inracellularis*.[23] In 1891, German surgeon Henrich Quincke began using a technique he developed known as the lumbar puncture, which helped provide early diagnostic analyses of the cerebrospinal fluid infected with the *Neisseria meningitides* bacterium.[24]

[22] "Meningococcal Meningitis," World Health Organization.

[23] Siamak P. Yasdankhah *et al*., "*Neisseria Meningitidis*: An Overview of the Carriage State," *Journal of Medical Microbiology* 53 (2004): 821-832, doi: 10.1099/jmm.045529-0.

[24] Alireza Minagar *et al*., "Dr. Heinrich Irenaeus Quincke (1842-1922): Clinical Neurologist of Kiel," *Journal of Medical Biography, SAGE Journals* 9, no. 1 (February 1, 2001), doi: 10.1177/096777200100900104.

International Outbreaks

Meningitis outbreaks have been recorded on five of the world's continents. According to the WHO, a disease "outbreak" takes place when "the occurrence of cases of diseases are in excess of what would normally be expected in a defined community, geographical area, or season."[25] While meningitis incidence is low in Europe and North America (1 case for 100,000), the same cannot be said for Africa, which experiences a much higher incidence (800 to 1,000 cases per 100,000) during epidemic outbreaks.[26] In fact, the African continent continues to experience meningitis epidemics. Some have posited that it was by European military garrisons that the bacteria initially arrived in the African continent.[27] Support for this notion has been drawn from historical incidents such as the two major outbreaks that occurred in 1840 and 1847 among French troops based in Algeria, as well as an 1889 outbreak among British troops in Egypt and again in Sudan in 1899.[28] The significant frequency of meningitis epidemics on the African continent in comparison to the rest of the world is plainly illustrated in Table 1 below:

Table 1

Global Meningitis Epidemics between 1905 - 2016

Year	Country
1905	Sudan
1906	Sudan, Ghana
1907	Sudan
1914	Sudan
1919	Ghana
1921	High-Volta (Burkina Faso), Niger, Nigeria
1924-1931	Sudan
1932	Sudan, Chad
1933	Sudan
1934	Sudan
1935	Sudan, Chad
1936	Chad, Sudan
1937	Nigeria, Niger, High-Volta, Chad, Sudan
1938	Nigeria, Niger, High-Volta, Chad, Sudan
1939	Ghana, Nigeria, Niger, High-Volta, Chad, Sudan
1940	Algeria, Mali, Nigeria, Niger, High-Volta, Chad, Sudan
1941	Mali, Nigeria, Niger, High-Volta, Chad, Senegal, Sudan

[25] "Disease Outbreaks," World Health Organization, http://www.searo.who.int/topics/disease_outbreaks/en/.
[26] Souleymane Coulibaly, "Summary of Meningitis Outbreaks across the World from 1905 to 2016," *Journal of Traditional Medicine & Clinical Naturopathy* (2017), https://www.omicsonline.org/open-access/summary-of-meningitis-outbreaks-across-the-world-from-1905-to-2016.php?aid=92525.
[27] *Ibid.*
[28] *Ibid.*

Table 1

Global Meningitis Epidemics between 1905 - 2016

Year	Country
1942-1949	Nigeria, Niger, High-Volta, Chad, Sudan
1950	North America, Europe, Ghana, High -Volta, Niger, Nigeria, Chad, Sudan
1951-1957	Nigeria, Niger, High-Volta, Chad, Sudan
1958	Brazil, Nigeria, Niger, High-Volta, Chad, Sudan
1959	France, Nigeria, Niger, High-Volta, Chad, Sudan, Zaire
1960-1962	Nigeria, Niger, High-Volta, Chad, Sudan
1965	Senegal
1968	Chad
1969	Senegal
1970	Norway, Spain, Italy, Portugal, Yugoslavia, Belgium, Senegal
1971	Brazil, Spain, Italy, Portugal, Yugoslavia, Belgium, Senegal, Ivory Coast, Egypt, Chad
1972	Brazil, Senegal, Zaire
1973	France, Finland, Mongolia, Senegal
1974	Argentina, Brazil, Finland, Mongolia, United Kingdom, Senegal
1975	Mongolia, Nigeria, Norway, United Kingdom, Russia, Senegal, Ivory Coast, Egypt
1976	Iceland, Senegal
1977	Vietnam, Nigeria, Senegal
1978	Algeria, France, Rwanda, Norway, Faroe Islands, Senegal
1979	Algeria, Burkina Faso, Chile, Mali, Senegal
1980	Cuba, India, Mongolia, Nepal, Russia
1981	Faroe Islands
1982	New Delhi, Cuba
1983	Nepal, Ivory Coast
1984	Cuba, Nepal
1985	Burkina Faso, Ivory Coast, Mali, New Delhi, Niger, Nigeria, Tanzania
1986	Afghanistan, Saudi Arabia, Chili, Djibouti, Egypt, United Arab Emirates, France, Iran, Iraq, Jordan, Morocco, Pakistan, Syria, Sudan, Tunisia, Yemen
1987	Afghanistan, Saudi Arabia, Djibouti, Egypt, United Arab Emirates, France, Iran, Iraq, Jordan, Kuwait, Morocco, Oman, Pakistan, Syria, Soudan, Tunisia
1988	Afghanistan, Algeria, Saudi Arabia, Egypt, United Arab Emirates, Iran, Iraq, Jordan, Morocco, Pakistan, Syria, Sudan, Chad, Tunisia, Yemen, Ethiopia
1989	Afghanistan, Saudi Arabia, Brazil, Egypt, Iran, Iraq, Jordan, Morocco, Pakistan, Syria, Sudan, Tunisia, Yemen, Kenya, Uganda, Burundi
1990	Saudi Arabia, Egypt, Iran, Pakistan, Syria, Sudan, Tunisia
1991	Egypt, Iran, Iraq, Morocco, Pakistan, Syria, Sudan, Tunisia
1992	Burundi, Egypt, Iran, Iraq, Morocco, Niger, Pakistan, Syria, Sudan, Tunisia, Yemen

Table 1

Global Meningitis Epidemics between 1905 - 2016

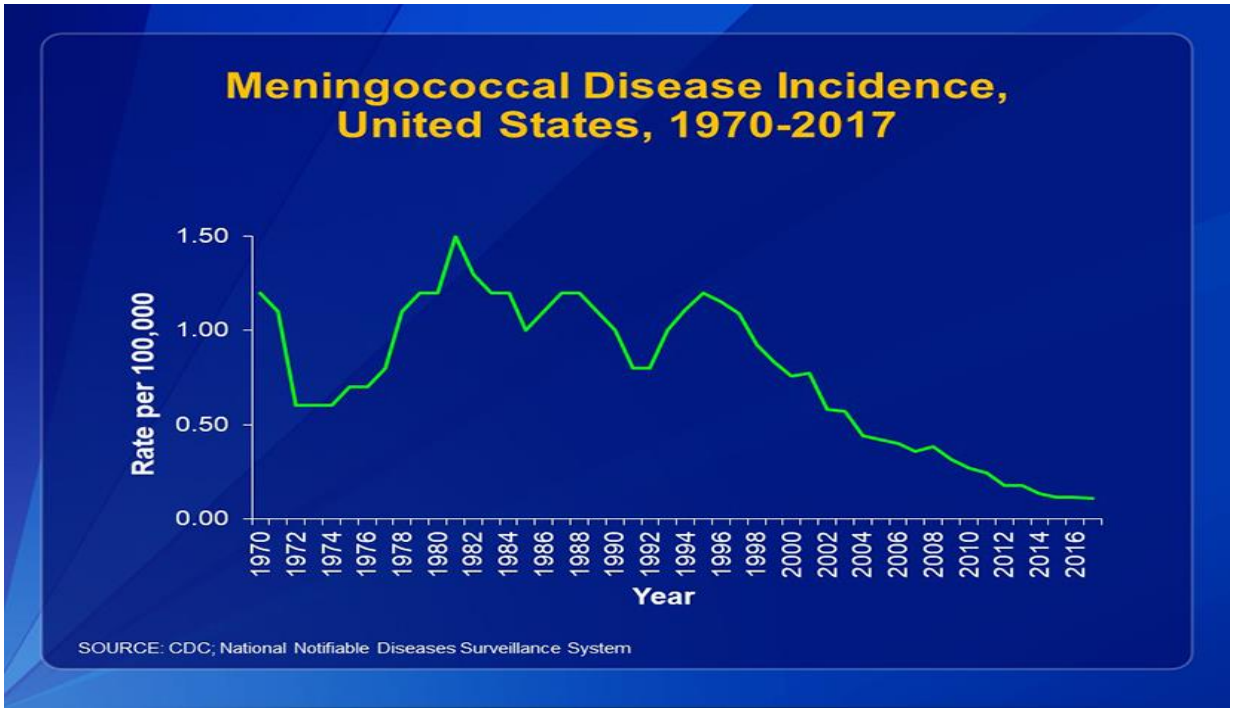
Year	Country
1993	Algeria, Chile, Egypt, Iran, Iraq, Morocco, Syria, Sudan, Tunisia, Yemen
1994	Egypt, Iran, Iraq, Morocco, Syria, Sudan, Tunisia, United States
1995	Cameroun, Egypt, Ghana, Iran, Iraq, Morocco, Niger, Pakistan, Syria, Sudan, Chad, Tunisia
1996	Burkina Faso, Cameroun, Ghana, Mali, Niger, Nigeria, Iran, Iraq, Sudan, Chad
1997	Burkina Faso, Mali
1998	Algeria, Burkina Faso, Mali, Niger, Chad
1999	Burkina Faso, Cameroun, Kenya, Ethiopia, Niger, Sudan, Chad
2000	Saudi Arabia, Niger, Nigeria, Chad
2001	Burkina Faso, Saudi Arabia, Niger, Chad, Democratic Republic of Congo
2002	Burkina Faso, Benin, Niger, Nigeria, Senegal, Chad, Democratic Republic of Congo
2003	Burkina Faso, Benin, Central Africa, Ghana, Niger, Nigeria, Mali, Ethiopia, Chad
2004	Burkina Faso, Central African Republic, Ghana, Kenya, Niger, Nigeria, Sudan, Uganda, Chad, Togo
2005	Burkina Faso, Benin, Cameroun, Kenya, Uganda, Mali, Niger, Sudan, Chad, Togo, Ivory Coast, Eritrea, Ethiopia
2006	Burkina Faso, Benin, Ivory Coast, French, Guinea, Kenya, Mali, Niger, Nigeria, Sudan, Uganda, Chad, Togo
2007	Burkina Faso, Benin, Cameroun, Central African, Kenya, Ghana, Uganda, Niger, Nigeria, Sudan, Chad, Togo, Ivory Coast, Ghana, Guinea, Mali, Uganda, Democratic Republic of Congo
2008	Burkina Faso, Benin, Central African, Ivory Coast, Guinea, Mali, Niger, Nigeria, Uganda, Democratic Republic of Congo, Chad, Togo
2009	Cameroun, Burkina Faso, Benin, Central African, Ivory Coast, Ethiopia, Ghana, Mali, Niger, Nigeria, Chad, Togo, Democratic Republic of Congo
2010	Burkina Faso, Benin, Central African, Ivory Coast, Cameroun, Ghana, Mali, Niger, Nigeria, Chad, Togo, Democratic Republic of Congo
2011	Burkina Faso, Benin, Cameroun, Ethiopia, Ghana, Guinea, Mali, Niger Nigeria, Chad, Togo, Democratic Republic of Congo
2012	Burkina Faso
2015	Niger
2016	Burkina Faso, Ghana, Mali, Niger, Togo, Democratic Republic of Congo

Source: Souleymane Coulibaly, "Summary of Meningitis Outbreaks across the World from 1905 to 2016," *Journal of Traditional Medicine & Clinical Naturopathy* (2017), https://www.omicsonline.org/open-access/summary-of-meningitis-outbreaks-across-the-world-from-1905-to-2016.php?aid=92525.

Meningitis (Meningococcal) in the U.S.

Based on the WHO definition of outbreak, as well as the world outbreak incidents by country shown above, the U.S. has a relatively low level of national meningitis outbreak incidents when compared to other nations worldwide. By 1995, the rate of meningitis incidents altogether declined by 55 percent in the U.S. through the introduction of vaccination efforts.[29] A 2007 *New England Journal of Medicine* study found that between 1998 and 2007 the incidence of meningitis dropped by 31 percent from 2.00 cases per 100,000 population in 1998–1999 to 1.38 cases per 100,000 population in 2006–2007.[30] Between 2005 and 2011, an estimated 800 to 1,200 cases of meningitis occurred every year in the U.S., representing an incidence of 0.3 cases per 100,000.[31] In 2017, the incidence rate reached a historical low of 0.11 cases per 100,000 population.[32] Chart 1 below provides a broader illustration of the overall decline in meningitis incidence in the U.S. from 1970 to 2017.

Chart 1



Source: "National Notifiable Diseases Surveillance System," U.S. Centers for Disease Control and Prevention, last modified May 31, 2019, https://www.cdc.gov/meningococcal/surveillance/index.html.

[29] Michael C. Thigpen, M.D. *et al*., "Bacterial Meningitis in the United States, 1998-2007," *The New England Journal of Medicine* 364, no. 21 (May 26, 2011): 2016-2025, doi: 10.1056/NEJMoa1005384.
[30] *Ibid.*
[31] "Meningococcal Meningitis," World Health Organization, 234.
[32] "Disease Trends," U.S. Centers for Disease Control and Prevention, last modified May 31, 2019, https://www.cdc.gov/meningococcal/surveillance/index.html.

It is important to note that while the incidence of meningitis disease has reached a historic low, the disease itself can be life-altering and even deadly. In 2017, there were approximately 350 total cases of meningitis reported within the U.S.[33] Of those who contract the disease, 14.9 percent die from it.[34] According to the National Meningitis Association (NMA), approximately 20 percent of survivors suffer from permanent disabilities, including brain damage, loss of hearing, loss of kidney function, and sometimes undergo limb amputations.[35]

Documented Incidents and Outbreaks in American Colleges and Universities

One area within the U.S. where meningitis cases and outbreaks continue to occur is on college campuses. The following is a list of incidents and outbreaks of meningitis in U.S. colleges and universities since 2000. The list has been compiled by Commission staff and accounts for most recorded cases; however, it may not be comprehensive. Furthermore, it should be noted that each of the following items is not an outbreak, rather, Table 2 contains both outbreaks and individual incidents.

Table 2

Incidents and Outbreaks in American Colleges and Universities
2000 - Present

State	IHS	Serogroup	Number of cases	Number of deaths
2004				
Kansas	Univ. of Kansas	B	1	0
North Carolina	Univ. of NC at Chapel Hill	B	1	0
2005				
North Carolina	Univ. of NC at Chapel Hill	*	1	0
2008				
Ohio	Ohio Univ. [a]	B	13	1
New York	State Univ. College at Oswego	B	1	1
New York	Cornell Univ.	B	2	0
2009				
Pennsylvania	Univ. of Pennsylvania	B	4	0
2011				
Idaho	Univ. of Idaho	*	1	0
Pennsylvania	Lehigh Univ.	B	2	0
2013				
Michigan	Kalamazoo College	B	1	1

[33] *Ibid.*
[34] Jessica R. MacNeil *et al.*, "Current Epidemiology and Trends in Meningococcal Disease – United States, 1996-2015," *Clinical Infectious Diseases* 66, no. 8 (April 3, 2018): 1276-1281, doi: 10.1093/cid/cix993.
[35] "Statistics and Disease Facts," National Meningitis Association, accessed March 24, 2020.

Table 2

Incidents and Outbreaks in American Colleges and Universities
2000 - Present

State	IHS	Serogroup	Number of cases	Number of deaths
Pennsylvania	West Chester Univ.	*	1	1
Maryland	Loyola Univ.	*	1	0
New Jersey	Princeton Univ.[b]	B	9	1[c]
Wisconsin	Univ. of Wisconsin at Madison	B	1	1
California	Univ. of California at Santa Barbara	B	4	0
California	Univ. of California at Long Beach	*	1	0
Georgia	Georgia Tech	*	1	0
2014				
Connecticut	Univ. of Hartford	*	1	1
Florida	Seminole State College	*	1	0
Washington D.C.	Georgetown Univ.	B	1	1
California	Palomar C.C.	B	1	0
Idaho	Univ. of Idaho	*	1	0
California	San Diego State Univ.	B	1	1
California	Humboldt State Univ.	*	1	0
2015				
Rhode Island	Providence College	B	2	0
Oregon	Univ. of Oregon[d]	B	7	1
Wisconsin	Marquette Univ.	*	1	0
Missouri	Missouri Univ.	B	1	0
California	Univ. of California at Davis	B	1	0
California	St. Mary's College	*	1	0
New York	Univ. of Rochester	*	1	0
Virginia	John Tyler C.C.	*	1	0
Kansas	Univ. of Kansas	B	1	1
South Dakota	Dakota Wesleyan Univ.	*	1	1
California	Cal Poly	B	5	0
2016				
California	Santa Clara Univ.[e]	B	3	0
Connecticut	Yale Univ.	*	2	0
New Jersey	Rutgers Univ. at New Brunswick[f]	B	2	0
Iowa	St. Ambrose Univ.	*	1	0
Illinois	Northeastern Univ.	*	1	1
Alabama	Auburn Univ.	*	1	0
Wisconsin	Univ. of Wisconsin at Madison	B	3	0

Table 2

Incidents and Outbreaks in American Colleges and Universities
2000 - Present

State	IHS	Serogroup	Number of cases	Number of deaths
2017				
California	Cal Poly[g]	B	2	0
California	Santa Barbara City College	B	1	0
North Carolina	Elon College	*	1	0
California	Univ. of California at Berkley	*	1	0
California	St. Mary's College	*	1	0
Arizona	Northern Arizona Univ.	Fusobacterium Necrophorum	1	1
Massachusetts	Univ. of Massachusetts at Amherst[h]	B	2	0
Illinois	Univ. of Illinois at Urbana-Champaign	B	1	0
Oregon	Oregon State Univ.	B	6	0
Pennsylvania	Drexel Univ.	B	1	1
Pennsylvania	Kutztown Univ.	B	1	0
2018				
Massachusetts	Smith College	B	1	0
California	San Diego State Univ.	B	2	0
Pennsylvania	Penn State Univ.	*	2	0
New York	Syracuse Univ.	B	1	0
North Carolina	Duke Univ.	*	1	0
Florida	Tallahassee C.C.	B	1	1
Connecticut	Central Connecticut State Univ.	B	1	0
2019				
New York	Columbia Univ.	B	2	0
California	Cuesta College	B	1	1
Between 2013-2017 Case reported directly to National Meningitis Association, no further information available:				
North Carolina	Univ. of North Carolina at Charlotte	*	1	1

* - Serogroup: Unknown
[a] - January 2008 - November 2010
[b] - March 2013 - March 2014
[c] - Visitor from Drexel Univ.
[d] - January 2015 - May 2015
[e] - January 2016 - February 2016
[f] - March 2016 - April 2016
[g] - January 2017 - June 2017
[h] - October 2017 - February 2018

Source: Compiled by JSGC Staff, Summer 2019.

CDC Guidelines on Public Health Management of Outbreaks in American Colleges and Universities

Because of the severe risks posed by the disease, the CDC established formal guidelines designed specifically to assist state and local government and organizations in the evaluation and public health management of suspected meningitis outbreaks.[36] The CDC guidelines are frequently updated and provide recommendations on investigating suspected outbreaks, initiating communication and reporting campaigns, preventing secondary cases, and determining whether to declare a formal outbreak. The guidelines also provide the factors to be considered when deciding whether to initiate mass vaccinations. This report's review of the guidelines pertains specifically to all recommendations applicable to colleges and universities as directed by Senate Resolution 292.

Investigation of Suspected Outbreaks

The CDC recommends that all cases in a suspected outbreak of meningococcal disease within a college or university undergo epidemiologic and laboratory investigations. In conducting an epidemiologic investigation, officials must solicit information (by interviewing or other methods) from individuals in the university's community in order to identify close contacts of the affected patient. Local and college health department staff should also collect information on each meningitis case to identify linkages with other meningitis patients and organizational affiliations such as university attendance, common social networks, or common geographical location. The CDC also recommends that sex partners of men aged 16 years or older, behaviors such as illicit drug use, or underlying medical conditions such as HIV, should be ascertained from all patients to characterize the population at risk.[37]

In addition to an epidemiologic investigation, officials are recommended to also conduct a laboratory investigation. Through a lab investigation, it is advised that specimens be collected from all individuals suspected of having the disease.[38] Once diagnosis is confirmed, officials must quickly identify the disease's serogroup. CDC guidelines recommend that serogroup identification should be initiated within 24 hours of disease confirmation. A state's public labs can send isolates or specimens to CDC's Bacterial Meningitis Laboratory for confirmation and characterization.[39] The CDC recommends that isolates from all cases undergo molecular typing when a suspected outbreak occurs.[40] Molecular typing can provide useful information for determining the existence

[36] U.S. Centers for Disease Control and Prevention, "Guidance for the Evaluation and Public Health Management of Suspected Outbreaks of Meningococcal Disease," (September 28, 2019), https://www.cdc.gov/meningococcal/downloads/meningococcal-outbreak-guidance.pdf.
[37] *Ibid*., 7.
[38] *Ibid.*
[39] *Ibid.*
[40] *Ibid.*, 8 - Molecular typing is a form of identifying different types of organisms within a species that examines the relatedness of isolates at a molecular level. – AJ Sabat, *et. al.*, "Overview of Molecular Typing Methods for Outbreak Detection and Epidemiological Surveillance," *Eurosurveillance* 18, no. 4 (January 24, 2013), https://www.eurosurveillance.org/content/10.2807/ese.18.04.20380-en.

of an outbreak. Molecular typing data revealing identical or closely related strains can provide supportive evidence to the epidemiologic investigation of a suspected meningitis outbreak.[41]

Communicating and Reporting a Suspected Outbreak

When an outbreak is suspected, it is recommended that healthcare providers and laboratories be alerted and encouraged to remain vigilant for patients with symptoms suggestive of the disease. The guidelines also recommend that providers and laboratories be encouraged to ensure that all suspected cases of meningitis have been reported to the local health department and that any subsequent suspected cases are promptly reported. Patients suspected of having the disease but whose lab results are negative should still be reported to the local health department. State health departments are also encouraged to notify the CDC once an outbreak is suspected.[42]

Preventing Secondary Cases

CDC guidelines also recommend the utilization of antimicrobial chemoprophylaxis (AC), which prescribes an antibiotic for close contacts of a patient with meningitis to prevent secondary cases, regardless of whether or not a meningitis outbreak is suspected. Expanded antimicrobial chemoprohylaxis may be considered in some organization-based outbreaks, such as outbreaks involving limited populations or where persons/groups at increased risk can be clearly defined (e.g. jails, child-care centers, residential facilities, or defined social networks within a larger populations such as university fraternity, sorority, etc.).[43]

Determining and Declaring an Outbreak

In the U.S., meningitis outbreaks are rare; only 1 in 20 meningococcal cases are related to outbreaks.[44] Declaring an outbreak however, is critical because it allows an organization or community to determine the level of public health interventions that should be considered. The CDC has distinguished outbreaks categorically as either "organization-based" or "community-based."

Organization-based outbreaks are linked by a common affiliation other than a shared, geographically defined community. Some examples of organization-based outbreaks are those that occur in universities, schools, child-care centers, or correctional facilities. Furthermore, the CDC has determined the numerical threshold for an organization-based outbreak to be two to three outbreak-associated cases within an organization occurring during a three-month period. In most situations, two cases within an organization is sufficient enough to constitute an outbreak per CDC guidelines. However, in some situations, such as an outbreak occurring within a large university

[41] U.S. Centers for Disease Control and Prevention, "Guidance for the Evaluation and Public Health Management," 9.
[42] *Ibid*.
[43] *Ibid.*
[44] "Meningococcal Disease," U.S. Centers for Disease Control and Prevention, last modified May 31, 2019, https://www.cdc.gov/meningococcal/outbreaks/index.html.

(e.g., > 20,000 undergraduate students) where no subgroup at risk within the population can be identified, it may in fact be reasonable to declare an outbreak after three cases.[45]

Community-based outbreaks on the other hand, "have no common affiliations to an organization but are instead linked by a shared, geographically defined community, such as a neighborhood or town."[46] Community outbreaks may include populations with shared characteristics, as long as no affiliation to a specific organization is identified.[47] Unlike the numerical threshold required for organization-based outbreaks, community-based outbreaks require a similar threshold as mentioned under the WHO guidelines, requiring that there be multiple outbreak-associated cases with an incidence of meningitis that is above the expected incidence in a community during a three-month period.[48] The CDC acknowledges that in general, the "outbreak threshold for vaccine decision-making should be determined on a case-by-case basis."[49]

Decision to Vaccinate

Vaccination is the control measure recommended by the CDC for meningitis outbreaks for all serogroups. Many factors should be considered when determining the need for vaccination efforts, such as:

- Number of cases;
- Population size (e.g. – university has 35,000 students);
- Ability to define a target group for vaccination;
- Whether on-going transmission is likely;
- Feasibility of a vaccination campaign; and
- Timing of potential vaccination in relation to cases[50]

In situations where on-going transmission is unlikely (e.g. cases limited to household members, roommates, or boyfriend/girlfriend), a vaccination campaign may not be necessary as long as a preventive antibiotic for close contacts is implemented to prevent further transmission. However, the CDC ultimately recommends the above-mentioned thresholds and factors as guidance for determining whether to implement a vaccination campaign. Moreover, the CDC further advises that such decisions be made a on a case-by-case basis in consultation with the

[45] U.S. Centers for Disease Control and Prevention, "Guidance for the Evaluation and Public Health Management," 11-12.
[46] *Ibid.*, 10.
[47] *Ibid.*
[48] *Ibid.*
[49] *Ibid.*, 11.
[50] *Ibid.*, 12.

local/state health department and CDC taking into account all circumstances and epidemiology specific to the outbreak.[51]

Re-evaluation of Outbreak Status

The CDC guidelines recommend that, following a declaration of an outbreak and implementation of public health measures, a college or university should reassess the status of the outbreak for continued public health decision-making. Based on expert opinion compiled by the CDC, a time frame of one-year (following the last case of meningitis) for reassessment is suggested for colleges, universities, and other organizations who have experienced outbreaks. According to the CDC, the risk of meningitis may be considered to have returned to expected levels one year following the last case.[52]

The ACIP

The Advisory Committee on Immunization Practices (ACIP) is a federal advisory committee that prepares written recommendations for use of vaccines approved and licensed by the Food and Drug Administration. The impetus behind the ACIP's formation has been largely attributed to the early proliferation of new vaccines. This proliferation had the effect of relegating the government's previous "*ad hoc* committee approach" to addressing nationwide immunization as an unsustainable thing of the past.[53] Hence, the ACIP was created to function as a single committee designed to address immunization on a more permanent and continuous basis.

Originally formed in 1964, with its members appointed by the Surgeon General of the U.S., the ACIP comprises a diverse roster of medical and public health experts who "… develop recommendations on the use of vaccines in the civilian population of the U.S." Once deliberated and voted upon, all recommendations approved by the ACIP are provided to the Director of the CDC. All recommendations are then reviewed by the CDC Director, and, if adopted, are published as official CDC and Health and Human Services (HHS) recommendations in what is known as the Morbidity and Mortality Weekly Report.[54] The CDC Director informs both the Secretary of HHS and the Assistant Secretary for Health of all ACIP recommendations.[55]

The ACIP has experienced significant changes in both structure and operation throughout its more than 50-year history. However, despite these changes, the ACIP continues its tradition of working closely with different public health organizations to achieve recommendations

[51] *Ibid.*
[52] *Ibid*., 16.
[53] L. Reed Walton *et al.*, "The History of the United States Advisory Committee on Immunization Practices (ACIP)," *Vaccine* 33, no. 3 (January 9, 2015): 407, https://doi.org/10.1016/j.vaccine.2014.09.043.
[54] CDC, Morbidity and Mortality Weekly Report, https://www.cdc.gov/mmwr/index.html.
[55] "Advisory Committee on Immunization Practices (ACIP): General Committee – Related Information," Center for Disease Control and Prevention, last modified Oct. 23, 2018, https://www.cdc.gov/vaccines/acip/committee/index.html.

harmonized among influential professional medical societies such as the American Academy of Pediatrics and the American Academy of Family Physicians.[56]

Statutory Authorization

Statutory authority for the formation of the ACIP is firmly rooted in Section 222 of the Public Health Service Act, which expressly permits the U.S. Secretary of HHS to "…from time to time, appoint such advisory councils or committees…for such period of times, as he deems desirable…for the purpose of advising him in connection with any of his functions."[57] The function of the HHS Secretary is provision of effective health and human services while fostering advances in medicine, public health, and social services.[58]

The day-to-day activities of the ACIP itself are governed by the standards established under the Federal Advisory Committee Act. In addition, the ACIP has been delegated numerous other specific roles under various federal acts including the Social Security Act and the Public Health Service Act.[59]

Specific Activities

In order to develop its recommendations, the ACIP holds committee deliberations specifically geared toward the use of vaccines to control diseases in the U.S. These deliberations include consideration of disease epidemiology and burden of disease, vaccine efficacy and effectiveness, vaccine safety, the quality of evidence reviewed, economic analyses, and implementation considerations. Deliberations take place at meetings open to the public, where visitors nationally and internationally are welcome to attend. Meetings are held approximately three times a year.[60] The very first ACIP meeting was held at the CDC's national headquarters in Atlanta on May 25 and 26, 1964 and was chaired by then-CDC Director James L. Goddard.[61]

In recent years, the ACIP has formed numerous permanent and need-based work groups that work year-round to provide its voting members with relevant information to each vaccine and its safety, efficacy, and use. These working groups are intended to help inform ACIP committee members on topics germane to each meeting.[62]

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[56] Walton, "The History of the United States."
[57] July 1, 1944, c. 373, Title II, § 222, as added Pub.L. 87-838, § 3, Oct. 17, 1962, 76 Stat. 1073; amended Pub.L. 91-515, Title VI, § 601(a)(3), (c), Oct. 30, 1970, 84 Stat. 1310, 1311; Pub.L. 99-158, § 3(a)(4), Nov. 20, 1985, 99 Stat. 879; 42 U.S.C. § 217a.
[58] "About HHS," U.S. Department of Health and Human Services, accessed March 25, 2020, https://www.hhs.gov/about/index.html.
[59] 42 U.S.C. § 1396s(e); 42 U.S.C. § 300gg-13(a)(2).
[60] "ACIP Charter: Authority, Objective, and Description," Centers for Disease Control and Prevention, last modified June 5, 2018, https://www.cdc.gov/vaccines/acip/committee/charter.html.
[61] Walton, "The History of the United States."
[62] *Ibid*.

Committee Members

The ACIP's committee meetings are attended and governed by a panel of "committee members." At its inception, the ACIP had eight voting members. This number has since expanded to 15 members, including a chair and vice chair. Members, who as previously mentioned are generally medical and public health experts, serve four-year terms which are non-renewable. To avoid conflicts of interest, each member undergoes a rigorous screening process for such conflicts before his or her name is formally submitted to the HHS Secretary for final consideration for nomination. Members must also submit an Office of Government Ethics Form during each year of their four-year tenure.[63]

In addition to voting members, the ACIP has eight non-voting *ex officio*[64] members from other government agencies (not within the CDC) and 31 non-voting liaison representatives from health-related professional societies.[65]

Recent ACIP Deliberations on Meningitis

Recently, the ACIP spent some time deliberating on the topic of meningitis vaccinations. In particular, the committee deliberated about the potential need for meningitis B (MenB) booster vaccinations for persons at higher risk. These deliberations occurred in ACIP meetings held on February 26, 2019 and June 27, 2019.

February 26, 2019 Meeting

During its February 2019 meeting, the ACIP reviewed both the persistence of immune response following MenB primary series vaccines and the immunogenicity and persistence of MenB booster dose vaccines. The committee also reviewed and discussed ACIP work group considerations for the use of MenB booster doses for persons at increased risk. The ACIP work group, along with pharmaceutical companies Pfizer and GlaxoSmithKline all presented to the committee on the topic.[66]

Work group-provided data on the MenB primary series vaccines appeared to reveal that antibodies within one of the licensed vaccine products wane by 12 months following administration and then stabilize for up to four years in healthy adolescents. In another MenB primary series vaccine product, data indicated that antibodies wane by two years following its administration in healthy adolescents and adults. However, due to limitations in data, the group acknowledged that earlier antibody waning could not realistically be ruled out. Ultimately, the work group interpreted the variable rate of waning between the vaccines as an illustration that

[63] *Ibid*., 412.
[64] The term "*ex officio*" is Latin for "from the office." An *ex officio* member of a board is one who is part of a board or body by virtue of holding another office.
[65] *Ibid*.
[66] Deliberation in ACIP Meeting held on February 26, 2019 at CDC Headquarters in Atlanta, Georgia.

there can be no generalization of antibody persistence. Simply put, the length of protection provided by MenB vaccines is not always consistent and cannot be generalized.[67]

Potential problematic challenges of MenB booster doses were also discussed. For example, MenB vaccines are not interchangeable, which means the same vaccine product must be used for all doses, including booster doses, in order to be effective in a subject.[68]

Stitching together the above information, the work group concluded that a MenB booster vaccination is necessary to sustain protection against MenB in persons (ages 10 years and older) who are at an increased risk of its contraction. The logic behind this conclusion, according to the work group, is based on its data demonstrating the expectation of greater persistence after the administration of a booster dose; thus, a longer interval for repeat boosters may be considered.[69]

Arriving at this conclusion, the work group explained that, based on its own clinical trials and various other studies, the safety of MenB primary series vaccines have been demonstrated time and time again. However, although no serious adverse events have been reported, the work group pointed out that safety data on MenB booster dose vaccines is limited. Nevertheless, it was the work group's position that given the life-altering, and sometimes even grave nature of meningitis' attendant effects, the potential benefits of MenB booster vaccinations outweigh its potential risks in persons with increased risk.[70]

June 27, 2019 Meeting

The ACIP's June 2019 meeting also included a meningococcal vaccine session. In this session, David S. Stephens, chair of the meningococcal work group, provided a presentation summarizing the previous data shown to the ACIP at its February 2019 meeting. In addition, the committee discussed policy options for MenB booster doses in persons at risk. After its deliberations, the ACIP ultimately voted in favor of recommending MenB booster doses in persons ages 10 years and older who are at increased risk. To avoid any misunderstanding, the ACIP reiterated that application of its recommendation did not apply to persons who previously completed a MenB primary series as an adolescent and who are not at increased risk for MenB. It was also reiterated that collection of safety and effectiveness data for repeated booster doses of MenB vaccines in persons at increased risk is needed for ongoing evaluation of this and other booster recommendations.[71]

The ACIP also voted in favor of updating the ACIP meningococcal vaccines statement to reflect the recommendation and to harmonize existing meningococcal vaccine recommendations with the new MenB booster recommendations into one consolidated document. The updated statement would describe background on meningococcal disease, epidemiology, and risk groups; provide updated information on currently licensed and available vaccines; describe the process

[67] *Ibid.*
[68] *Ibid*.
[69] *Ibid*.
[70] *Ibid*.
[71] Deliberation in ACIP Meeting held on June 27, 2019 at CDC Headquarters in Atlanta, Georgia.

undertaken and rationale used to support ACIP recommendations; and provide ACIP recommendations and guidance for use of meningococcal vaccines.[72]

Vaccinations

The genesis of American meningitis vaccine development took place in the 1960s when the U.S. military commissioned a meningitis research group.[73] Much of the military's interest in the disease has been linked to both World Wars, which saw meningitis outbreaks that affected new recruits within their first few months of service.[74] In 1968, military scientists developed the first polysaccharide vaccine engineered to target meningitis serogroup C.[75] The military also developed a meningitis serogroup A polysaccharide vaccine for which clinical trials were conducted in African communities.[76] By the early seventies, all new U.S. armed forces recruits were mandated to receive the military's serogroup C vaccine, which was a vaccine yet to be licensed by the U.S. Food and Drug Administration (FDA).[77] Shortly after the military began developing meningitis vaccines, drug companies began to follow, developing and licensing their own vaccines through the FDA. The following timeline illustrates the chronology of meningitis vaccines licensed in the U.S. since the 1970s. See Table below.

Table 3
General Timeline of Meningitis (Meningococcal) Vaccines in the U.S

Year	Vaccine	Target Population	Producer
1968	Serogroup C and A Polysaccharide	U.S. Armed Forces (Unlicensed by the FDA)	U.S. Military
1974	MPSV4	Licensed for ages 2 – 55 years	---
1981	Menomune Serogroups A, C, Y and W-135	Licensed for ages 2 – 55 years	Sanofi Pasteur
2005	Menactra (MenACWY-D)	Licensed for ages 9 months – 55 years	Sanofi Pasteur
2011	Menveo (MenACWY-CRM)	Licensed for ages 2 months – 55 years	Novartis (GlaxoSmithKline)
2012	MenHibrix (Hib-MenCY-TT)	Licensed for ages 6 weeks and up	GlaxoSmithKline

[72] *Ibid.*
[73] Grabenstein JD *et al.*, "Immunization to Protect the US Armed Forces: Heritage, Current Practice, and Prospects," *Epidemiologic Rev*iew 28, no. 1 (2006): 3-26, doi: 10.1093/epirev/mxj003.
[74] "What is the History of Meningococcal Use in America?" National Vaccine Information Center, accessed March 25, 2020, https://www.nvic.org/vaccines-and-diseases/meningitis/vaccine-history.aspx.
[75] *Ibid.*
[76] *Ibid.*
[77] *Ibid.*

Table 3 General Timeline of Meningitis (Meningococcal) Vaccines in the U.S			
Year	**Vaccine**	**Target Population**	**Producer**
2014	First meningococcal serogroup B vaccine TRUMENBA	Licensed for ages 10 – 25 years	Wyeth (Pfizer)
2015	Second meningococcal serogroup B vaccine BEXSERO	Licensed for ages 10- 25 years	GlaxoSmithKline
2017	Menomune was discontinued	---	Sanofi Pasteur

*Green Highlights indicate the vaccinations that are currently licensed and available in the U.S. - unknown

Source: "What is the History of Meningococcal Use in America?" National Vaccine Information Center, accessed March 25, 2020, https://www.nvic.org/vaccines-and-diseases/meningitis/vaccine-history.aspx; Centers for Disease Control and Prevention, Epidemiology and Prevention of Vaccine-Preventable Diseases, Hamborsky J, Kroger A, Wolfe S, eds. 13th ed. (Washington D.C. Public Health Foundation, 2015), 236-37.

As shown in the above timeline, the first set of licensed vaccines (MenACWY conjugate vaccines) were engineered to combat serogroups A, C, W, and Y (W-135 also for Menumune, now discontinued). The CDC currently recommends two routine doses of the MenACWY for adolescents ages 11 through 18 (the first dose at 11 or 12 years old, with a booster dose at age 16).[78] Furthermore, the CDC recommends that adolescents with HIV obtain additional doses.[79] In addition to routine vaccination for adolescents, the CDC also recommends the vaccine for the following individuals:

- College freshmen living in dormitories
- People at risk of serogroup A, C, W, or Y meningitis outbreak
- People with HIV
- Any individual with a damaged or removed spleen, including people with sickle cell disease
- Anyone with "persistent complement component deficiency"
- Anyone taking a drug called eculizumab (also called Soliris)
- Microbiologists who routinely work with isolates of *N. meningitis*

[78] "Meningococcal ACWY Vaccine: What You Need to Know," U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Vaccine Information Statement, last modified August 15, 2019, (Emphasis Added) – the vaccine information materials are disseminated by the CDC pursuant to 42 U.S.C. § 300aa-26.
[79] *Ibid.*

- Anyone traveling to, or living in, a part of the world where meningitis is common, such as certain regions of Africa

- U.S. military recruits[80]

Those individuals who have had any severe or life-threatening allergic reactions after a previous dose of the meningitis ACWY (MenACWY) vaccine are advised by the CDC not to get the vaccine.[81] In addition, women who are pregnant or breastfeeding are also advised to avoid the MenACWY vaccination; however, the CDC advises that a pregnant or breastfeeding woman should be vaccinated if she is at increased risk of meningococcal disease.[82] According to the CDC, those with a mild illness, such as a cold, can probably get the vaccine, but those who are moderately or severely ill should wait until recovery to receive the vaccine.[83]

Serogroup B vaccines, known as meningitis B (MenB) vaccines, which became licensed for the first time in 2014, help prevent meningitis caused by serogroup B. As illustrated above on the vaccines timeline, two MenB vaccines (Bexsero and Trumenba) have been licensed by the FDA. The CDC recommends these vaccines routinely for people ten years or older who are at increased risk for serogroup B meningococcal infections including:

- People at risk because of a meningitis B outbreak

- Any individual with damaged or removed spleen, including people with sickle cell disease

- Anyone with "persistent complement component deficiency"

- Anyone taking a drug called eculizumab (also called Soliris)

- Microbiologists who routinely work with isolates of *N. meningitis*[84]

According to the CDC, MenB vaccines may also be given to anyone 16 through 23 years of age to provide short term protection against most strains of MenB; however, ages 16 through 18 years are the preferred ages.[85] Further, the CDC has indicated that for the best protection, more than one dose of a MenB vaccine is needed.[86] The CDC has noted that available data on MenB vaccines have indicated that its protective antibodies decrease quickly in many adolescents (within one to two years) after vaccination, whereas available data have suggested that the protections within the MenACWY vaccines decreases in many adolescents within five years from obtaining the vaccination.[87]

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[80] *Ibid.*
[81] *Ibid.*
[82] *Ibid.*
[83] *Ibid.*
[84] *Ibid.*
[85] *Ibid.*
[86] *Ibid.*
[87] "About Meningococcal Vaccines," U.S. Centers for Disease Control and Prevention, last modified July 26, 2019, https://www.cdc.gov/vaccines/vpd/mening/hcp/about-vaccine.html.

Unlike MenACWY vaccines, serogroup B vaccines, known as meningitis B (MenB) vaccines are not routinely recommended by the CDC for college freshmen aged 18 to 24 years. Instead, it is recommended that the decision to receive the MenB vaccine be ultimately left up to the student in consultation with his or her physician.[88]

MenB vaccines became licensed by the Federal Drug Administration (FDA) for the first time in 2014 and were designed to prevent meningitis disease caused by serogroup B. As shown above on the vaccines timeline, two MenB vaccines (Trumenba and Bexsero) are currently licensed in the U.S. Despite recent findings that college students aged 18 to 24 years are at higher risk of contracting MenB than non-college students of a similar age, the CDC has not gone so far as to routinely recommend that all college students living in on-campus housing receive the MenB vaccine.

The CDC's Advisory Committee on Immunization Practices (ACIP)[89] issued both a Category A recommendation and a Category B recommendation for MenB vaccination. The Category B recommendation is that adolescents aged 16 to 23 years (preferred age of 16 to 18 years), who are not at increased risk be vaccinated for MenB based on shared clinical decision-making with his or her healthcare provider. College attendance, and in particular, residency within college dorms and on-campus housing, may factor into that patient-provider decision.[90] However, the ACIP issued a Category A recommendation for MenB vaccination for people ten years of age or older who are at increased risk for MenB infections including:

- People at risk because of a meningitis B outbreak
- Any individual with damaged or removed spleen, including people with sickle cell disease
- Anyone with "persistent complement component deficiency"
- Anyone taking a drug called eculizumab (also called Soliris)
- Microbiologists who routinely work with isolates of *N. meningitis*[91]

[88] Dr. Sarah Meyer Mbaeyi, MD, MPH, National Center for Immunization and Respiratory Diseases, U.S. Centers for Disease Control and Prevention, email to JSGC, September 30, 2019.

[89] The Advisory Committee on Immunization Practices (ACIP) was established under Section 222 of the Public Health Service Act, 42 U.S.C. § 217a and is comprised of medical and public health experts who develop recommendations on the use of vaccines in the civilian population of the U.S. The recommendations themselves stand as public guidance for safe use of vaccines and other related biological products. "Advisory Committee on Immunization Practices (ACIP)," Centers for Disease Control and Prevention, last modified Oct. 23, 2018, https://www.cdc.gov/vaccines/acip/committee/index.html.

[90] Sarah A. Mbaeyi, MD, MPH *et al.*, "Meningococcal Disease Among College-Aged Young Adults: 2014-2016," *American Academy of Pediatrics* 143, no. 1 (January 2019), doi: 10.1542/peds.2018-2130; Dr. Mbaeyi, email to JSGC, September 30, 2019.

[91] "Serogroup B Meningococcal Vaccine (MenB): What You Need to Know," U.S. Dept of Health and Human Services, Centers for Disease Control and Prevention, last modified August 9, 2016 – the vaccine information materials are disseminated by the CDC pursuant to 42 U.S.C. § 300aa-26.

The contrast between the CDC's recommendations for MenACWY vaccines versus MenB vaccines has led to confusion among certain state jurisdictions. This confusion has been magnified by the recent finding that college students are at approximately a 3.5-fold risk of contracting MenB when compared to similarly-aged non-college students – a departure from previous CDC findings that college students and non-college students were at similar risk for MenB.[92]

One study in particular reviewed 166 cases of meningitis in persons aged 18 to 24 years between 2014 and 2016. Of the 166 cases, 88 cases were attributable to MenB. The study found that of the 88 MenB cases, 60 (76.9 percent) were found in college students versus 28 (38.4 percent) found in non-college students. Further, six MenB outbreaks were reported on college campuses, accounting for 18 (30 percent) of the cases among college students. All but one outbreak-associated case occurred at the college the infected student attended. The study found that no non-MenB (meningitis serotypes other than serotype B) outbreaks were known to have occurred among college students. To the contrary, there were eight cases associated with four known outbreaks due to non-MenB serogroups among non-college students of similar age reported during this same 2014-2016 time period.[93]

The CDC and other health experts acknowledged that while the incidence of MenB among U.S. college students is low, college students are undeniably at an increased risk of contracting MenB when compared to non-college students. Again, this is evidenced by the fact that college students have a higher incidence of MenB, accounting for nearly three-fourths of all cases in this group.

It is worth noting that although "outbreaks are an important factor accounting for >30% of serogroup B cases in college students, the risk remains elevated for college students even after the exclusion of outbreak-associated cases."[94] This conclusion has ignited some debate as to whether the CDC should routinely recommend MenB vaccines to college freshmen regardless of whether there is increased risk because of a MenB outbreak. It appears however, that the limited history of MenB surveillance activities (which only date back to 2014) may be one of the prudential reasons the CDC has not gone so far as to routinely recommend MenB vaccines to college freshmen. Such limitation is further compounded by the fact that medical experts have not yet been able to fully evaluate trends in meningitis incidence among college students. One can also draw the inference that because the overall incidence rate for MenB is still low in the U.S., the CDC believes it is unnecessary to routinely recommend MenB vaccines in the same way it does for MenACWY vaccines. To counter this point however, one could easily draw attention to the fact that the overall incidence rate for MenACWY is low in the U.S. as well, leaving many to ponder why one is routinely recommended and the other is not. Moreover, it may be possible that the CDC has based its decision on a cost-benefit analysis demonstrating that the costs of vaccines may not justify countering the level of risk demonstrated by the low incidence rate for MenB.

[92] Mbaeyi, "Meningococcal Disease," 3.
[93] *Ibid*.
[94] *Ibid*., 5.

The CDC's recommendation on MenB vaccinations could intensify through continued improvements in surveillance of MenB and meningitis in general. Improving the surveillance of the disease is the key to "monitoring the epidemiology of meningitis in college students and informing public health prevention and response strategies."[95]

There are several factors that affect the scope and intensity of the MenB recommendation. First, vaccine manufacturers encountered difficulties in creating a vaccine that was sufficiently immunogenic. A vaccine is a weakened version of a disease called an antigen that is injected into the body to elicit an immune response that can be replicated if the fully strengthened version of the disease infects the body. For some vaccines, the antigen by itself is too weak to provoke the necessary immune response. A vaccine that does not produce the desired immune response would have low immunogenicity. To address this complication, vaccine manufacturers will sometimes bond a weak antigen—which is usually a polysaccharide—to a protein antigen. The resulting conjugate can amplify the body's response. The vaccine used for Men ACWY is a polysaccharide-protein conjugate.[96] Vaccine manufacturers struggled to create a similar vaccine for MenB due to the similarities between a MenB polysaccharide capsule and the structure of human neuronal cells. Introducing the MenB polysaccharide capsule could create an autoimmune response against the neuronal cells.[97] The vaccines that have been developed come from outer-membrane vesicles of specific strains of MenB, but these can only provide protection against certain strains.[98]

The MenACWY conjugate polysaccharide vaccine also provides protection against carriage of meningococcal disease in the nasopharynx. Meningococcal disease is primarily transmitted by "asymptomatic carriers," meaning an individual who carries the bacteria without developing into invasive meningococcal disease.[99] The bacteria could live in a carrier for weeks and sometimes months, leaving a large window for transmitting the disease to someone who is more vulnerable to it. Unlike the MenACWY vaccine, though, the vaccine for MenB is thus far unable to provide protection against carriage. This conclusion is supported by a 2016 study of outbreak response in Rhode Island, a 2016 study of outbreak response in Oregon, and a 2020 study of carriage in adolescents in Australia.[100] The implication of these findings is that there is no effect of herd immunity if a certain proportion of the population is vaccinated against MenB. These results are why experts recommend vaccines as protection for already vulnerable populations.

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[95] *Ibid.*, 7.

[96] Shamez N. Ladhani *et al*., "Vaccination of Infants with Meningococcal Group B Vaccine (4CMenB) in England," *The New England Journal of Medicine* 382, no. 4 (January 2020): 309-317, doi: 10.1056/NEJMoa1901229.

[97] Nicole E. Basta *et al*., "Immunogenicity of a Meningococcal B Vaccine during a University Outbreak," *The New England Journal of Medicine* 375 (July 2016): 220-228, doi: 10.1056/NEJMoa1514866.

[98] *Ibid.*

[99] Heidi M. Soeters *et al*., "Meningococcal Carriage Evaluation in Response to a Serogroup B Meningococcal Disease Outbreak and Mass Vaccination Campaign at a College—Rhode Island, 2015–2016," *Clinical Infectious Diseases* 64, no. 8 (2017): 1115-1122, doi: 10.1093/cid/cix091.

[100] *Ibid*; Lucy A. McNamara *et al*., "Meningococcal Carriage Following a Vaccination Campaign With MenB-4C and MenB-FHbp in Response to a University Serogroup B Meningococcal Disease Outbreak—Oregon, 2015–2016," *The Journal of Infectious Diseases* 216 (2017): 1130-1140, doi: 10.1093/infdis/jix446; Helen S. Marshall *et al*., Meningococcal B Vaccine and Meningococcal Carriage in Adolescents in Australia," *The New England Journal of Medicine* 318 (January 2020): 318-327, doi: 10.1056/NEJMoa1900236.

After the delay in being able to produce a vaccine that is sufficiently immunogenic, another factor that limits the MenB vaccine's effectiveness is its inability to protect against all strains of the disease. A 2016 study of vaccinated students at a U.S. university experiencing an outbreak found that only 66.1% of students who received the full series of the 4CMenB (Bexsero) vaccine were fully protected against the outbreak strain.[101] A 2020 study of infants fully vaccinated with a three-dose series found the vaccine to be 59.1% effective against all strains of MenB and 71.2% effective against those already known to be preventable by the vaccine.[102]

Another concern is the persistence of the vaccine, or the length of time a vaccinated individual remains protected against the disease. The ACIP Meningococcal Vaccines Work Group determined in 2019 that in the use of the 4CMenB primary series, antibodies waned within two years; limited data prevent researchers from predicting if waning could occur even earlier.[103] These results mean that a student vaccinated with a primary series of a MenB vaccine as a freshman could once again be susceptible to the disease by his junior or senior year. Because of these results, the ACIP now recommends a booster vaccination one year following the original series if a student remains at increased risk.[104]

[101] Basta, "Immunogenicity."
[102] Ladhani, "Vaccination of Infants."
[103] Sarah Mbaeyi, "Serogroup B Meningococcal Vaccines Booster Doses," June 2019 ACIP Meeting.
[104] *Ibid.*

SURVEY

Act 83 of 2002, known as the College and University Student Vaccination Act, contains the most recent statutory language directing institutions of higher education (IHEs) with regard to vaccination against meningococcal disease (meningitis). The statute directs institutions to prohibit students from living in a dormitory or housing unit unless that student has received a one-time vaccination against meningitis. Exceptions to this rule are permitted when a student signs a written waiver affirming that they have chosen not to be vaccinated for religious or other reasons.[105] Since the enactment of the College and University Vaccination Act in 2002, the Pennsylvania Department of Health's Bureau of Communicable Diseases has conducted biennial surveys of the IHEs to assess their policies and compliance with the act.

Commission staff conducted a survey of Pennsylvania's IHEs to gather data about meningitis vaccination among students and how the institutions disseminate vaccination information. Commission staff also reviewed results of the Department of Health's latest biennial survey of IHEs, which includes data about meningitis.

Joint State Government Commission Survey

Methodology

Senate Resolution 292 directed the Joint State Government Commission to

- Determine and report the vaccination rates for meningitis ACWY (MenACWY) and meningitis B (MenB) by each IHE; and

- Determine if IHEs throughout this Commonwealth are advising and monitoring the need for a catch-up dose of the MenACWY or MenB vaccination or doses of both.

Commission staff created a survey of the Commonwealth's IHEs to measure the number of resident students who have and have not been vaccinated, to find out how the IHEs communicate with students about meningitis, and how they monitor whether students are subsequently vaccinated. An initial validity questionnaire was sent to five IHEs within the Commonwealth. The validity questionnaire asked the respondents to first answer the draft survey and then a follow-up questionnaire to rate each question of the draft survey as either Clear or Unclear. Space was

[105] Act of June 28, 2002, (P.L. 492, No. 83); 35 P.S. § 633.1 *et. seq.*

provided to explain their responses. Three institutions responded. Commission staff edited and added questions based on their feedback.

The list of IHEs was obtained from the Pennsylvania Department of Education website. Commission staff deleted those institutions that do not have dormitories or students housing. One hundred and thirty-two IHEs in the Commonwealth were determined to be eligible to participate in the survey because they have dormitories or student housing. A first mailing of the survey was e-mailed to all Student Health Directors. Commission staff followed up via phone and e-mail. Of those 132 institutions, 101 or 77% of eligible institutions responded to the survey. Seventy respondents are private IHEs; 27 are public IHEs.

Survey Results

Meningitis ACWY Vaccinations

Institutions were asked what percentage of students residing in dormitories or on-campus housing units were vaccinated for MenACWY. Nine of the IHEs responded that 100 percent of their student population were vaccinated for MenACWY for the 2018-2019 school year. One institution responded that 100 percent of its students were either vaccinated or had submitted a waiver. Thirty-four IHEs responded that between 90 and 99 percent of their student population were vaccinated, and eight IHEs responded that their vaccination rates were between 80 and 89 percent. Two IHEs estimated that their vaccination rates were in the 70 to 79 percent range and one gave the MenACWY vaccination rate as 63 percent. Forty-six IHEs responded that their vaccination rates were unknown.

Table 4
Pennsylvania Institutions of Higher Education
MenACWY Vaccination Rates
2018-2019 School Year

Name of Institution	Percentage of Students Vaccinated
Albright College	94%
Allegheny College	81 [a]
Alvernia University	100 [b]
Arcadia University	99
Bryn Athyn College	95
Bryn Mawr College	80
Bucknell	100

Table 4 Pennsylvania Institutions of Higher Education MenACWY Vaccination Rates 2018-2019 School Year	
Name of Institution	**Percentage of Students Vaccinated**
Cabrini University	95
Cairn University	99
Carlow University	(See footnote) [c]
Chatham University	86 [a]
Curtis Institute of Music	100
Delaware Valley University	99
DeSales University	98
Dickinson College	86
Drexel University	100
Duquesne University	94
Eastern University	93
Franklin and Marshall College	> 90
Grove City College	90-95 [a]
Holy Family University	90-100 [a]
Jefferson University East Falls	95 [a]
Juniata College	95 [a]
Keystone College	93
King's College	> 90 [a]
La Salle University	97 [b]
Lackawanna College	63
Lafayette College	100
Lehigh University	90 [a]
Lincoln University	99 [a]
Manor College	100
Marywood University	97

Table 4 Pennsylvania Institutions of Higher Education MenACWY Vaccination Rates 2018-2019 School Year	
Name of Institution	**Percentage of Students Vaccinated**
Mercyhurst University	99
Messiah College	100
Millersville University	90 [a]
Misericordia University	95 [a]
Moore College of Art and Design	98
Moravian College	99
Muhlenberg College	> 95
Northampton Community College	100
Pennsylvania College of Technology	97
Robert Morris University	100 [a]
Saint Charles Borromeo Seminary	86
Saint Francis University	98
Saint Vincent College	85*
Susquehanna University	> 98
Swarthmore College	70
Temple University	83
The Pennsylvania State University	98
Thiel College	80
University of Pennsylvania	99
University of Pittsburgh	87
University of the Arts	73
University of the Sciences - Philadelphia	99
University PITT at Greensburg	100
Valley Forge Military College	95
Waynesburg University	95

Table 4
Pennsylvania Institutions of Higher Education
MenACWY Vaccination Rates
2018-2019 School Year

Name of Institution	Percentage of Students Vaccinated
Westminster College	98
Widener University	100

[a] – Estimated
[b] – Includes students who signed waivers
[c] – Unknown specific percentage; all freshmen for the last two years have been vaccinated

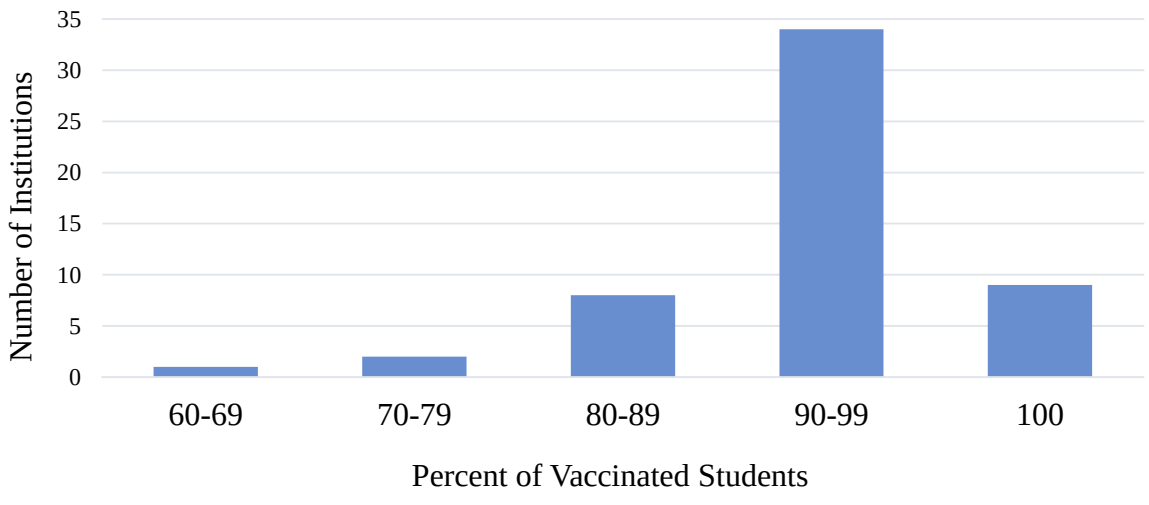
Please see the appendix for all institutions that responded "unknown". (p. 121)

Source: JSGC Staff Survey of Pennsylvania Institutions of Higher Education, Summer 2019

Two institutions, Reformed Episcopal Seminary and St. Tikhon's Orthodox Theological Seminary, replied that they do not require students residing in on-campus housing to receive vaccination. Through follow up phone calls, staff at the institutions explained that they had either not known about the requirement or had not thought that it applied to them because their student population are all in master's degree programs and generally above the recommended age range for the vaccination. Students at both institutions primarily live in family units in the programs' on-campus housing. Both institutions communicated to Commission staff that they are in the process of implementing the requirement.

Chart 1

Institutions Grouped by Students' MenACWY Vaccination Rates
2019



Source: JSGC Staff Survey of Pennsylvania Institutions of Higher Education, Summer 2019

Meningitis B Vaccinations

The IHEs were asked what percentage of their students were vaccinated for MenB for the 2018-2019 school year. If the amount was unknown, they were given a space to write "unknown." Eighty-two institutions responded that the percentage was unknown. There was a wide range in the remaining responses. One institution responded that approximately 70 percent of students have received at least the first MenB vaccine prior to arrival on campus and another responded that 50 percent of first year students were vaccinated for MenB. One college responded with a MenB vaccination rate of 40 percent. Responses from the remaining institutions ranged from reporting 0 to 20 percent of the student population were vaccinated.

Table 5

Pennsylvania Institutions of Higher Education
MenB Vaccination Rates
2018-2019 School Year

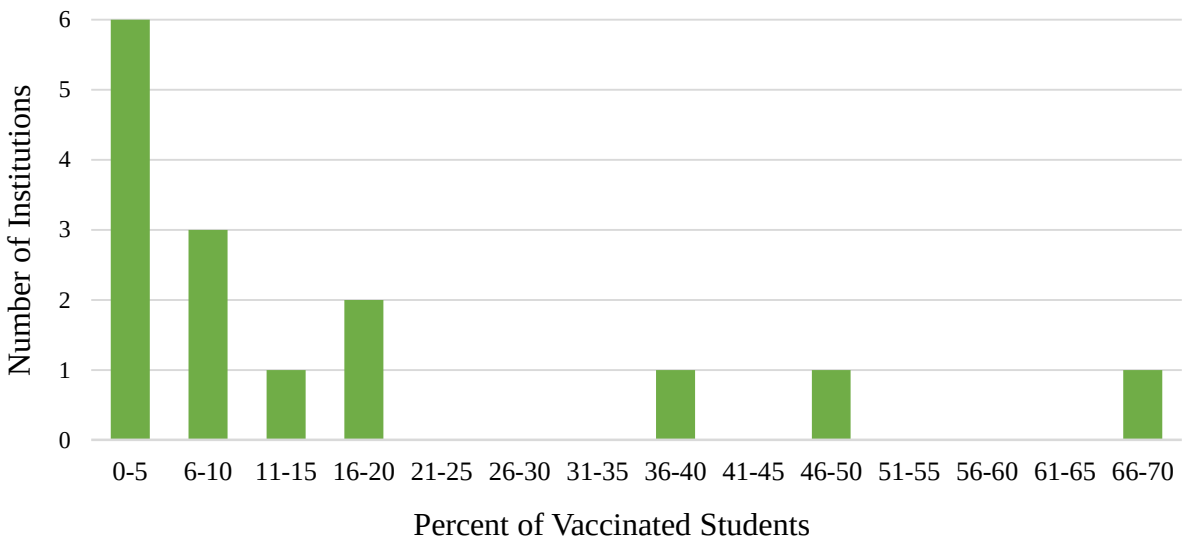
Name of College Or University	Percentage of Students Vaccinated
Albright College	40%
Bryn Athyn College	0
Bryn Mawr College	8
Bucknell	3
Carlow University	0
Carnegie Mellon University	20
Delaware Valley University	2
Lackawanna College	0
Lafayette College	4
Lehigh University	70 [a]
Millersville University	8 [a]
Moore College of Art and Design	19
Susquehanna University	50 [b]
Thiel College	13
University of Pennsylvania	5 [a]
University of the Sciences - Philadelphia	(See footnote) [c]

[a] – Estimated
[b] – Estimated first year students
[c] – Unknown specific percentage

Please see the appendix for all institutions that responded "unknown". (p.123)

Source: JSGC Staff Survey of Pennsylvania Institutions of Higher Education, Summer 2019

Chart 2
Institutions Grouped by Students' MenB Vaccination Rates 2019

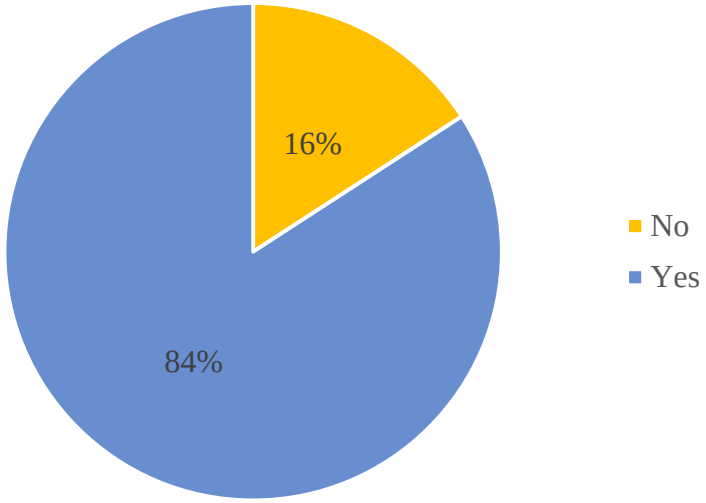


Source: JSGC Staff Survey of Pennsylvania Institutions of Higher Education, Summer 2019

Vaccination Booster Requirement and Follow Up

Institutions were asked if there was a consequence for students if they did not submit the required meningococcal vaccination information. Results are based on institution's current practices. Twenty-two institutions responded that there were no consequences for students who did not submit the information. Several replied that they intended to put consequences in place in the upcoming school year. Multiple institutions did not disclose a specific consequence although they indicated that they require vaccinations or a signed waiver from all students residing in on-campus housing. Another institution responded that although vaccination or a waiver is required, it does not consistently enforce compliance. There were two common consequences. The first is that students were not allowed access to their dorm room – twenty-six of the IHEs do not allow a student into their dorm room if the student does not have a vaccination or a waiver. The second most common response is that non-compliant students were not allowed to register for classes – twenty-five of the IHEs do not allow a student to register for classes if they have not yet met the vaccination requirements. One institution does not send grades to students who have not submitted immunization information. Another institution responded that a student can either sign a waiver or go to the student services center to receive the vaccine immediately.

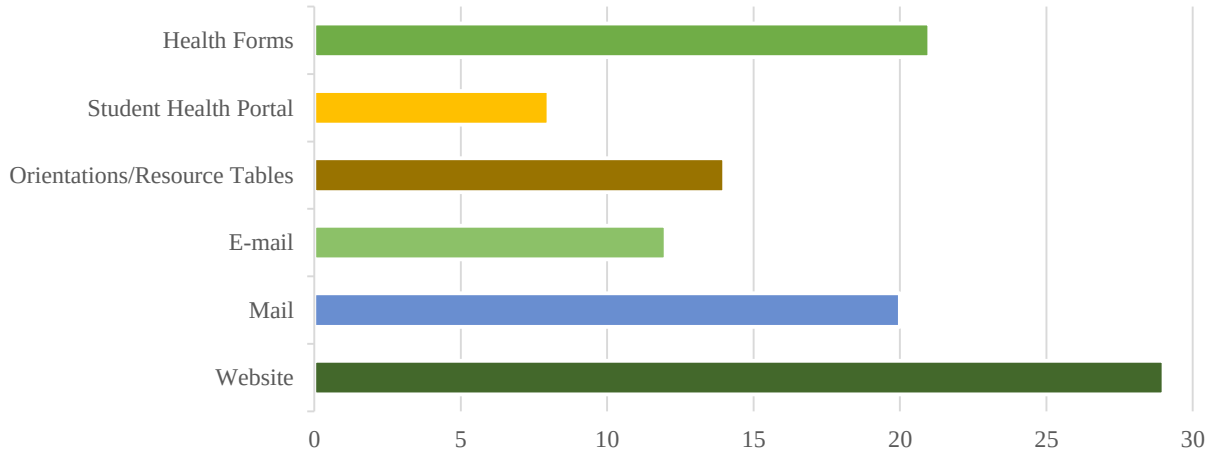
Chart 3
Do you advise your students to receive the recommended booster dose of MenACWY?



Source: JSGC Staff Survey of Pennsylvania Institutions of Higher Education, Summer 2019

The institutions were asked whether they advised their students to receive a recommended booster dose of MenACWY. Approximately 16 percent of the institutions do not advise their students to receive the follow up dose. The remaining 84 percent do advise their students to receive the MenACWY booster dose.

Chart 4
What method is used to contact your students to recommend a booster dose of MenACWY?



Source: JSGC Staff Survey of Pennsylvania Institutions of Higher Education, Summer 2019

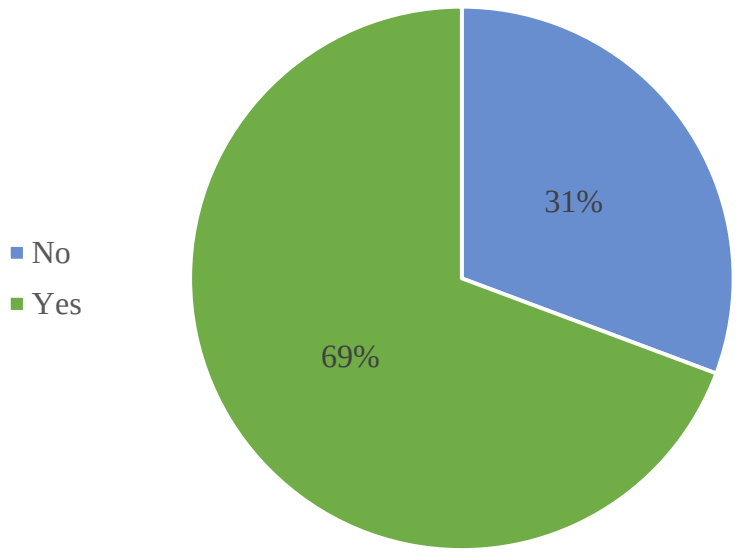
The institutions that do advise their students to get a follow up dose of the MenACWY vaccine were asked how they convey this information to the student. Some institutions use multiple methods of contact. Because each method was logged separately, the number of responses adds up to more than the number of institutions that responded. The most common means of alerting the student was through the university website. Thirty institutions place the information onto their website. Twenty institutions informed the students of the need for a booster dose via direct mail while twelve advise students through e-mail. Thirteen institutions convey this information at orientations or through resource tables. Eight of the institutions responding inform students via Student Health Portals and 19 institutions utilize the student health forms to advise students to get a follow up dose of the MenACWY vaccine. Some institutions indicated that they will start utilizing additional notification methods in the future.

Monitoring and Recording

The institutions were asked whether they monitor and record when their students receive a catch-up dose of the MenACWY vaccine. Thirty-one of the institutions do not monitor and record the catch-up dose. Seventy of the institutions do monitor and record when their students receive a catch-up dose of the vaccine.

Chart 5

Does your institution monitor and record when its students receive a catch-up dose of MenACWY?

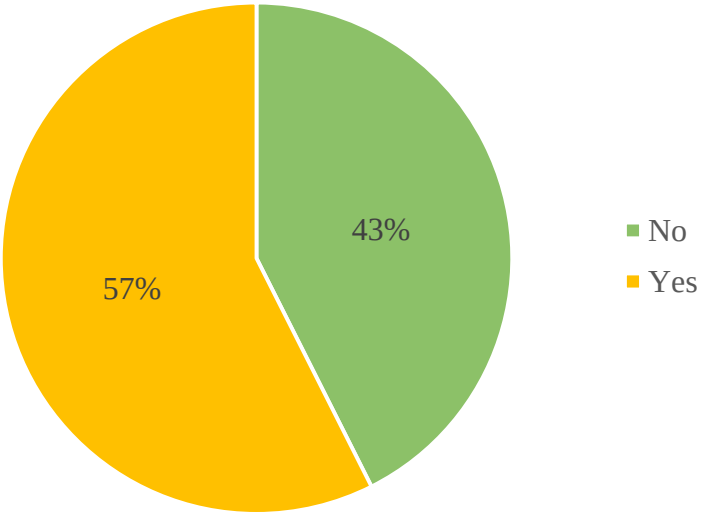


Source: JSGC Staff Survey of Pennsylvania Institutions of Higher Education, Summer 2019

The institutions were asked whether they monitor and record when their students receive a MenB vaccination. Fifty-eight institutions monitor and record when their students receive a MenB vaccination. Forty-three institutions do not monitor and record when their students receive the MenB vaccination.

Chart 6

Does your institution monitor and record when its students receive a vaccination for MenB?



Source: JSGC Staff Survey of Pennsylvania Institutions of Higher Education, Summer 2019

Pennsylvania Department of Health
College and University Immunization Policy Questionnaire

The Division of Immunizations within the Pennsylvania Department of Health's (DOH) Bureau of Communicable Diseases has conducted biennial surveys of IHEs to assess current higher education immunization policies and requirements since the enactment of the College and University Student Vaccination Act in 2002. The results of the surveys are used to help the DOH update program information and plan for outbreak control of vaccine-preventable diseases.

Methodology

For the 2018 survey, the DOH mailed the College and University Immunization Policy Questionnaire to 181 colleges and universities on September 3, 2018 with a requested return date of October 12, 2018. The department's questionnaire included questions on multiple vaccines, including mumps, rubella, measles, varicella, and meningococcal disease, among others. As part of the mailing, the Division of Immunizations included information from the 2016 survey, Pennsylvania state immunization requirements, PA Department of Health policy and recommendations, and the American College Health Association's most recent guidelines.

Survey Response

Sixty-five of the institutions surveyed completed and returned the questionnaire. The response rate was approximately 35.9 percent.[106] Since 2004, the average response rate has been slightly less than 50%. The 2018 response rate is the lowest response rate in 14 years. Using National Student Clearinghouse Research Center data from 2018, the DOH calculated that the response represented 225,117 students out of an estimated 654,165 post-secondary students enrolled in PA colleges and universities for the Fall 2018 term.

Survey Results

Of the 65 college and universities that completed the 2018 questionnaire, 46 (70.8 percent) have an immunization policy that is enforced with a penalty for noncompliance. Of the 46 IHEs that have an immunization policy enforced by a penalty, 84.8 percent require at least one dose of meningococcal.[107]

Of the institutions that require meningococcal vaccination and have a penalty in place for noncompliance, 13 institutions require all students to receive the immunization and 24 institutions require residential students to receive the immunization. Seventeen of these respondents replied that they require new students to receive the immunization.[108]

Of the 65 colleges and universities that completed the questionnaire, 54 (83.1 percent) stated that they have a health care clinic on campus. Of those 54 institutions, 22 offer meningococcal vaccinations and 32 do not.[109]

[106] "College and University Immunization Policy Questionnaire: 2018 Results," Division of Statistical Registries, Bureau of Health Statistics and Registries, PA Department of Health, Pennsylvania Department of Health, January 2019.
[107] *Ibid.*, 2.
[108] *Ibid.*, 3.
[109] *Ibid.*, 4.

NATIONAL OUTBREAKS ON COLLEGE CAMPUSES

Senate Resolution 292 directs Joint State Government Commission to examine meningitis outbreaks at institutions of higher education (IHEs) throughout the U.S. and report the fiscal impact of those outbreaks on the institutions.

In the process of researching these outbreaks, Commission staff spoke with 13 staff members at different universities throughout the country, 10 state health department employees and 3 employees at county health agencies. Throughout this process, Commission staff also reviewed medical journal and newspaper articles to establish facts, timelines, and general details that would present a full picture of the outbreaks and institutional responses.

It is notable that in some cases, firsthand accounts vary slightly. Record keeping varied in some instances. Efforts were made to portray accurate information of emergency responses that in some cases occurred seven years ago. When there were differing accounts of these incidents, Commission staff attempted to portray a reliable general picture. Much of the information was compiled after the fact and relies on the recollection of the stakeholders involved. Additionally, Commission staff encountered different dates in compiling the timelines that in some cases may have reflected the difference between onset of illness, initial hospitalization, diagnosis of MenB, and confirmation of serogroup.

One study, prepared by RTI Press, created a conceptual framework describing the response to a meningococcal outbreak on a university campus. The first phase of that response focuses on a medical response for identified cases and their contacts. This phase includes acute medical care and prophylaxis antibiotics for close contacts.

The public health response is a separate section of the framework. The public health response spans from state to county to university to local providers. Mass vaccination clinics fall within the public health response, as does case investigation which then results in prophylaxis and long-term surveillance. The university health center functions within the public health response and a public health awareness communication campaign.

The final piece of the framework is strategic communications. Medical management and engagement with public official or policymakers comprise this portion of the framework.[110]

One source of funding for vaccinations during outbreaks is the CDC's Public Health Service Section 317 Immunization Grants Program, established by the Vaccination Assistance Act of 1962. The program uses discretionary grants to help states purchase vaccines for communities

[110] Sean D. Candrilli *et al*., "The Response to and Cost of Meningococcal Disease Outbreaks in University Campus Settings: A Case Study in Oregon, United States," RTI Press, October 2019, doi: 10.3768/rtipress.2019.rr.0034.1910.

that need but cannot afford them. Section 317 Funding can cover a variety of different services, from vaccination delivery and administration to improved record-keeping measures.[111] There are two kinds of 317 funding: Direct assistance and financial assistance. Direct Assistance is used to purchase vaccines, whereas financial assistance is used for program infrastructure.[112]

States are required by the CDC to produce annually an estimate of the number of children from 0-18 in their state, separated demographically and by insurance coverage. With these data, the CDC determines how much money it will allocate to each state. States submit their applications in August or September and learn how much money they have been allocated in December or January.[113] Once states have their funding budget, they decide how to spend the funds. The vaccines are bought through the CDC's Vaccine Management System (VACMAN) and the state account is billed for the vaccines immediately after they are ordered, not after they arrive. Once the account is empty, it cannot be utilized again until more money is placed in it; there is no credit system.[114] Although direct assistance and VFC funds are given out in installments throughout the year, financial assistance is given to the state in a lump sum at the beginning of the calendar year.[115]

In the survey of each of the outbreaks, Commission staff briefly touched on details of these outbreaks at the various IHEs. It is the Commission's goal that its summaries provide just enough detail to paint the picture of the surrounding environment, the events of the outbreak, and responses at all the different levels involved. What has become apparent throughout the scope of the research is that outbreak events are unique and that one size responses do not fit all. Whether it is the size of the school or state culture or any other number of factors, the course of each outbreak presented here is unique.

2013

Princeton University[116]

The first outbreak of meningitis B (MenB) in the U.S. occurred at Princeton University in 2013. The Princeton outbreak is unique in that it happened before MenB vaccines had been approved by the FDA for use in the U.S., and vaccination was brought about by arrangements between the CDC and FDA to permit importation and use of the vaccine Bexsero. Prior to this outbreak, Bexsero had been approved for use in Europe and Australia but not licensed by U.S. regulators.

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[111] "Immunization Infrastructure," ASTHO, accessed October 1, 2019, http://www.astho.org/Programs/Immunization/Immunization-Infrastructure/Immunization-Infrastructure-Overview/.
[112] Gary L. Freed *et al*., *State-Level Perspectives on Vaccine Purchase Financing*, (Ann Arbor, MI: University of Michigan, 2002).
[113] *Ibid.*
[114] *Ibid.*
[115] *Ibid.*
[116] Unless otherwise noted, the information in this section was from a telephone conference between Commission staff and Robin M. Izzo, M.S., Executive Director, Environmental Health and Safety, Princeton University on November 8, 2019.

Nine cases of MenB were associated with the Princeton outbreak between March 2013 and March 2014, beginning with the first diagnosis on March 25, 2013. Seven cases were Princeton students and one was a high school student. The outbreak's one fatality was a student at Drexel University who had had contact with Princeton students at an off-campus event several days before falling ill. Three patients suffered long-term consequences, including one with hearing loss, one with neurocognitive deficits, and one with chronic headaches.[117]

The first student to be stricken was diagnosed in March 2013, after having returned from an eight-day spring break vacation and going straight to the hospital for treatment. In April, a second case was diagnosed in a high school student in Texas who had been visiting Princeton.

The first of two on-campus cases was diagnosed in early May 2013. The CDC had been surveilling the initial two cases and then linked the third case, the first of the two May cases, to a single strain. This link led to the New Jersey Department of Health (NJDOH) concluding that a cluster existed. Shortly thereafter, the university launched a hygiene campaign to inform and motivate the campus community to take precautionary measures to protect itself. The university held informational meetings, distributed emails, and established a website dedicated to MenB. Further, brochures were distributed, table tents were placed in dining halls, and posters hung in dormitory bathrooms. Two weeks later, the second May case was diagnosed when the patient's mother, while driving him home after final exams, became concerned over his febrile state. At 3:00 a.m. the next morning, she took him to the hospital where he was admitted and diagnosed with MenB. The NJDOH declared an outbreak upon being notified. Shortly thereafter, the university's academic term concluded with commencement and class reunions, and it continued the hygiene campaign, with distributing hand sanitizers, information packets, and the use of non-reusable cups.

The fifth case was diagnosed at the end of June 2013. A student on a study abroad trip in Greece was diagnosed with MenB that was assumed to be the same strain as the other Princeton cases. In early July, the CDC began considering the possibility of vaccinating at-risk populations, e.g., Princeton undergraduates. At the time, however, licensed vaccines were not yet available for use in the U.S.

The new school year started in September, and the university's hygiene efforts ramped up with the "Mine. Not Yours." campaign, which also included videos of MenB survivors being interviewed about their experiences. A sixth case was diagnosed during the first week of October. All patients, at this point in the timeline, recovered.

At the beginning of October, the CDC petitioned the FDA to open an IND process in order to get Bexsero approved for use. IND, or investigational new drug, is the process by which the FDA may permit the use of unlicensed drugs. IND is considered part of a treatment protocol and is not considered part of a research or trial stage. Such drugs are considered low risk and are permitted for limited use. The task of allowing Bexsero to be used involved a formidable number of obstacles to overcome. The CDC and FDA institutional review boards had to coordinate their

[117] Lucy A. McNamara, PhD, MS *et al*, "First Use of a Serogroup B Meningococcal Vaccine in the US in Response to a University Outbreak," *Pediatrics* 135, no. 5 (May 2015): 798-804, https://pediatrics.aappublications.org/content/pediatrics/135/5/798.full.pdf, 800.

efforts so as to ensure that all necessary procedures and protocols were followed as they navigated this unique threat. The vaccines were produced in Italy and had to be transported to the U.S. The doses were transported to a refrigerated storage facility in Louisville, Kentucky and then moved in batches to Princeton. Each of the thousands of doses had to be relabeled to conform to the IND's labeling requirements. The IND approval was granted in mid-November, a seemingly rapid process that reflects the severity of the public health crisis. The seventh case was diagnosed in the meantime. By the end of November, the eighth case was diagnosed.

The IND was approved and the vaccination campaign commenced with the first round doses being administered in early December. The vaccination clinics were held on campus—Princeton is unusual among American colleges in that all undergraduate students reside on campus while earning their degrees. The university holds annual on-campus flu vaccine clinics through a private contractor. The contractor was the only entity approved to administer the Bexsero doses. The CDC was on site to advise and answer questions that arose during the clinics. The second round of doses were administered in February. The information campaign notified at-risk persons through email, texts, and posters. Potential vaccine recipients were assessed via questionnaire, with further counseling provided by doctors from the university and the CDC. Real-time vaccination information was entered into students' electronic health records; nonstudents' records were collected in hardcopy. Adverse events were gathered from phone calls and health clinic visits made by students and others. Further, the second dose clinic included surveys about adverse events occurring after the first clinic, and again 30 days after the second vaccination.

After the conclusion of the February clinics, a Drexel University student, who had had social contact with Princeton students, was diagnosed as having contracted the illness from a Princeton student who had been vaccinated. The Drexel student passed away. The tragic death illustrates the unfortunate fact that MenB vaccination, while it may provide immunization for the individual who receives it, does not affect carriage. In other words, a person might have been vaccinated and protected from MenB yet still remain a threat vector by carrying the disease. With no further cases identified by spring of 2015, the CDC declared the outbreak over.[118]

Beginning in September 2014 and for the next two academic years, all incoming students were offered vaccinations. The university paid all associated costs of purchasing, transporting, and administering the vaccines. Further information about the costs, including dollar figures, is confidential by the terms of non-disclosure agreements signed by the parties involved. The only information available is that the university paid less than the market price per dose. Under terms of an IND, the manufacturer's accounting needs to show that no profit was realized through the sale of the vaccines and that the purchaser paid only the costs.

Student involvement was critical to the success of the vaccination campaign. The university was somewhat hampered by the terms of the IND: the vaccination could not be mandatory; coaches could not push students-athletes to get vaccinated.

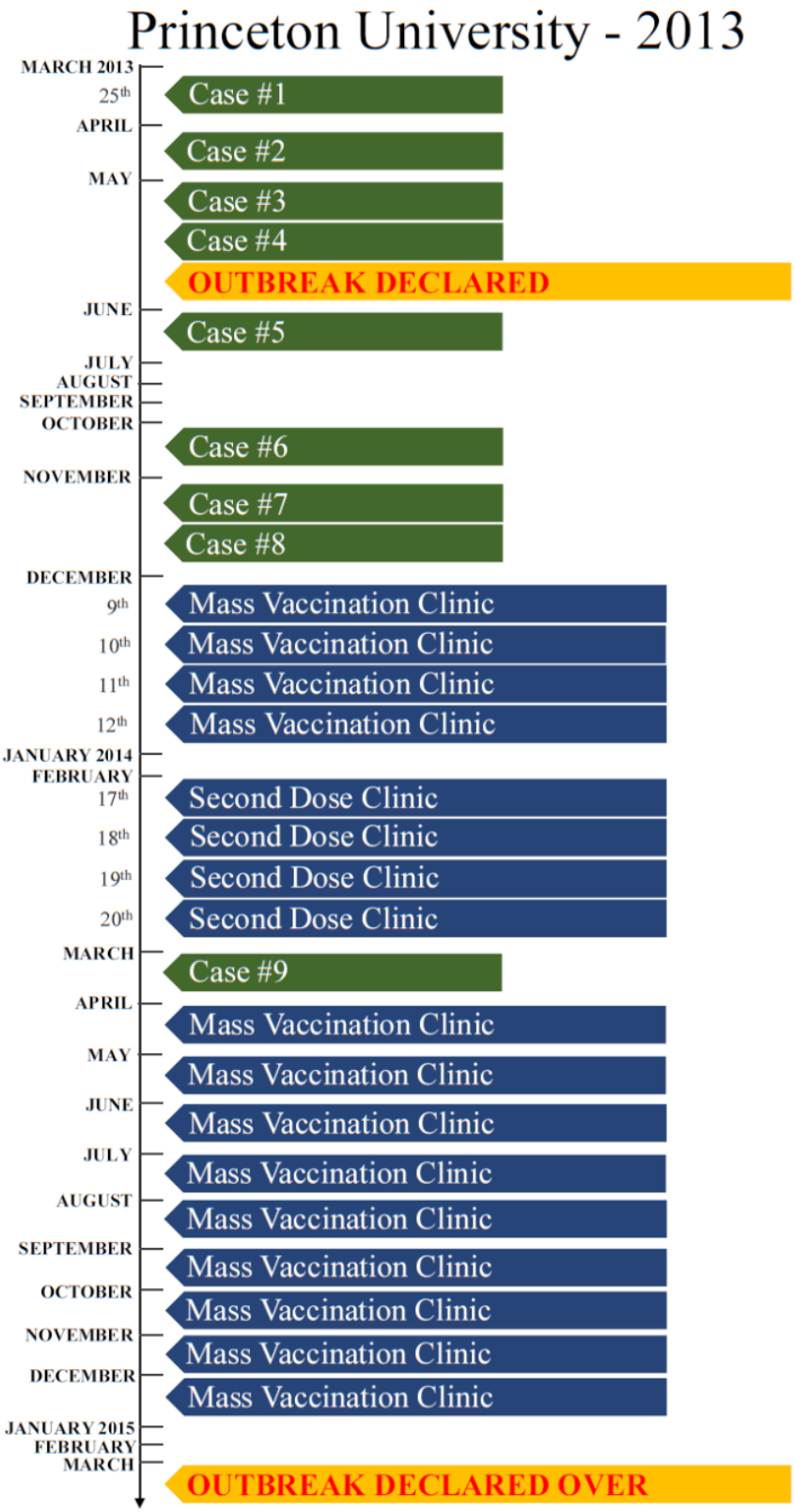
[118] "Meningitis," Emergency Management, Princeton University, last modified January 5, 2017, http://emergency.princeton.edu/what-to-do/public-health-alerts/meningitis.

The student health advisory was brought into the process early, and its involvement resulted in very widely accepted ideas for videos, posters, table tents, emails, and social media notices. The information campaign for the first dose clinic was presented with serious, even somber tones. A video featured a doctor's interview with one of the initial four MenB patients. The clinic for the second dose was promoted with more fun and entertainment, and featured pictures of a $100 bill cut in half, a half-clothed student standing in the snow, and a condom cut in half all with the message that inoculation requires both the first and second doses. Half is not effective. The social media campaigns were credited with attracting many more people than expected, including those outside of the target population. Although some individuals not included in the original IND were cleared by the CDC for vaccination (for example, personal caregivers who resided in dormitories were permitted vaccination), others were not (for example, off-campus romantic partners of undergraduate students). University staff were aware of student peer pressure to get vaccinated. Students began posting Instagram pictures of their "menge arms," depicting photos of their arms where they had received the inoculation. Students were posting pictures of their hand stamps—when a student was cleared for vaccination at the clinic intake, his or her hand was stamped with an orange tiger to identify his or her being eligible to be vaccinated.

Initial hopes were that between 75 percent and 80 percent of undergraduate students would receive vaccinations. However, almost 97 percent of all Princeton undergraduates received the first dose of Bexsero, and 91.4 percent received the second. The first-dose vaccination clinic led to 5,502 people being vaccinated, 5,062 of whom were students. The second clinic had 4,791 undergraduates vaccinated. For the whole population of eligible people, including graduate students, faculty, staff, and others, 5,502 doses (94.9 percent) and 5,165 (89.1 percent) of first and second doses were administered, respectively. Several factors are attributed as contributing to the coverage of nearly all of the 5,241 undergraduates.[119] First, the campaign used a multi-pronged approach to communicating the danger of MenB and what steps were available to protect oneself. Information was provided to students and their parents through emails, texts, posters, meetings that included both university and CDC staff, and a video created by students. Second, clinics were managed such that wait times were short, and high numbers of students could move through quickly. Third, the "high attack rate" of the disease and the fact that three new cases were documented within weeks of the clinic's start, likely motivated students to take action.

The university faced intense news media scrutiny after the fourth case was identified and the outbreak declared. The media were generally kept away from the campus, and all the university, CDC, local, and state authorities coordinated their responses and kept each other apprised so that they would speak to the media with "one voice" to avoid confusion and potentially conflicting information.

[119] McNamara, "First Use of a Serogroup B Meningococcal Vaccine," 802.


Princeton University - 2013
MARCH 2013
25th
Case #1
APRIL
Case #2
MAY
Case #3
Case #4
OUTBREAK DECLARED
JUNE
Case #5
JULY
AUGUST
SEPTEMBER
OCTOBER
Case #6
NOVEMBER
Case #7
Case #8
DECEMBER
9th
Mass Vaccination Clinic
10th
Mass Vaccination Clinic
11th
Mass Vaccination Clinic
12th
Mass Vaccination Clinic
JANUARY 2014
FEBRUARY
17th
Second Dose Clinic
18th
Second Dose Clinic
19th
Second Dose Clinic
20th
Second Dose Clinic
MARCH
Case #9
APRIL
Mass Vaccination Clinic
MAY
Mass Vaccination Clinic
JUNE
Mass Vaccination Clinic
JULY
Mass Vaccination Clinic
AUGUST
Mass Vaccination Clinic
SEPTEMBER
Mass Vaccination Clinic
OCTOBER
Mass Vaccination Clinic
NOVEMBER
Mass Vaccination Clinic
DECEMBER
Mass Vaccination Clinic
JANUARY 2015
FEBRUARY
MARCH
OUTBREAK DECLARED OVER

University of California, Santa Barbara

The University of California at Santa Barbara (UCSB), one of ten public University of California campuses, is located about eleven miles outside of downtown Santa Barbara in Southern California. In November of 2013, UCSB experienced a MenB outbreak. On November 11, 13, 18, and 21, four students were diagnosed with invasive meningococcal disease.[120] The students were all active members of organizations on campus, but none of them lived in the same unit. The afflicted students faced varying levels of severity in their cases, with three recovering fully and one left permanently disabled.[121]

As soon as the first case was confirmed, the Santa Barbara Public Health Department (SBPHD) began to work with UCSB's health department to administer chemoprophylaxis, an antibiotic pill, to the students who were in close proximity to the affected student. This effort continued as the other three students were diagnosed until eventually 1,200 UCSB students received the pill.[122]

The next step for SBPHD was an educational campaign on the symptoms and spread of MenB. They urged students to seek medical attention quickly if they developed symptoms and advised against attending events where there would be "smoking, alcohol, and close personal contact."[123] At the request of SBPHD, UCSB canceled all fraternity and sorority social events until after winter break. SBPHD also alerted medical providers to be on the lookout for MenB symptoms in at-risk populations. To keep the public updated, SBPHD engaged in news interviews and held a press conference to ensure that everyone in the community was well-informed.[124]

SBPHD and the California Department of Public Health (CDPH) began to discuss using the investigational vaccine Bexsero early in the outbreak, but the CDC was required to do a site visit and test the UCSB strain against the vaccine before its use could be approved. After making its way through the red tape, the vaccine was approved by the FDA on January 23 and was offered to the 20,238 enrolled undergraduate students starting February 24, 2014.[125] 9,831 students received their first dose of Bexsero, a 51 percent take rate, and were directed to return for their second dose. 7,707 students received the second dose, for a 40 percent take rate. The overall series completion rate was 78 percent.[126] The health departments were concerned with the uptake rates for the second dose, as the vaccination events could be spread across breaks which made it difficult

[120] Paige Batson, "Provider Alert: Update on Meningococcal Outbreak in UCSB Students," Santa Barbara County Public Health Department, last modified December 4, 2013, https://www.countyofsb.org/phd/documents/Press_Release/2013_Press_Release/2013-12-04%20Meningococcal%20Provider%20Alert%202.pdf.

[121] Christina Cocca, "UCSB Student Loses Feet to Meningitis in Campus Outbreak," *NBC Los Angeles*, December 5, 2013.

[122] Charity Thoman, "Meningococcal Outbreak at UCSB: An Update from Public Health," *Santa Barbara Independent*, December 25, 2013.

[123] Thoman, "Meningococcal Outbreak."

[124] Thoman, "Meningococcal Outbreak."

[125] Jen Christensen, "Calif. Students Getting Unlicensed Meningitis Vaccine," *CNN Health*, February 24, 2014.

[126] Jonathan Duffy *et al*., "Safety of a Meningococcal Group B Vaccine Used in Response to Two University Outbreaks," *Journal of American College Health* 65, no. 6 (2017): 380-388, doi: 10.1080/07448481.2017.1312418.

to track student's immunizations. The outbreak stopped with the fourth student on November 21 and no new cases were reported in that academic year.[127]

The staff that supported these vaccination events was "a mixture of campus staff and contracted Maxim nurses and some administrative support."[128] Though one time UCSB utilized the Santa Barbara Medical Reserve Corps, the university found that for their purposes it created too much extra background work and was not within the Reserve Corps' usual duties which resulted in the decision to utilize other alternatives. Another important factor noted in mobilizing staff was the reliability of the workers. Volunteers were less reliable and in such a large vaccination event the staff needed to be organized and focused. This is why the staff was mostly comprised of UCSB employees.[129]

For this outbreak, payment was complicated because private insurance and government programs would not cover the vaccine since it was not licensed. UCSB was responsible for all the vaccines in the initial response to the outbreak. The university covered the cost of 20,000 vaccines that were made available to students in the days following the outbreak. In a follow-up campaign after an additional case two years later, the CDPH provided 8,000 vaccines through 317 Funding.[130] All told, the university spent over a million dollars on the outbreak. This number was largely comprised of purchasing the vaccines. The school also paid for staffing vaccination events, supplies, and public relations campaigns. [131]

The SBPHD offered a hotline for community members with questions or concerns to contact.[132] Because of its education and publicity initiative, the SBPHD was inundated with false reports. Students and members of the community were hypervigilant to symptoms and alerted the SBPHD in cases where MenB was not present. As a result, the SBPHD was working overtime for months to ensure that the outbreak was contained and to set the public at ease. The crisis dragged on for longer than most do because of the prolonged process of obtaining Bexsero.[133]

UCSB received an honorary resolution from the Santa Barbara County Board of Supervisors commending its handling of the outbreak. Though one student suffered permanent bodily harm, the university worked quickly to cooperate with local, state, and federal authorities to minimize the outbreak's impact. Given the added complexity of obtaining the unlicensed vaccine, the student health department's efforts to gain approval as soon as possible were considered impressive.[134]

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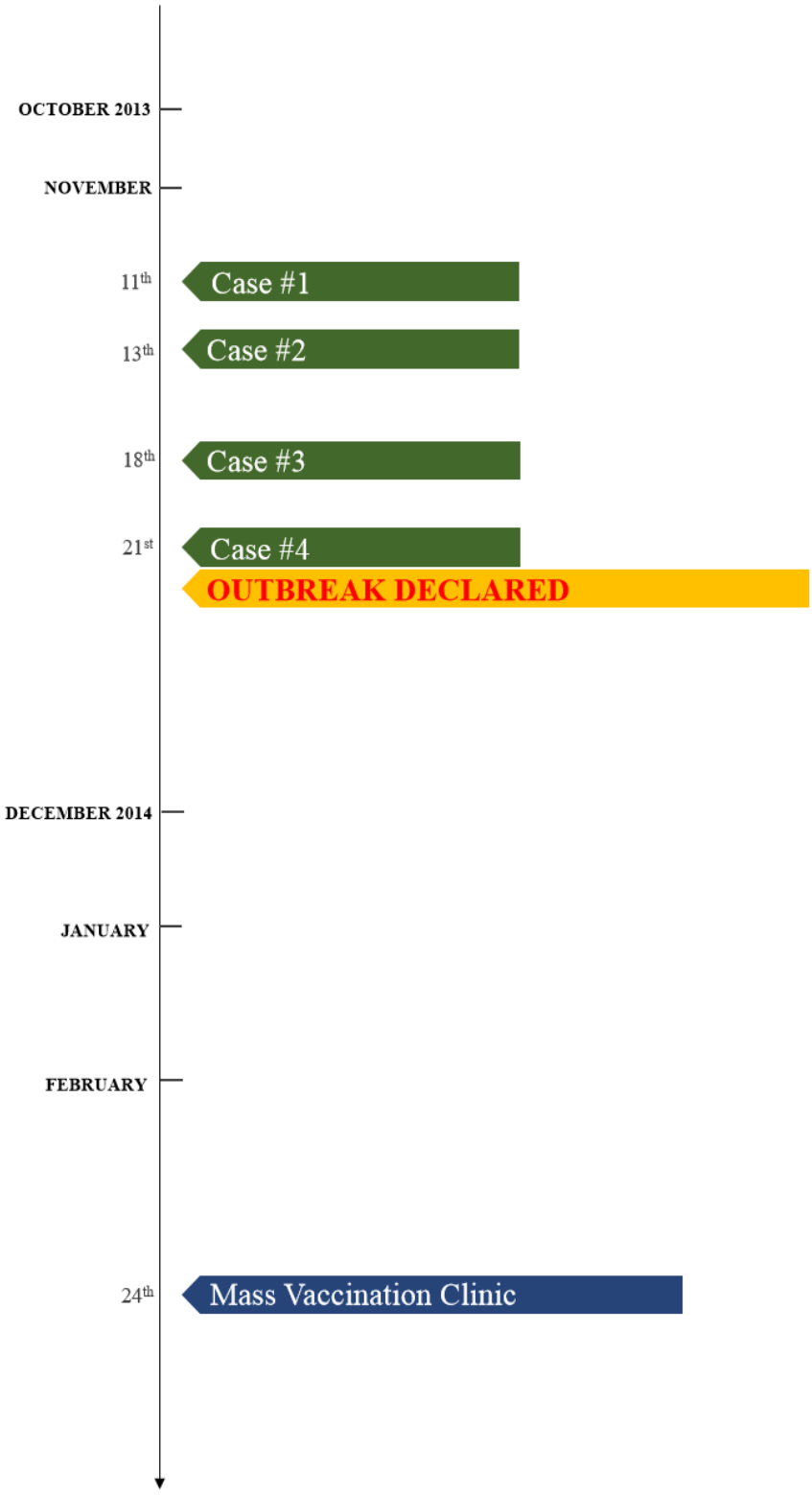
[127] These numbers were pulled from a scientific study conducted on the safety of the MenB vaccine and are slightly different than numbers provided by health department.
[128] Holly Smith, RN BSN, Administrative Nursing Supervisor UCSB Student Health, email to JSGC, October 7, 2019.
[129] Holly Smith, RN BSN, Administrative Nursing Supervisor UCSB Student Health, email to JSGC, October 2, 2019.
[130] Holly Smith, email to JSGC, October 7, 2019.
[131] Holly Smith, email to JSGC, October 2, 2019.
[132] *Ibid*.
[133] Paige Batson, Deputy Director for the Community Health Division, Santa Barbara Health Department, phone call with Commission staff, September 25, 2019.
[134] Julia Govan, "Meningitis: UCSB Health Gave It a Shot," *Daily Nexus*, May 15, 2014.

SBPHD spoke highly of the working relationship between the university's Health Department and SBPHD. They mentioned previous cooperation with the university on education and prevention regarding STDs and other infectious diseases as a factor that may have increased the ease of cooperation in 2013. They also noted that universities in California are often able to bring their own resources to the table during an outbreak, which increases all parties' ability to act quickly and decisively.[135] This was helpful in this case as UCSB provided the staff and resources to conduct the immunization campaign that SBPHD could not execute based on the size of their department.[136]

[135] Paige Batson, phone call, September 25, 2019.
[136] Holly Smith, email to JSGC, October 2, 2019.

University of California at Santa Barbara - 2013



2015

University of Oregon

In the winter of 2015, the University of Oregon (UO) experienced an outbreak consisting of 7 cases, including one fatality. Six of these cases were undergraduate students at the university and one was a visitor, a father who had visited his daughter on campus early in May and was then confirmed as the seventh case of meningococcal disease linked to the outbreak.[137] The case onsets ranged from January through May 2015.[138]

UO is a large campus with approximately 22,000 undergraduates. Slightly less than 4,000 of the student body live in campus dormitories and roughly another 3,000 are part of the Greek fraternity and sorority system.[139] The outbreak disproportionately impacted freshmen and students affiliated with Greek organizations.[140]

The first case was reported mid-January. Immediately following identification of this case, the university offered prophylaxis antibiotics to students and staff who were most at risk. The Lane County Public Health and Oregon Health Authority (OHA) worked together to identify those individuals.[141]

The second and third cases were identified at the very beginning of February and the CDC threshold in place at the time was met for declaration of an outbreak. However, cases 2 and 3 were determined to be close contacts and therefore, an outbreak was not declared.[142] Case four was a student athlete who was sent home from the hospital near campus after being diagnosed with flu-like symptoms on February 17, 2015. She died later that day.[143] The outbreak was declared on February 17, 2015.[144] On February 19, the CDC recommended vaccination for all students at UO.

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[137] "University of Oregon 'Dad' is 7th Meningococcal Disease Case" *Outbreak News Today*, May 29, 2015.
[138] Angela Albee, Senior Policy Advisor, Oregon Health Authority "Meningitis Update: Legislative Presentation" December 12, 2016.
[139] Cieslak, Paul, "Meningococcal Disease" Powerpoint presentation, Oregon Public Health Division, Oregon health Authority.
[140] Emily A. Fisher *et al*., "Evaluation for Mass Vaccination Clinics in Response to a Serogroup B Meningococcal Disease Outbreak at a Large, Public University – Oregon, 2015," *Journal of Adolescent Health* 63, no.2 (August 2018): 151-156, doi: 10.1016/j.jadohealth.2018.03.018.
[141] Linda Ames, "Analysis: Item 13: Oregon Health Authority: Meningitis Vaccination Program," Oregon Health Authority, last modified December 2016, accessed October 15, 2019, https://olis.leg.state.or.us/liz/2015I1/Downloads/CommitteeMeetingDocument/94262.
[142] Blair Capitano *et al*., "Experience Implementing a University-Based Mass Immunization Program in Response to a Meningococcal B Outbreak," *Human Vaccines & Immunotherapeutics* 15, no. 3 (January 2019): 717-724, doi: 10.1080/21645515.2018.1547606.
[143] "Jury rules Eugene hospital must pay $1.5 million in Oregon student-athlete's death," *The Oregonian*, September 30, 2017.
[144] Fisher, "Evaluation for Mass Vaccination."

The university held mass vaccination clinics in March, May and October 2015 at a large sports arena on campus. An additional clinic was held in February 2016.[145] However, in addition to these mass vaccination clinics, multiple additional vaccination events were offered to students. UO held a surge clinic from February 23-27 in the Knight Arena. At this advance clinic, UO billed students for the cost of the vaccine, then provided them with a receipt and the paperwork necessary to file for reimbursement with their insurance.[146] At the mass vaccination clinics held shortly thereafter, and all subsequent mass vaccination clinics, Albertsons-Safety administered the insurance billing directly.

The university continued with multiple smaller clinics apart from the mass vaccination clinics: a mini clinic was held in March and then in April, and a second dose clinic was also held in April. In addition to the specific clinics, the university directed students that they could receive the vaccine at local pharmacies, the student health center, during new student orientation, at local public health clinics, and from their healthcare providers.

According to a Legislative Report on the outbreak, "The University estimates that between 14 percent and 19 percent of vaccinations administered were not covered by insurance. The most common reasons for this were that the student had no insurance (the university does not require insurance of U.S. students) or that the insurance did not cover the particular provider that gave the vaccination."[147]

The university promoted the mass vaccination clinics to students through posters, e-mails to students, e-mails to parents, texts, social media, bracelets, coffee cups, stickers, sidewalk chalk messages, and newspaper articles.[148] In an effort to further reach freshman and Greek students, OU asked resident advisors to encourage students on their hall to get vaccinated, promoted vaccinations at Greek organizations' weekly chapter meetings, and provided professors with presentation slides to show during class.[149]

Full coverage across the student body was low. Out of 22,000 undergraduate students, 12,983 received the first of three doses of Trumenba. 6,452 received the second and only 2,455 reached series completion with the third dose. Lane Community College also received the vaccine but they opted to use Bexsero, which requires only two doses. 4,489 students received the first dose and 2,485 received the second dose.[150] One student cited a busy schedule as his excuse for not yet receiving the vaccination, but he noted that his mother urged him to receive it.[151] UO sent emails to parents to encourage their children to get the vaccines, as college students do not always prioritize healthcare. These measures still did not greatly increase the number of students receiving the vaccination.[152] By October 2016, the university had given out 30,462 vaccinations. This does

[145] *Ibid*., 152.
[146] Ames, "Analysis."
[147] Linda Ames, "Analysis," 2.
[148] Fisher, "Evaluation for Mass Vaccination."
[149] *Ibid*., 152.
[150] Ames, "Analysis."
[151] Saul Hubbard, "Meningitis Shots Need Boost," *The Register Guard*, March 20, 2015.
[152] Mark Hanrahan, "6th Student in Oregon Infected with Meningitis Bacteria," *USA Today*, March 19, 2015.

not include the number of students that were vaccinated through local pharmacies or providers at their homes.[153]

The Oregon state legislature passed Senate Bill 5526 of 2015 requiring that,

> The Oregon Health Authority, in collaboration with the Department of Consumer and Business Services, shall work with the University of Oregon on the vaccination program for meningitis. The Department of Consumer and Business Services shall ensure timely insurance coverage is covering appropriate costs for those with insurance. The Oregon Health Authority shall, within existing emergency preparedness funds, work with the University of Oregon on funding appropriate costs. The Oregon Health Authority and the University of Oregon shall report to the appropriate legislative committee the final cost of the program including any additional funding needs by December 2015 and any recommendations to ensure effective and efficient response to any future events.[154]

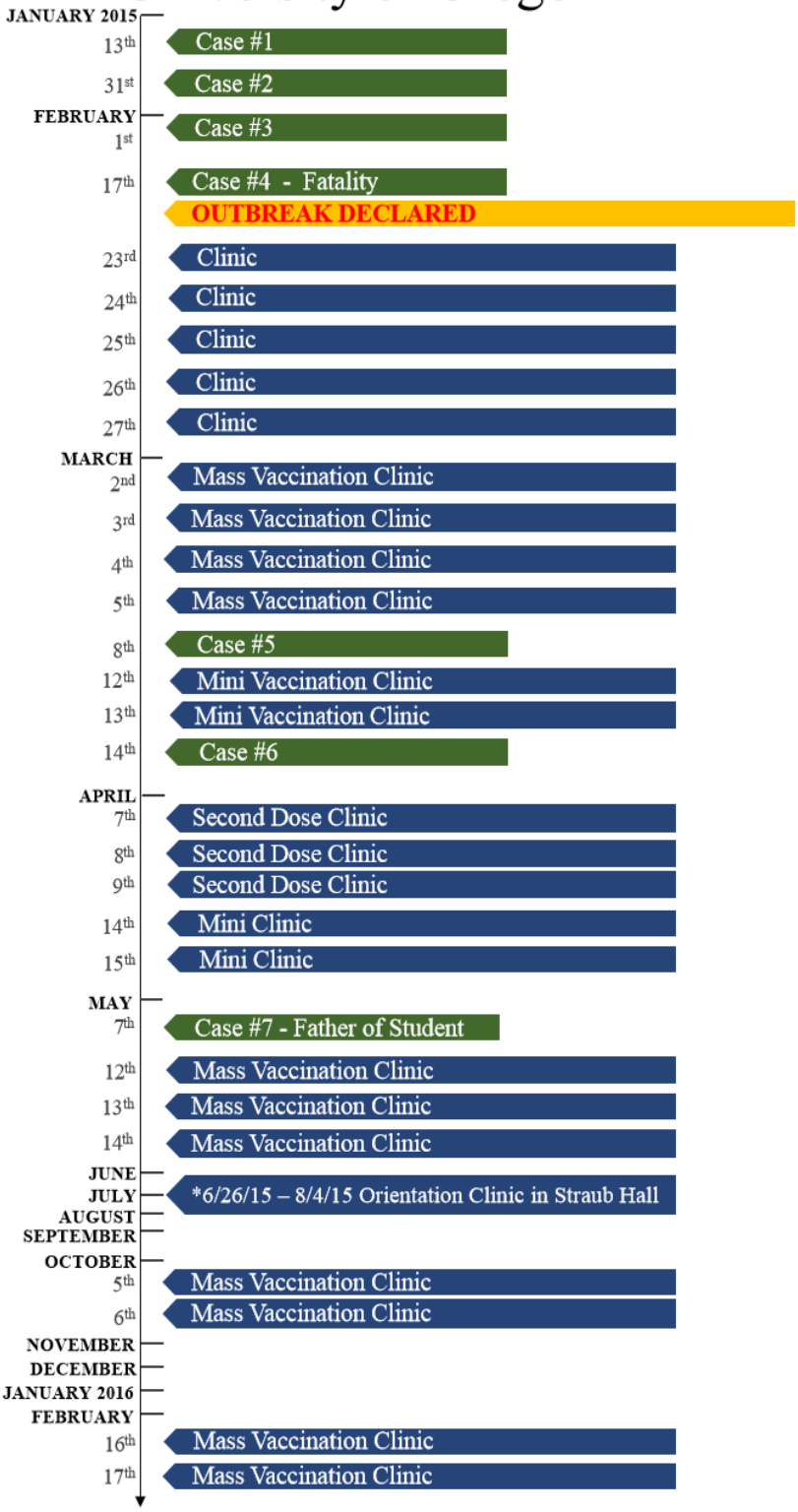
The vaccination campaign was the most significant cost driver in the UO outbreak. The Oregon Department of Consumer and Business Services worked with insurers to improve and ensure coverage of the vaccine. As of June 15, 2016, costs to the University were $589,806. The OHA reported costs of $157,187. The OHA leveraged a $1 million emergency preparedness fund to cover the response to the meningitis outbreak amongst other initiatives and responses. The Lane County Health Department and Lane Community College reported costs of $113,866 and $19,000 respectively. All told, the costs of the outbreak as of June 15, 2016 were $879,859. This does not include vaccination costs of students that were covered by insurance. This figure also does not include in-kind costs resulting from existing staff that were temporarily assigned to the vaccination efforts. [155]

The Oregon Legislative Fiscal Office recommended the allocation of $659,392 from the Oregon Emergency Fund to the Department of Administrative Services to disburse funds to the UO, Lane Community College and Lane County Health Department.

The mother of the student who died filed a wrongful death lawsuit against the company operating the hospital in Eugene, Oregon. The jury awarded her $1.5 million for negligent medical care.[156]

[153] Ames, "Analysis," 1.
[154] *Ibid*., 13-i.
[155] *Ibid*.
[156] "Jury rules Eugene hospital must pay $1.5 million in Oregon student-athlete's death," *The Oregonian*, September 30, 2017.

University of Oregon - 2015



Providence College

In early February of 2015, Providence College (Providence) in Rhode Island (RI) experienced a MenB outbreak among its over 4,000 student body population.[157] The outbreak consisted of two confirmed cases involving two students residing on Providence's 105 acre campus.[158] Neither diagnosed student had any known association with the other.[159] The first infected student, a 19-year old, was admitted to a Boston-area hospital on January 31, 2015 with an onset of symptoms consistent with MenB. Subsequent laboratory testing confirmed the student had contracted MenB. Within a week, the second student was identified by the Providence Health Center staff as being a probable MenB case and as a result, was transported to an acute care facility and was later confirmed to be the second MenB case.[160] Both students were treated and ultimately survived their diagnosis.

In response to the two confirmed incidents, Providence notified the RI Department of Health (RIDOH), which activated its Incident Command System (ICS) to coordinate an outbreak response. The ICS included the RIDOH Director's office staff; RIDOH Communications; Infectious Disease and Epidemiology, and Immunization, and Emergency Preparedness and Response Teams.[161] After activating its ICS, the RIDOH conducted an epidemiological investigation.[162] Approximately 60 students who had close contact with the two diagnosed students were provided prophylaxis antibiotics to reduce their increased risk of contracting MenB.[163]

On February 5, 2015, the RI State Epidemiologist confirmed with Providence's Director of Student Health Services that an outbreak would formally be declared by the RIDOH. The college's Director of Emergency Management Services (EMS) was then notified, followed by the college's student body. Notification to the students ignited a frenzied environment on campus and Providence's student health center quickly became overcome with a wave of phone calls from concerned parents and students, prompting the need for the center to extend its office hours to a 24/7 schedule to effectively field the calls. To assuage the mounting concerns, the RIDOH Director met with students, faculty, and staff at Providence's campus to provide additional education and reassurance.[164]

After receiving approval from the CDC and consulting with public stakeholders within the ICS, Providence launched a vaccination clinic to administer the first dose of MenB vaccines to its students on February 8, 2015. While two MenB vaccines (Trumenba and Bexsero) were approved

[157] "Fast Facts & Statistics," Providence College, accessed March 25, 2020, https://about.providence.edu/fast-facts/.
[158] Katie Mulvaney, "Second Meningitis Case Confirmed at Providence College; Vaccination Clinics Begin," *Providence Journal*, February 9, 2015.
[159] *Ibid.*
[160] "2015 Providence College Meningitis Response February 8, 2015 After Action Report/Improvement Plan," (Rhode Island Department of Health, April 26, 2016), 5.
[161] Theresa M. Fiorito MD *et al.*, "Rapid Response to a College Outbreak of Meningococcal Serogroup B Disease: Nation's First Widespread Use of Bivalent rLP2086 Vaccine," *Journal of American College Health* 65, no. 4 (January 25, 2017): 294-296, doi: 10.1080/07448481.2017.1285772.
[162] Dr. Uptala Bandy, Rhode Island Department of Health, phone call with Commission staff, July 11, 2019.
[163] Mulvaney, "Second Meningitis Case."
[164] Fiorito, "Rapid Response to a College Outbreak."

by the FDA at the time of the outbreak, distribution of Bexsero would have been severely delayed due to a blizzard affecting the New England area. Since Providence needed quick mobilization, it opted to purchase Trumenba for its vaccine clinics, which allowed for a much quicker distribution.[165] The initial vaccines were purchased by Providence.

To notify all eligible students of the clinic, Providence transmitted e-mails advertising the clinic's date and time. Flyers were also posted conspicuously throughout the campus. Communication through radio, television, and newspaper advertisements was also facilitated by Providence's public relations' office. To increase campus-wide awareness, Providence's Office of Residence Life designed and implemented an educational campaign called "Stop the Swap" that provided students with information on the prevention of meningitis.[166]

The RIDOH's Center for Emergency Preparedness and Response and the RI Medical Reserve Corps[167] assisted Providence in mobilizing the vaccine clinic while providing volunteer staff and supplies. The planning stage of the clinic took place between February 5 and February 7.[168] A total of 95 staff members (71 of this total were qualified vaccinators) were available throughout the day to provide direct assistance. Since there were a total of 3,745 individuals eligible to receive the vaccine, Providence opted to hold its clinics in the college's 50,000 square foot recreation center gymnasium. Prior to receiving the vaccine, each student was required to complete consent forms supplied by Providence and the RIDOH. Students under 18 years of age were required to obtain prior written consent from their parents.[169]

To maintain a sense of order and efficiency, a vaccination schedule was established for each dormitory by floor, assigning specific time slots for groups of 75-150 students. To further enhance efficiency, the Director of EMS at Providence created a mass texting system prior to and on the day of the clinic, which updated students on when vaccination wait times were minimal, and reminded when the clinic would be concluding.[170]

After the first dose, two additional rounds of the vaccine followed during the week of April 12, 2015 and then again during the weeks of August 30 and September 6 of 2015. The first dose clinic resulted in a 94 percent turnout rate for eligible students, while the second and third doses saw an 80 percent and 77 percent turnout rate respectively.[171] Within the nine-hour first dose round, 3,169 students were screened and processed with a total of 3,061 students electing to be vaccinated and 108 declining.[172] Providence also hired a mass vaccination company to administer vaccines at a follow-up clinic held on February 11, 2015 for all remaining individuals who had not

[165] Andrea Bagnall-Degos and Alysia Mihalakos, Rhode Island Department of Health, phone call with Commission staff, October 2, 2019.
[166] Fiorito, "Rapid Response to a College Outbreak."
[167] The RI MRC is a part of a national initiative to recruit health care professionals for emergency responses across the country. Each state has an MRC and there are approximately 3,000 health care workers total within the MRCs across the U.S. RI MRC's workers are volunteers and their expenses are reimbursed through a 501(c)(3) organization registered in Rhode Island. Bagnall-Degos, phone call, October 2, 2019.
[168] "2015 Providence College Meningitis Response," Rhode Island Department of Health.
[169] Fiorito, "Rapid Response to a College Outbreak."
[170] *Ibid.*
[171] Bandy, phone call, July 11, 2019.
[172] Bagnall-Degos, phone call, October 2, 2019; "2015 Providence College Meningitis Response," Rhode Island Department of Health.

received the vaccine at the initial February 8 clinic. At this follow-up clinic, 444 additional students were vaccinated with 37 students declining.[173] Students studying abroad during the outbreak were provided the opportunity for vaccinations on an individual basis by the university upon their return to the U.S. To ensure all students had the opportunity to receive all three recommended rounds, Providence officials even reached out to offer final rounds of vaccines to students who had graduated from the college before completing all three rounds.[174]

As a precautionary measure, Providence held another three-round set of MenB vaccine clinics for its Class of 2019 students. The first of this precautionary set was administered on August 30, 2015, followed by a clinic for a second dose on November 14, 2015, and a clinic for a third and final dose the week of March 20, 2016.[175] To keep track of the students vaccinated through all the clinics, the RIDOH generated a written list which it subsequently archived into an electronic database.[176]

Throughout all three vaccine rounds, Providence had to enlist the expertise of its general legal counsel to ensure it was preserving the privacy rights of its students during the outbreak. The preservation of privacy became especially important in light of the media blitz that descended over campus shortly after the outbreak's declaration. The Wall Street Journal had sought to interview Providence students, and some media outlets requested the ability to film certain aspects of the initial vaccine clinic – a request college administration flatly rejected. Providence's legal counsel also had to prepare formal waiver documents for students who declined the vaccine, as well as confidentiality agreements for those individuals who assisted at the clinics. Legal expertise from Providence's attorneys was also necessary to review scope of employment agreements for any independent contractors who assisted with vaccine administration. Providence also had to be sure that it avoided absolutes in its communication campaigns in order to prevent the promoting of any legally recognizable undue reliance on the part of parents and students.[177]

The outbreak's total response costs to the RIDOH were never formally calculated. However, Providence incurred significant costs. The first round of vaccines administered on February 8 were initially absorbed by Providence after it received approval from its chief financial officer to draw money from its general contingency fund. While the CDC absorbed the actual vaccine costs in all the following vaccination rounds, it is uncertain as to whether Providence was ever reimbursed for the first set. In addition, the incidental costs generated by the mobilization of the vaccine clinics ended up costing Providence between $100,000 and $300,000 – this estimated range does not include the extended work hours by college staff and administrators during the outbreak.[178]

[173] *Ibid.*
[174] Kathy Kelleher, Gail Dyer, Esq., and Koren Kanadanian, Providence College, phone call with Commission staff, October 10, 2019.
[175] Providence College, "Meninigitis Information: Information for the Campus Community," (Mar. 23, 2016), https://health-center.providence.edu/meningitis/.
[176] Bandy, phone call, July 11, 2019.
[177] Kelleher, phone call, October 10, 2019.
[178] *Ibid.*

After all the vaccine clinics were completed, the RIDOH reviewed and analyzed operational aspects of the clinics. From this review, it then generated a report titled *2015 Providence College Meningitis Response After Action Report/Improvement Plan* (After Action Report) on its findings, specifically identifying strengths to be maintained and built upon, potential areas for further improvement, and corrective actions.

Some strengths identified included: successful implementation of rapid outbreak response using key elements of RI's mass dispensing plan; use of considerable subject matter expertise in planning vaccine clinics response operations; and effective interagency coordination. Alternatively, some primary areas identified for improvement included: too much interference of public information dissemination by the Office of the Governor; the inability of day-to-day reporting structures at the vaccine clinics to seamlessly mesh with the established integrated command structure; sluggish and sometimes overly hasty management of students reporting to the vaccine dispensing sites; and weak execution of training and education for vaccine dispensing staff due to a lack of appropriate audio/visual equipment.[179]

Overall, the Providence MenB outbreak response was perceived to be a success from both state-wide and national perspectives. While certain weaknesses, such as those identified above, were present, the vaccine clinics and the organized communication efforts helped to contribute to high participation rates. This sentiment was expressed in the After Action Report which provided:

> In a very short period of time, an epidemiologic investigation determined that an institutional outbreak was occurring, a plan to provide at-risk students with a meningitis B vaccine was developed, a new vaccine was selected and acquired, and a [point-of-dispensing] was operationalized to manage the process of providing the vaccines in a safe, orderly manner (during a significant snow storm).[180]

The After Action Report also noted that Providence's first dose clinic held on February 8 was the highest number of people vaccinated in a single day, at any single location in the state of Rhode Island using the key elements of the State's mass dispensing plan.[181] Providence's outbreak also marked the first time Trumenba was effectively used in an outbreak response. Trumenba had been administered in the MenB outbreak in Oregon prior to Providence; however, low coverage was achieved in that response comparatively speaking.[182]

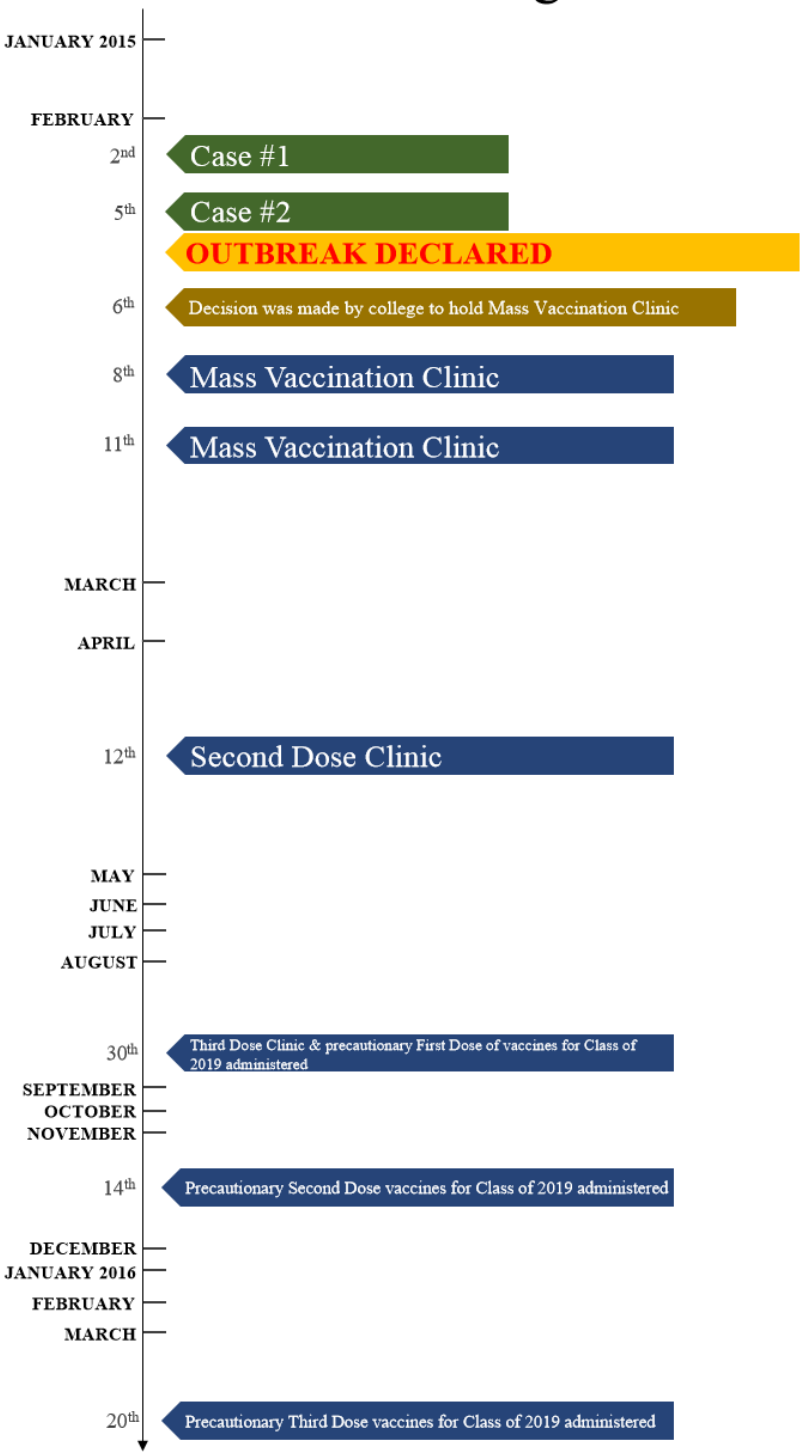
[179] "2015 Providence College Meningitis Response," Rhode Island Department of Health, 5-6.
[180] *Ibid.*, 6.
[181] *Ibid.*
[182] Fiorito, "Rapid Response to a College Outbreak."

Providence officials integrally involved in the outbreak response agree that a large factor behind the success of the clinics was its decision to hold the clinics themselves in-house – keeping the vaccine clinics physically on campus, operating under the college's control. The idea to outsource the clinics to private pharmacies, while initially considered, was fraught with potential record-keeping difficulties and the need to perilously rely on students to adequately report their vaccinations to the college. As such, administering the clinics in-house allowed Providence to carefully chronicle all the students who received vaccines.[183]

Additional factors that helped allow for a successful response was the condensed geographical size of RI, along with its centralized vaccine management which made communications and accessibility to resources easier among public stakeholders such as the CDC and the RIDOH.[184] Furthermore, the mostly smooth functioning of the vaccination clinics was also attributed to the consistent communication of the college's student health center services to students and parents, along with the number of "[w]ell-seasoned volunteer groups [which] allowed for efficient execution."[185]

[183] Kelleher, phone call, October 10, 2019.
[184] Fiorito, "Rapid Response to a College Outbreak."
[185] *Ibid.*

Providence College - 2015



2016

Santa Clara University

Santa Clara University (SCU) is a small private Jesuit university located about three and a half miles outside of downtown San Jose in Northern California. In 2016, three students at SCU were diagnosed with MenB. The first patient fell ill on January 31, 2016, with two more following closely behind on February 2. The initial patient required intensive care but the other two affected students had a milder version of the illness. The first two patients were positively determined to have been affected by serogroup B, whereas the third patient's results were inconclusive.

On the day of the diagnosis of the first case, SCU released a statement notifying the students of the case and reassuring them that Student Health was working with the Santa Clara County Public Health Department (SCCPHD) to get antibiotics to students who had close contact with patient A. This statement included education on the symptoms of and at-risk populations for MenB.[186]

Ciprofloxacin chemoprophylaxis was made available by the school health center and a local hospital after the first patient was admitted and this was administered to patients B and C after they began experiencing symptoms but before they were diagnosed. The CDC *Morbidity and Mortality Weekly Report* suggests this treatment decreased the severity of their cases. 436 students in total received this treatment because their social networks overlapped with the affected students.[187]

After the diagnoses of patients B and C, SCCPDH and the CDPH recommended the MenB vaccine be offered to the students at SCU. On February 4, SCU released an announcement on their website that the federally funded MenB vaccine was offered free of charge by the CDPH. Both rounds of this vaccine were provided by federal Section 317 Funding. CDPH provided 5,000 vaccines for each round.[188] All undergraduate students and some graduate students and faculty at increased risk were advised to receive the vaccine. This release also detailed the communications operation: the Cowell Center posted daily updates on their website and asked faculty and staff to take time to encourage students to get vaccinated.[189]

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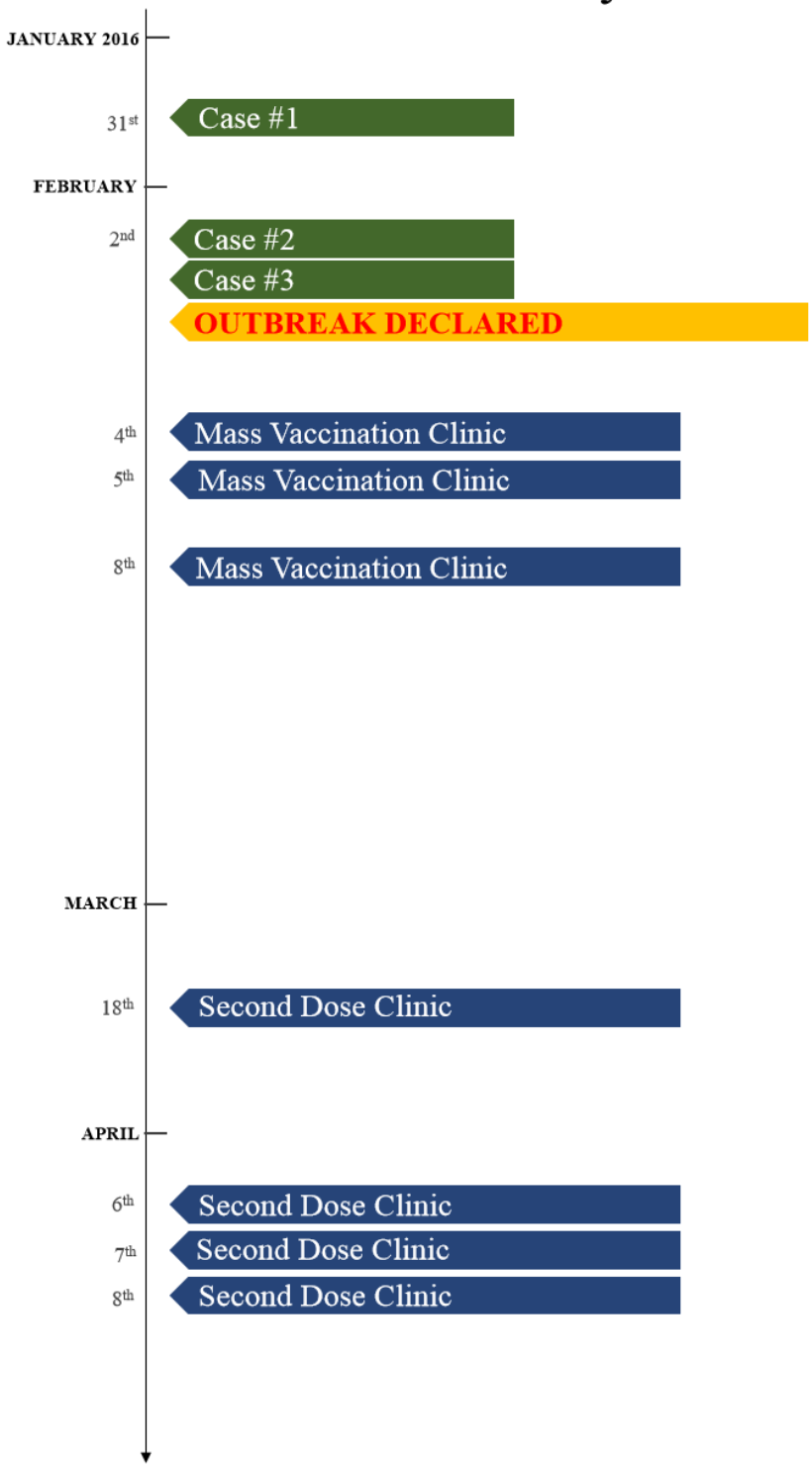
[186] "Cowell Center Statement on Meningitis Case," Santa Clara University Cowell Center, accessed September 27, 2019, https://www.scu.edu/cowell/meningitis-updates/cowell-center-statement-on-meningitis-case.html.
[187] Hope H. Biswas *et al*., "Notes from the Field: Outbreak of Serogroup B Meningococcal Disease at a University — California, 2016," *Morbidity and Mortality Weekly Report* 65 (2016): 520–521, http://dx.doi.org/10.15585/mmwr.mm6520a3.
[188] "Meningitis Vaccination Information for SCU Campus," Santa Clara University, last modified February 3, 2016, https://www.scu.edu/news-and-events/feature-stories/2016/stories/meningitis-vaccination-information-for-scu-campus.html.
[189] "Update from Student Life," Santa Clara University Cowell Center, accessed September 27, 2019, https://www.scu.edu/cowell/meningitis-updates/update-from-student-life-1.html.

Turnout was relatively high, with 4,921 people receiving the first vaccine and 4,731 receiving the second dose out of the undergraduate population of 5,232 students.[190] SCU reported on February 5 that they administered 375 vaccines per hour in one day with the help of SCCPHD and 100 volunteers.[191] SCCPHD doubled the number of vaccinators from the day before due to the influx of 1,500 students who received the vaccination on February 4.[192] SCU held one more mass vaccination campaign on February 8 and also kept extended hours in the clinic over the weekend to address the medical concerns of the students.[193] The second dose was offered in mass vaccination clinics on March 18 and April 6, 7, and 8.[194]

The Morbidity and Mortality Weekly Report describes the response from the university and local health departments as immediate and well-thought-out due to previous preparation including a "serogroup B meningococcal disease outbreak tabletop exercise in June 2015", updated "incident command system protocol," and good relationships with the state and local health departments.[195] At the time, SCU set a national record for response time by offering vaccinations on campus within 48 hours of the confirmation of the outbreak.[196]

[190] Biswas, "Notes from the Field."
[191] "Update from Student Life," Santa Clara University Cowell Center.
[192] "Santa Clara Public Health Department Update," Santa Clara University Cowell Center, accessed September 27, 2019, https://www.scu.edu/cowell/meningitis-updates/santa-clara-public-health-department-update.html.
[193] "Update from Student Life," Santa Clara University Cowell Center.
[194] Biswas, "Notes from the Field."
[195] *Ibid.*
[196] "Santa Clara University Students with Meningitis Released from Hospital," *CBS San Francisco*, February 2, 2016.

Santa Clara University - 2016



Rutgers University

Rutgers University had its first incidence of MenB diagnosed on March 18, 2016, with its second case and the consequent outbreak declaration occurring on April 29, 2016. Samples from the first two students infected were identified as MenB after laboratory testing. Both of the two available vaccines, Bexsero and Trumenba, were evaluated for use to immunize at-risk people. Generally speaking, both are considered effective against the spread of MenB. In this case, however, testing revealed that there was enough of "a mismatch" between the particular MenB strains antigens and those targeted by Bexsero. Consequently, it was decided that Trumenba alone would be administered.[197]

The outbreak was declared on or about June 2, 2016. Mass vaccination clinics took place during September, October, and November. The 2016 outbreak was declared over on or about March 18, 2017.

A clinic was also held in April 2017. Initially, the university consulted with Princeton to learn from its experiences, but subsequently determined that Princeton's unique circumstances meant Rutgers would have to devise its own response. A working group was established that included Residence Life, Recreation, Fraternities and Sororities, Marketing and Advertising, Finance, and the Assistant Vice Chancellor of Health. The working group started by convening weekly meetings, but met less frequently over the summer months because there were fewer students on campus and scheduling meetings became more difficult.

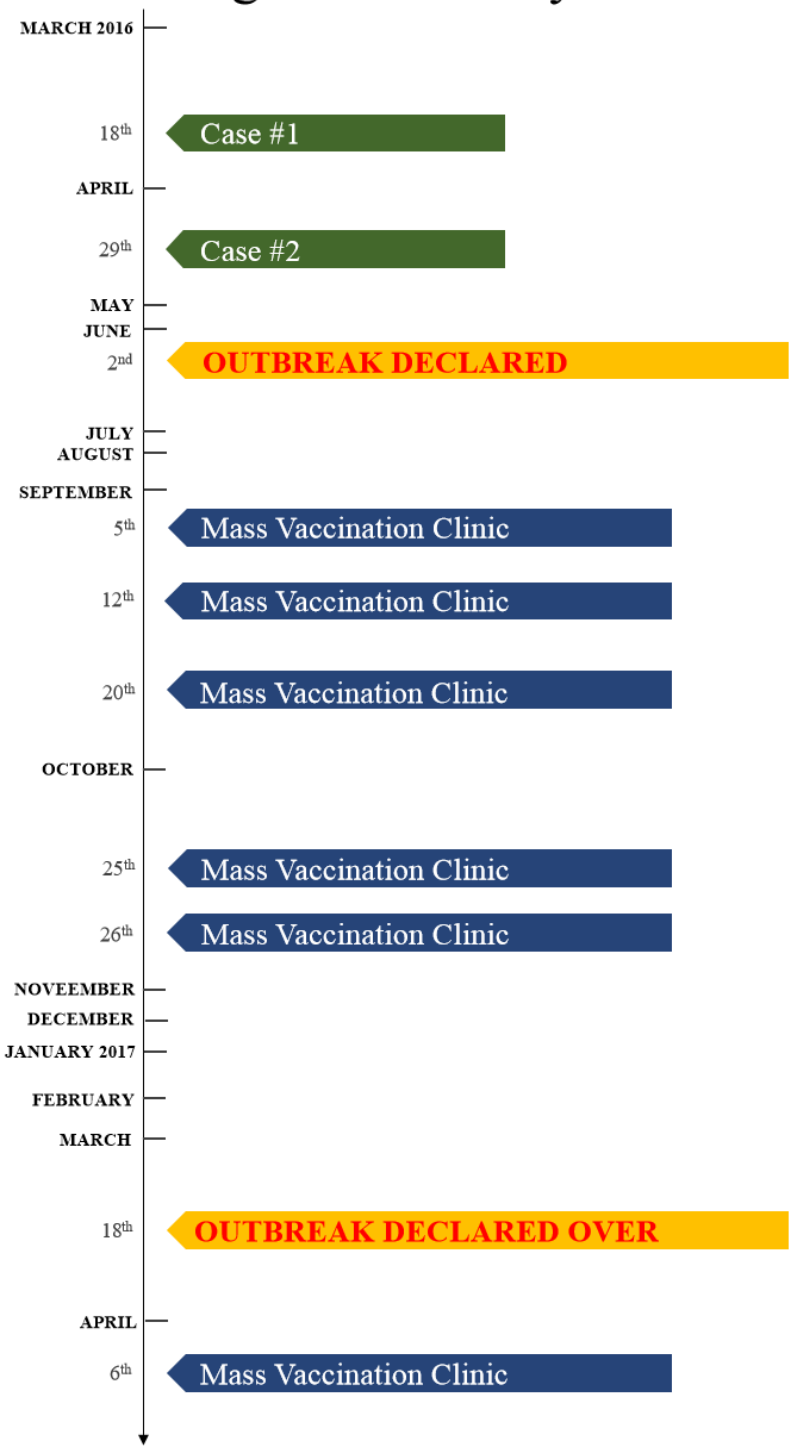
The university used a swipe ID system in which student vaccination information was registered on each ID card. A swipe of the card alerted users when a vaccination was administered and when the second (or third) doses were indicated.

Although some insurance coverage was challenging for out-of-state and international students, insurance coverage for vaccinations was otherwise characterized by Rutgers officials as "pretty good."[198] Section 317 funds were used to provide some of the vaccines for students aged 19 and older; younger students were not eligible to receive vaccinations through this funding stream.

Over the course of the outbreak, 350 doses of Trumenba were administered at one of the New Brunswick campuses at a cost of $29,939. Ninety-eight percent of the available doses were utilized.[199]

[197] Heidi M. Soeters, *et al*, "Serogroup B Meningococcal Disease Vaccine Recommendations at a University, New Jersey, USA, 2016," *Emerging Infectious Diseases* 23, no. 5 (May 2017): 858, http://cdc.gov.eid.
[198] Cathryn Heath and Lynn Fryer, Rutgers University, phone call with Commission staff, July 10, 2019.
[199] Elizabeth F. Zaremski, MPH, Surveillance Coordinator, New Jersey Department of Health, Vaccine Preventable Disease Program, email to JSGC, October 15, 2019.

Rutgers University - 2016



University of Wisconsin

The University of Wisconsin at Madison (UWM) is a large, public institution. It is the largest university in the state and the flagship institution of the University of Wisconsin system. In 2016, there were approximately 29,536 undergraduate students, 8,904 graduate students, an additional 4,898 professional and special students for a total enrollment at University of Wisconsin of 43,338. Of these students, over 7,400 lived on campus in 19 different dormitories and 90 percent of those living in dormitories were freshman.[200]

In the fall of 2016, the University of Wisconsin Health Services (UWHS) was notified when the mother of a student who was sick could not get in contact with her daughter and contacted the university. The student was found, unresponsive, taken to the hospital and identified as having meningococcal disease. Another potential case came into the same hospital that week, however that student lived off campus. The first student had spent the weekend prior to illness at home with their family while the second case had traveled with a friend to the University of Michigan for a football game. They rode on a bus with a group of students for a portion of the return trip.[201]

Of all of the 2016 entrance medical forms completed by students, less than five percent, or 825 students, indicated that they had received one or more doses of either serogroup B vaccine. The decision to provide mass vaccination was made when an outbreak was declared by student health services, in consultation with the State Department of Health and the CDC on October 13, 2016.[202]

A third case of meningococcal disease presented on October 27, 2019. This student lived in a different dorm than the first student. When the isolates were sent to the CDC for genome sequencing, the sequences were the identical type and clonal complex.[203] The UWHS and Public Health Madison/Dane County worked together on case reporting and identification of contacts. An average of five to ten contacts were identified for antibiotic prophylaxis for each of the three cases. UWHS and Public Health Madison/Dane County collaborated on contact interviews. Case 3's interview was delayed for several days because of the serious condition of the patient.[204]

Within twenty-four hours of the second case, the UWHS had saturated the campus with e-mails and communications to students, faculty/staff and parents. Part of the information campaign was to describe the severity of the disease and part was to provide vaccine recommendations, time and locations of clinics, and information on cost.

[200] Susann Ahrabi-Fard, "A Serogroup B Meningococcal Disease Outbreak on a Wisconsin University Campus and the Mass Vaccine Campaign Response" (lecture, Council of State and Territorial Epidemiologists: Vaccine-Preventable Diseases Subcommittee Meeting, February 28, 2017).
[201] Susann Ahrabi-Fard, M.S., Wisconsin Department of Health, phone call with Commission staff, July 10, 2019.
[202] Ahrabi-Fard, "A Serogroup B Meningococcal Disease Outbreak."
[203] *Ibid.*, 15.
[204] *Ibid.*, 13.

The key messages were:

- Dates of the clinics,
- The vaccine was available at no cost to the students,
- Two doses were necessary, and
- The importance of respiratory hygiene.[205]

The UWHS collaborated with the Wisconsin Division of Public Health and the CDC to define the sub-population at risk. This was determined to be undergraduates through the age 25 and graduate and professional students who lived with or were in an intimate relationship with an undergraduate.[206] The University administered Bexero at the clinics due to its shorter schedule. Trumemba was given to those students who had received it elsewhere as a first dose.[207]

The university used multiple communications strategies in their campaign. They emailed messages to students, parents, faculty and staff, they used text messages, provided faculty with an informational power point to use in class, placed posters and signs around campus and outside of the clinics, produced video, radio and digital TV ads, and print materials including stickers, flyers, posters, buttons, dorm door knob hangers, and table tents. The UWHS already had four full-time communications people on the student health services staff and their time was devoted to the vaccination campaign.[208]

> Key lessons learned throughout the communication process included the importance of communicating with parents who had questions and were key in motivating students to be vaccinated. In future events, more emphasis would be placed on communicating with internal SHS staff when new correspondence was sent out, so they would be prepared for an increase in call volume and clinic traffic. Having templates prepared in advance for a variety of communicable diseases hastened the communication process.[209]

[205] Alicia M. Ritscher *et al*., "Meningococcal Serogroup B Outbreak Response University of Wisconsin-Madison," *Journal of American College Health* 67, no. 3 (2019): 191-196, doi: 10.1080/07448481.2018.1469502,
206; Ahrabi-Fard, "A Serogroup B Meningococcal Disease Outbreak."
[207] *Ibid*., 29.
[208] Arnold Jennerman, Director of Administrative Services, University of Wisconsin Health Services, phone call with Commission staff, November 12, 2019.
[209] Ritscher, "Meningococcal Serogroup B Outbreak Response," 195.

The UWM had an existing Point of Dispensing (POD) plan that had never been activated. Plans were in the works for a full-scale exercise to be run in July of 2017. A planning committee of UWHS, UW Police Department, and federal, state, and local public health authorities was working on a plan and had identified potential volunteer groups as well as mapped locations and floorplans.[210] That, combined with FEMA's model for public health emergencies that provided the basics were then quickly modified into an action plan. "Modifications included recruiting individuals trained to administer vaccines, maintaining the cold chain for vaccine stock, adapting one of the POD locations to fit a vaccine administration workflow, and running clinics while campus and SHS were still open for business."[211]

The UWM planned five initial mass vaccination clinics and then later added two additional clinics. Staff and student volunteers from multiple organizations, the police emergency management, recreational sports, university housing, school of nursing, school of pharmacy, and pre-health organizations donated thousands of volunteer hours to the vaccination clinics.[212] The mass vaccination clinics were held over a two-week period and targeted undergraduate students aged 25 and younger, particularly those living in residence halls. The clinics were held in the student recreational facility, which was then shut down for the duration of the clinics so that that everything could be left in place between the clinics.[213] The UWHS staff, medical, nursing, and pharmacy students all administered vaccines during the clinics. Other volunteers staffed check-in tables and waiting tables, provided information, and gave directions from the street to the clinic.[214] The university police force helped with overall traffic control. When the seven days of the clinics were combined, staff and volunteers contributed 4,013 hours as greeters, screeners, and immunizers in the immunization clinics.[215] It was during these two weeks of clinics that the third case was identified on campus.

During the clinics, university information technology provided infrastructure and dedicated Internet bandwidth to support reliable access to electronic medical records and the state immunization information system. On the first day of the clinics, from the time a student got to the consent table and then passed through and was finished with the immunization table was 22 minutes 28 seconds. By clinic day 5 this time had been decreased to 16 minutes and 17 seconds. This does not account for time that students spent waiting in line prior to consent and screening.[216] Clinic staff and volunteers used iPads for screening and real-time reporting in the UWHS electronic health records and the Wisconsin Immunization Registry (WIR).[217] When students showed up at the clinics with records of their vaccination but without the type or trade name of the vaccine, the Wisconsin Department of Public Health staff would help them access their records through the WIR.[218] The clinics utilized iPads already owned by the UWHS and used in their

[210] Jennerman, phone call, November 12, 2019.
[211] Ritscher, "Meningococcal Serogroup B Outbreak Response," 192.
[212] Ahrabi-Fard, "A Serogroup B Meningococcal Disease Outbreak," 19.
[213] Jennerman, phone call, November 12, 2019.
[214] Ahrabi-Fard, "A Serogroup B Meningococcal Disease Outbreak," 22.
[215] Ritscher, "Meningococcal Serogroup B Outbreak Response," 193.
[216] *Ibid.*, 195.
[217] Ahrabi-Fard, "A Serogroup B Meningococcal Disease Outbreak," 23.
[218] *Ibid.*, 24.

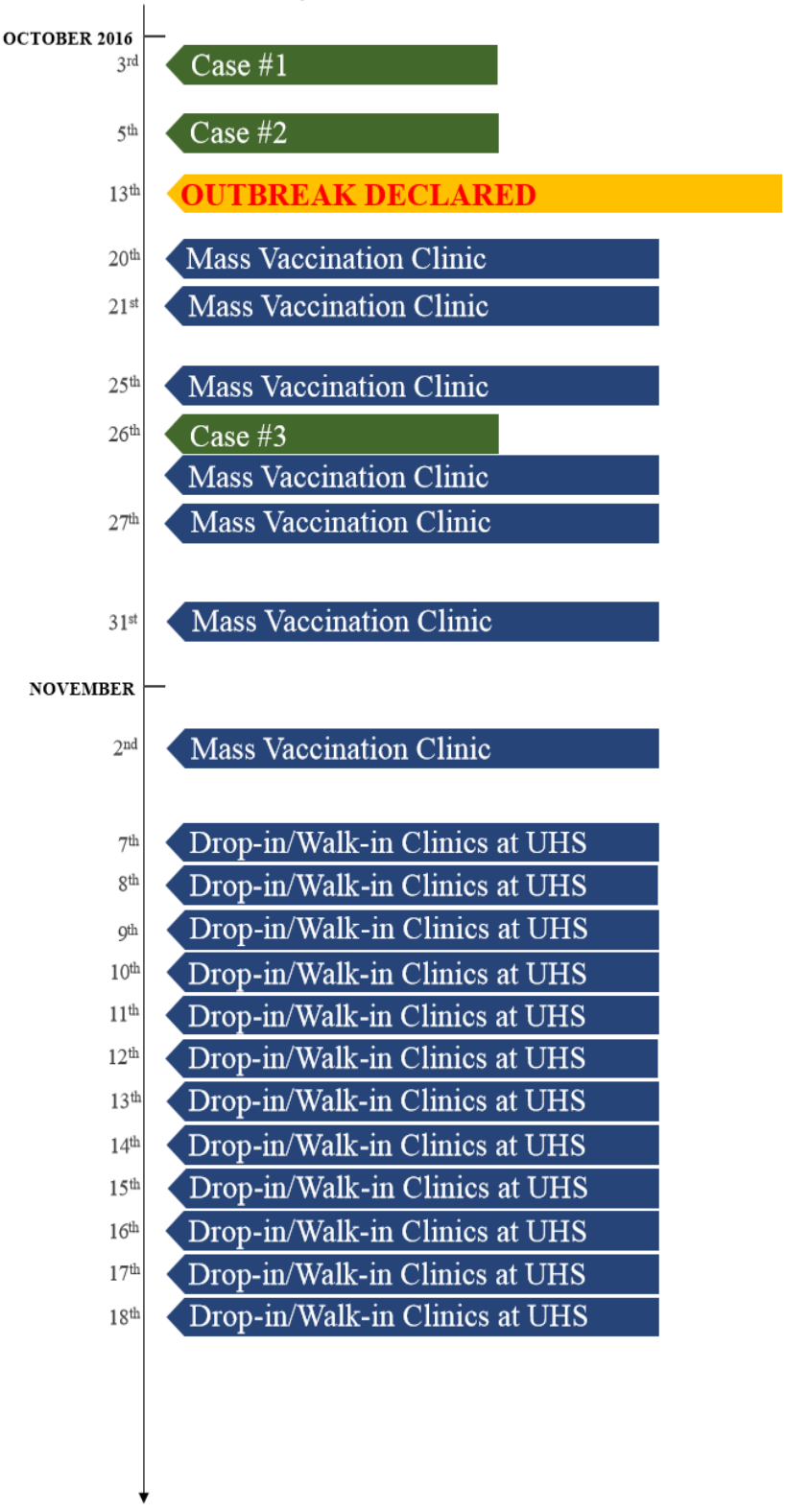
regular office protocol for student check-in as well as others previously purchased during summer student health programs.[219]

MenB vaccine was obtained by the DOH immunization program from the CDCs vaccine outbreak set aside fund and was provided to students at no cost. Insurance was not billed for the vaccinations that were provided by the CDC. Through seven clinics, 20,440 immunizations were administered and an additional 496 doses were administered by student health services outside of clinic hours.[220] Nearly all of the 25,000 doses from the CDC's vaccine outbreak set-aside fund were provided as first doses to students. This meant that very little was available for the second follow up dose. Because the second dose fell due after students returned to their homes for winter break, student health services recommended that students receive the second dose at their own cost while they were at home.

The Wisconsin Immunization Program made four total orders of vaccine from the CDC.[221] Seventy percent of freshmen at the UWM received a dose of the MenB vaccine at one of the seven clinics. By comparison, 71 percent of the sophomores, 68 percent of the juniors, and 63 percent of the seniors received a dose. Residence hall occupants had a higher rate of vaccination (74 percent) compared to the 68 percent of the students of the students who live off campus and received one dose of vaccine. The doses administered as part of the seven clinic mass vaccination effort comprise the largest MenB immunization event implemented by a university until that time.[222]

[219] Phone call with Arnold Jennerman, Director of Administrative Services, University of Wisconsin Health Services, November 12, 2019.
[220] Ritscher, "Meningococcal Serogroup B Outbreak Response," 192.
[221] *Ibid.*, 30.
[222] Ritscher, "Meningococcal Serogroup B Outbreak Response," 192.

University of Wisconsin - 2016



Oregon State University

In mid-November of 2016, a MenB outbreak occurred at Oregon State University at Corvallis[223] (OSU), with two students diagnosed and their close contacts interviewed and treated with antibiotics after the performance of an epidemiological investigation by the Benton County Health Department.[224] Both of the students were OSU athletes, with one being a then-current wide-receiver and former quarterback for OSU's football team.[225] No vaccination events were held on campus after these diagnoses, though the vaccine was promoted to students at a heightened risk, a demographic which included 7,000 students.[226] Promotional efforts to receive the vaccine were orchestrated by the university and included mass e-mail notifications to students and staff, local news advertisements, and recurrent messages adorning cross-campus television reader boards.[227] These communication strategies were also later employed during OSU's formal outbreak.

A third student was hospitalized on February 22, 2017, prompting the Oregon Health Authority (OHA) to formally declare an outbreak on March 2, 2017 once the subtype was confirmed by the CDC to be the same as in the first two incidents.[228] After the third incident, local health authorities in coordination with OSU held mass vaccination clinics on March 8 and 9 in the McAlexander Field House, a large multipurpose court complex on OSU's campus. The university was able to obtain volunteer assistance from health professionals belonging to its state Medical Reserve Corps, as well as recruit student and staff volunteers from OSU's School of Pharmacy and ROTC. While these clinics were held on OSU's campus and were partially staffed with college volunteers, vaccine administration still required assistance from outside sources which prompted OSU to outsource to private pharmacists.[229] Vaccination clinics were organized based on a six-station structure, with two administrative stations and four medical stations.[230]

Prior to the clinic dates, students were encouraged to speak to their insurance companies about vaccine coverage and upon arrival at the clinic, students were advised to bring all necessary coverage information. In most cases, students' insurance plans covered the vaccines. However, even those without coverage were encouraged to show up and receive the vaccine.[231]

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[223] While Oregon State University has more than one campus, Oregon State University at Corvallis is the university's flagship campus.
[224] Rachael McDonald, "OSU Student in Hospital with Meningitis," *KLCC*, November 15, 2016.
[225] Nick Daschel, "Former Oregon State QB/Receiver Set Collins Blames Corvallis Environment for his Health Issues," *The Oregonian,* August 6, 2018.
[226] Jenny Haubenresier *et al*., "Managing Meningococcal Disease Outbreaks in the University Setting: Oregon State University and the State of Oregon Partnership and Response," Powerpoint.
[227] Dr. Jeffrey Mull, Oregon State University Medical Director, phone call with Commission staff, November 1, 2019.
[228] Dr. Paul Cieslak, Medical Director, Communicable Disease and Immunizations, Office for Public Health Practice, email to JSGC, October 18, 2019.
[229] Mull, phone call, November 1, 2019. Fred Meyer Company is a superstore founded in 1922 in Portland, Oregon that among other departments, operates in-house pharmacies. Fred Meyer is now operating as a subsidiary of Kroger – Oregon Historical Society, "The Fred Meyer Story," https://www.ohs.org/museum/exhibits/the-fred-meyer-story.cfm.
[230] Krista Dillon *et al.*, "Meningitis: Experiences and Lessons Learned," Powerpoint.
[231] "Meningitis Prompts March 8, 9 Vaccinations," Oregon State University, accessed October 17, 2019, https://oregonstate.edu/alert/meningitis.

In August of 2017, the Governor signed Oregon House Bill 3276 (HB 3276) into law.[232] HB 3276 required insurance companies to cover the costs of vaccines during an outbreak in a way that would not indirectly dissuade a student from receiving a vaccine in the most suitable location. For example, during UO's 2015 outbreak, some students were deterred from receiving vaccines distributed at UO's mass vaccination clinics due in part to inflexible insurance policy stipulations conditioning coverage on care received only through providers within the insurance company's network. In order to eliminate these textual roadblocks often found within insurance policies, HB 3276 categorically required insurance companies to cover the cost of vaccines in extenuating circumstances such as preventive immunization in response to an outbreak formally declared by the Public Health Director regardless of in-network status of a provider.[233]

In the fall of 2017, OSU enacted a policy requiring all incoming freshman and transfer students to receive the vaccine before coming to campus.[234] The consequence for failure to do so resulted in a hold being placed on class registration for the violating student.[235]

In October of 2017, a fourth student contracted MenB. After this incident, the OHA determined it beneficial to re-declare outbreak status at OSU as an effort to formally invoke the newly mandated obligations of insurance companies pursuant to HB 3276.[236] OSU set up two more immunization clinics; one specifically for MenB on November 8, 2017 and one for general immunization including MenB on November 21, 2017. Once again, students with insurance were instructed to come equipped with their coverage information, and those without were encouraged to receive the vaccine anyway.[237]

Following the diagnosis of the fourth student, a fifth student contracted MenB in late November along with a suspected sixth case, involving a student home for winter break in mid-December. After this suspected case, OSU announced a broad expansion to its 2017 vaccination policy, requiring all students under the age of 26 to receive the full series of vaccinations by February 15 of 2018 or forfeit their ability to register for classes or receive grades electronically.[238] In order to help students fulfill this new requirement, OSU offered mass vaccination clinics from January 9-13, 2018.[239] After additional testing, the suspected sixth case of MenB mentioned previously was determined to be unrelated to the other cases, meaning the outbreak officially

[232] "2017 Regular Session, HB 3276 Enrolled," Oregon State Legislature, accessed October 18, 2019, https://olis.leg.state.or.us/liz/2017R1/Measures/Overview/HB3276.
[233] Cieslak, email to JSGC, October 18, 2019.
[234] Lynne Terry, "OSU Hit with 6th Case of Meningococcal Disease; All Students under 26 Will Need a Vaccination," *The Oregonian*, January 9, 2019.
[235] Mull, phone call, November 1, 2019.
[236] Lillian Shirley, "Disease Outbreak Determination," Oregon Health Authority, November 1, 2017; Dr. Paul Cieslak, Medical Director, Communicable Disease and Immunizations, Office for Public Health Practice, email to JSGC, October 18, 2019.
[237] "Corvallis Meningitis Memo," Oregon State University, accessed October 17, 2019, https://leadership.oregonstate.edu/corvallis-meningitis-memo.
[238] "OSU, State Urge Vaccinations to Fight Meningitis Outbreak," *Portland Tribune*, December 20, 2017.
[239] Sean Nealon, "Meningococcal B Mass Vaccination Clinics Set at Oregon State University," Oregon State University, last modified January 11, 2018, https://today.oregonstate.edu/news/meningococcal-b-mass-vaccination-clinics-set-oregon-state-university.

consisted of only five cases instead of six.[240] On November 23, 2018, the OHA determined that the outbreak was officially over, as no one had contracted MenB since November 22, 2017.[241]

Overall, the outbreak response itself at OSU had both commonality and dissimilarities with other college outbreaks across the country. Like many other college MenB outbreaks previously mentioned, a media presence materialized around OSU's campus after the outbreak was declared; however, OSU officials maintained that individual media outlets were largely respectful of the university's attempts to protect student privacy. To manage media requested interviews and filming requests, the university directed all outlets to proceed through OSU's public relations office as opposed to directly contacting university staff and students. After requests were properly channeled through public relations personnel, certain staff members and university health department officials provided interviews.[242]

OSU's vaccination rates between November 2016 and October 2017 paralleled the rates of UO's outbreak response. Approximately 8,711 students received the first dose of Bexsero, the two-dose vaccine, with only 4,572 reaching series completion. Trumenba, the three-dose vaccine, was distributed 2,768 first doses, 1,399 second doses, and 612 third doses.[243] Upon the creation and enforcement of the new OSU policy requiring all students under 26 to receive the vaccine, series completion rose dramatically to above 90 percent in March of 2018. Before that policy enactment, the series completion rate was below 30 percent, even after five students had contracted MenB.[244] These initial rates sharply depart from those in many other universities faced with a MenB outbreak, with the exception of some outbreaks previously mentioned in California.

The low vaccination rates initially achieved by OSU may be attributable to student concerns relating to the perceived cost of the vaccine itself; a concern that was likely augmented among students who lacked health insurance altogether. Another contributing factor could be a general apathy or lack of concern toward the outbreak among many students. Such apathy would be a sharp contrast from the student-parent reactions in other outbreaks such as Providence College and University of Wisconsin. The gridlock and elongated wait times generated at OSU's clinics by repeated attempts to triage students to the proper source for receiving their vaccine was a possible deterrent to students.[245]

One university health official opined that a health-emergency event like the outbreak could potentially be avoided in the future if the university bolstered its enforcement efforts in requiring students to be vaccinated prior to being permitted to physically reside on campus as opposed to just holding up class registration. The rationale behind this concept is that those students who were not vaccinated and simply not permitted to register for classes would already be physically present on the campus, potentially exposing the student population to meningitis if they are infected. While the university's decision to mandate vaccines among its students did contribute to the dramatic spike in vaccine rates, such mandate is only effective through appropriate

[240] Cieslak, email to JSGC, October 18, 2019.
[241] Lillian Shirley, "Termination of Disease Outbreak Determination," Oregon Health Authority, November 23, 2018.
[242] Mull, phone call, November 1, 2019.
[243] Cieslak, "Meningococcal Disease."
[244] Jenny Haubenresier *et al*., "Managing meningococcal disease outbreaks in the university setting: Oregon State University and the State of Oregon Partnership and Response."
[245] Mull, phone call, November 1, 2019.

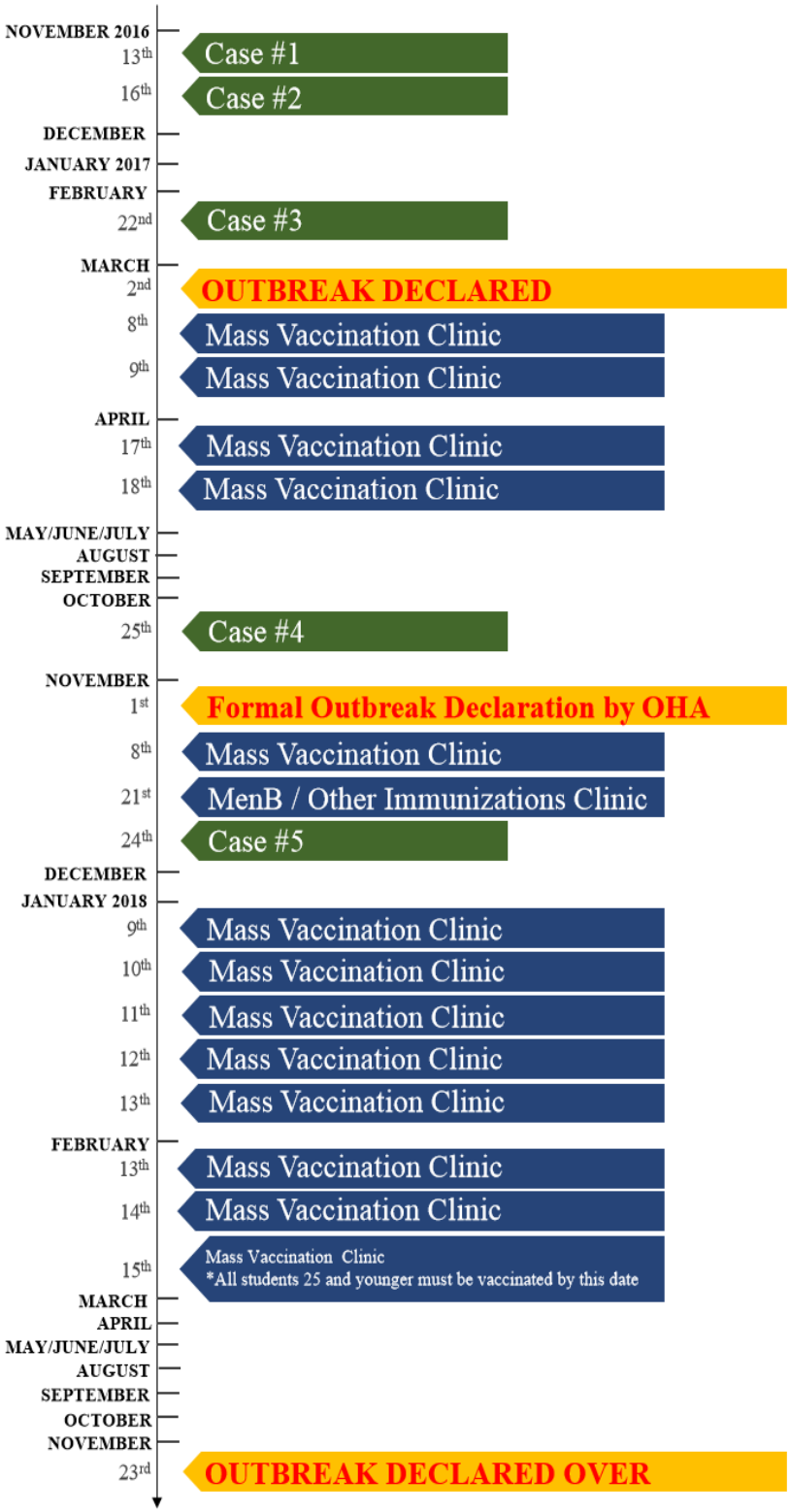
enforcement. This point is only further highlighted by the fact that OSU's fourth and fifth MenB cases were the result of two students who failed to receive the MenB vaccines in compliance with the initial 2017 vaccine policy.[246]

Another takeaway from OSU's outbreak is that coordination between the affected institution and the local and state health authorities is important to ensuring a smoothly functioning outbreak response. During OSU's outbreak response, the OHA and the Benton County Health Department were consistently coordinating with university health officials through organized phone calls. To participate in these calls, a committee comprised of professionals from the OHA and OSU was established and spoke frequently throughout the response. The county health department performed case investigations and assisted with vaccinations while offering an incident command structure with OSU. OHA professionals maintained an oversight and advisory role within the committee, often providing recommendations on campus policy for university officials to consider.[247]

Generally, there were no adverse reactions to the vaccines for students other than some soreness at the injection site, some reports of mild fever, and some nausea. This result seems consistent with the vaccine outcomes that prevailed in other meningitis-related outbreak responses across U.S. campuses.[248] While it is clear that significant resources were expended in response to the OSU outbreak, there does not appear to be an abundance of data on the overall cost related to the vaccines themselves, as well as the incidental costs of mobilizing the clinics. In October 2019, a research report compiled cost information primarily from the outbreak at the University of Oregon and estimated that the total cost for a university's outbreak response could be just over $12 million. It should be noted that this report provided little raw cost data from the OSU outbreak and admitted that it lacked adequate data sufficient "to calculate true costs."[249]

[246] *Ibid.*
[247] *Ibid.*
[248] Mull, phone call, November 1, 2019.
[249] Sean D. Candrilli *et al*., "The Response to and Cost of Meningococcal Disease Outbreaks in University Campus Settings: A Case Study in Oregon, United States," RTI Press, October 2019, doi: 10.3768/rtipress.2019.rr.0034.1910.

Oregon State University at Corvallis - 2016



2017

University of Massachusetts

The first case of meningococcal disease occurred on October 24, 2017 at the University of Massachusetts Amherst when a student came to the student health center with flu-like symptoms. Due to the severity of the symptoms, the student was then sent to a local hospital and from there to a trauma center. The CDC determined that the strain was MenB.

The student was in a fraternity and it was homecoming weekend, so the University immediately started a communications campaign which included a mass blast e-mail to all students, faculty, and staff. The communications campaign was then expanded to local newspapers and radio.

On November 12, the second case was diagnosed. An undergraduate who had no common connection to the first case told his mother he was sick. She drove to the university and took him to the emergency room. That undergraduate lived in the high-rise towers (holding approximately 6,000 students). Because it was a second case, there was no immediate social connection between the two students and the student lived in a high-density housing, the University took an aggressive stance with a vaccination campaign. The CDC determined that the two strains of MenB were identical.

In Massachusetts, the local municipality a university is situated in does not have jurisdiction over the university's campus; the university has its own health department. Outbreak determination was a collaborative decision between the university, the Massachusetts State Health Department, and the CDC because there were only two cases at that point. The CDC conducted the testing and once testing confirmed both cases were a hypervirulent strain of meningococcal disease, there was agreement on declaration of an outbreak on November 28, 2017.[250] Although MenB is not routinely covered by insurance, because this was declared an outbreak, insurance covered vaccination costs. The vaccination campaign did not result in a loss of money to the university.

The university choose a two-dose vaccination series and set up clinics at the University Health Center. The university purchased approximately $1.5 million of the vaccine, stored it on campus and scheduled a mass vaccination campaign. Within one month, through a series of four walk-in clinics, the university had given out more than 10,000 vaccinations to undergraduate students. Staff from the University Health Center worked overtime and the clinics were also staffed by the UMass Amherst Medical Reserve Corps, a volunteer organization established in 2005 made up of healthcare professionals and students in health or public service-related disciplines.[251]

[250] Michael P. Norton, "Meningitis Outbreak Declared at UMass Amherst," *WBUR News*, November 29, 2017.
[251] "University Health Services," University of Massachusetts Amherst, accessed July 15, 2019, https://www.umass.edu/uhs/health/mrc/faq#4.

The decision was made that no student would be turned away because of under coverage or the cost of co-pays. Because this time frame encompassed the Thanksgiving and Christmas holidays, many students received their vaccinations while at home and the university does not have any tally on the number who did that. There was a high rate of insurance coverage for those who were vaccinated by the university. For those who had insurance coverage, the university was able to charge the cost of the vaccine plus a small additional percent to cover administrative costs. For students under 19 years of age, the Commonwealth of Massachusetts covered the cost of the vaccine by providing the vaccine directly to the university. During clinics, students were registered through the University's standard electronic patient information portal. The university did not have a strong tracking system in place.

The university incurred about $20,000 in additional cost during the vaccination campaign. There were marketing costs including signage and strategic ads on Facebook in addition to the cost of food provided to the volunteers who staffed the clinics. Because of the large area where sensitive information was kept during the vaccination campaign, the university installed more secure locks to certain doors. There was additional cost for the rental of computers and scanners that were used during the vaccination campaign.

A third case occurred in winter of 2018. Although the student was at a different institution, Smith College, the student had been socializing with students from University of Massachusetts Amherst. Smith College and University of Massachusetts Amherst are part of a five college consortium (Five College) that allows students to take classes at any of the campuses.[252] No further cases were identified after the third case and the outbreak was declared over in March of 2019.[253]

Massachusetts regulation requires students to submit a certificate of immunization prior to moving into the dorm and beginning classes unless they opt out of the requirement for medical, religious or other reasons. Each postsecondary institution must provide all full-time students who will be living in a dorm with detailed information on meningococcal disease.[254]

In April of 2017, the Five College community had run an Emergency Dispensing Site Exercise. The purpose of the exercise was to provide participants with the opportunity to evaluate the current emergency response concepts, and emergency dispensing site and notifications plans. In the exercise scenario, the university experienced three cases of bacterial meningitis that were then diagnosed as serotype B, followed by two additional cases. Through facilitated discussion, the universities worked to establish procedures for communications, site operations, and demobilization.

[252] The University of Massachusetts Amherst (UMass), Amherst College, Mount Holyoke, Hampshire College and Smith College are part of a Five Colleges Inc consortium.

[253] Ann Becker, Public Health Nurse, University Health Services, University of Massachusetts, phone call with Commission staff, June 28 2019.

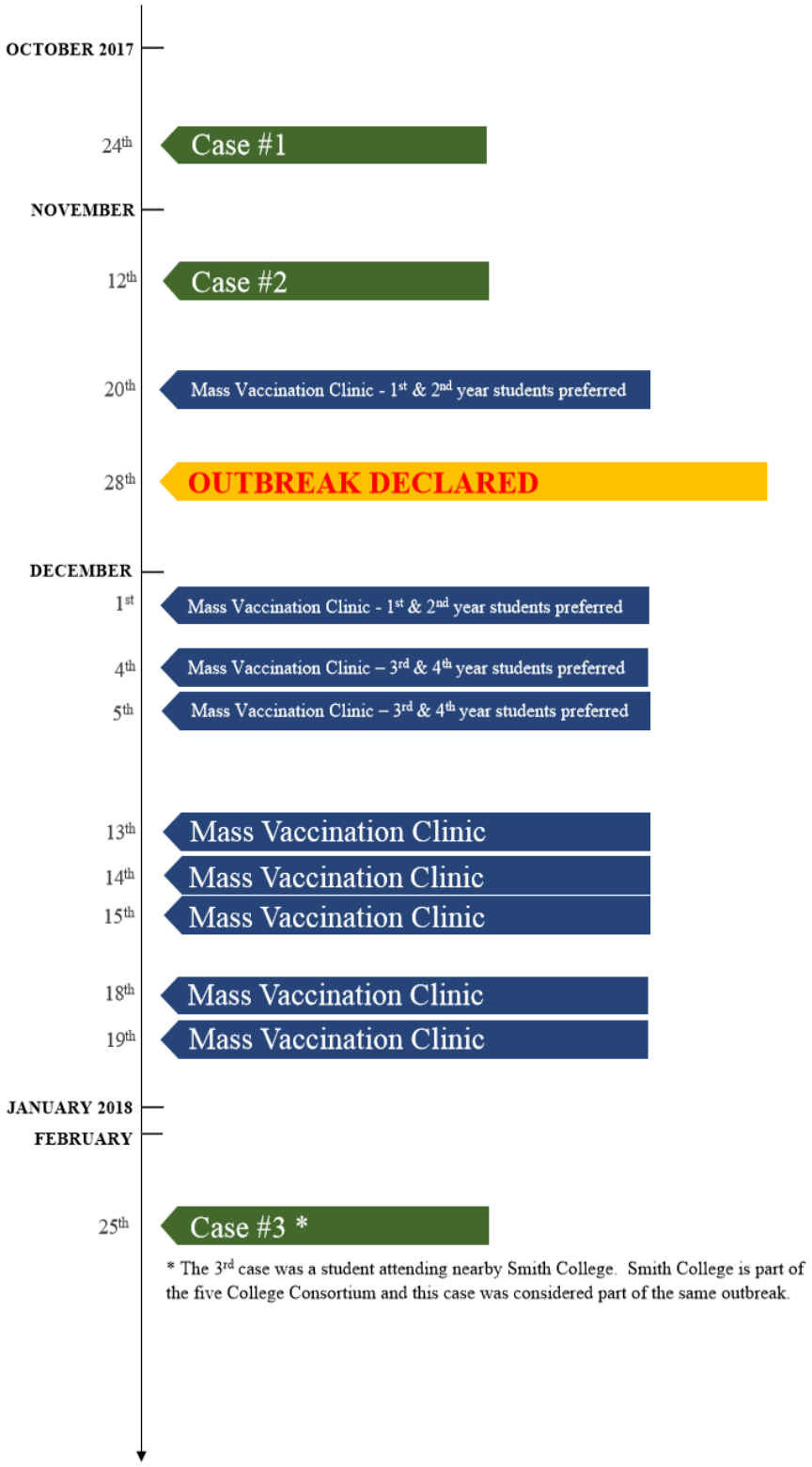
[254] Massachusetts 105 CMR, Department of Public Health, Immunization of Students before Admission to School file:///H:/SR292/States%20Case%20Files/Massachusetts%20105-CMR-220.000-Reviewed-12-30-16.pdf

During the exercise, participants discussed emergency operations coordination and emergency public information and warning. Through medical countermeasure dispensing participants reviewed the institutions' ability to provide medical countermeasures including vaccines and antibiotics to the identified population. The exercise involved a review of volunteer management and risk communication.[255]

In September of 2017, the University of Massachusetts Amherst and the other colleges in the consortium released an Emergency Dispensing Plan which "prepares for a large scale emergency where Strategic National Stockpile (SNS) assets are being deployed as well as large scale events which require other publicly or private purchased vaccines and medications."[256] Detailed operations checklists, including notification systems, facilities set-up and dispensing procedures, were part of the plan.

[255] Jeff Hescock, Executive Director of Environmental Health and Safety and Emergency management, University of Massachusetts, phone call with Commission staff, August 8 2019.
[256] "University of Massachusetts Amherst: Emergency Dispensing Plan (EDS)," (September 17, 2017), 4.

University of Massachusetts at Amherst - 2017



* The 3rd case was a student attending nearby Smith College. Smith College is part of the five College Consortium and this case was considered part of the same outbreak.

2018

San Diego State University

San Diego State University (SDSU) is a public state university located ten miles outside of San Diego in Southern California, that had an undergraduate population of 29,513 students in the fall of 2018[257]. San Diego County Public Health (SDCPH) declared an outbreak at SDSU on September 27, 2018 after the third case within three and a half months was reported. While the outbreak started with a student contracting MenB while on summer break and away from campus on June 12, a second case occurred on campus on September 4, resulting in the hospitalization of the student. On September 26, the third patient was tested and diagnosed with MenB by the California Department of Health. None of the students had prior contact with each other.

SDSU immediately gave preventative antibiotics to anyone believed to have close contact with the second patient. The student had recently participated in a sorority recruitment event, triggering SDSU to offer the antibiotic to a large group of students on September 6 and 7. The SDCPH reported that 1,840 students received antibiotics, which was almost 100 percent of the at-risk population.[258] There was no prophylaxis administered after the third case.[259]

The university and county health department declared an outbreak in order to take advantage of additional resources provided by the State of California, including vaccines. Preventative antibiotics were not recommended for individuals who were not in close contact with the infected person and who did not have symptoms. County Public Health Officer Wilma Wooten recommended that all unimmunized undergraduates be vaccinated with one of two available meningococcal B vaccinations. Wooten did not recommend that low risk populations such as graduate students, Open University students, staff, faculty, or visitors receive it.[260] Students who did not want to wait for an on-campus vaccination event were encouraged to contact their primary healthcare provider and ask if the vaccine was available and covered under their insurance.[261]

San Diego's Health and Human Services Agency (HHSA) and University Student Health Services coordinated vaccinations for undergraduate students. On October 5 and 8, they held their first mass vaccination events. Walgreens, Kaiser Permanente, and San Diego HHSA administered the vaccine. Those who had insurance that covered the first two providers would be billed, but the county supplied free vaccines to uninsured or underinsured individuals.[262] Unfortunately, the

[257] "Enrollment by Ethnicity Data Tables," San Diego State University, accessed November 18, 2019, https://asir.sdsu.edu/enrollment-ethnicity-data-table/.
[258] Megan Burks, "Health Officials Confident after 1,800 San Diego State Students Treated to Prevent Meningitis," *KPBS*, September 10, 2018.
[259] County of San Diego, *SDSU MenB Outbreak Status Report*, June 28, 2019.
[260] Tom Christensen, "Third Meningococcal Case at SDSU, County Declares Outbreak," *County News Center*, September 28, 2018.
[261] "Additional Meningococcal Meningitis Case Confirmed; Vaccinations Recommended," *SDSU News Center*, September 28, 2018.
[262] "Meningococcal Meningitis Clinic, Vaccinations, Insurance: Frequently Asked Questions," SDSU Student Health Services, accessed September 27, 2019, https://newscenter.sdsu.edu/sdsu_newscenter/files/09401-Meningococcal-Meningitis_Clinic-and-Insurance-FAQs-100418-UPDATED.pdf.

vaccines that Walgreens administered were stored at an improper temperature and on October 19 it was announced that students who received it would need to be re-vaccinated.[263] This presented a challenge in timing the next vaccination clinics on campus because the second dose would not be effective if administered within a month of the first dose.[264]

On December 5, SDSU announced that in total 8,000 students had been vaccinated. The Division of Student Affairs had started an educational campaign to make students aware of MenB that had reached 3,000 students. Two more mass vaccinations were held on February 20 and 25.[265] Things seemed to be settling down as there had been no new cases.[266] On April 16, 2019, a fourth case of MenB was identified on campus, which set into motion more prophylaxis for close contacts and another round of vaccinations being offered on campus.[267] The close contacts were again related to Greek Life. Students who attended two Delta Sigma Phi events were given prophylaxis.[268] SDSU held two more mass vaccination events on April 23 and May 2.

SDSU's outreach efforts were a combination of digital and in-person reminders in both the fall and spring semesters. In the fall, students received information through email, class announcements, hall sweeps, and social media. In the spring, the information campaign was expanded to student portals and texts about upcoming vaccination events as well as the school newspaper.[269] All undergraduate students were reached through student portals, and 23,674 students and 27,090 parents were reached by email. 25,503 students received texts about upcoming vaccination events. 4,887 students were reached through in-class presentations, compared to 2,900 in the fall.[270]

In May of 2019, SDSU announced that their official policy on MenB vaccinations had changed. All new incoming students are now required to be vaccinated for MenB and produce proof of immunization before the schedule adjustment deadline 10 days after classes start. If they do not comply, a class registration hold will be placed on their account, making it impossible for them to change their schedule or register for classes until the hold is lifted. This preventive measure was commended by HHSA.[271] Reminders of this policy were mailed over the summer break to students and they were reminded again at fall orientation.[272]

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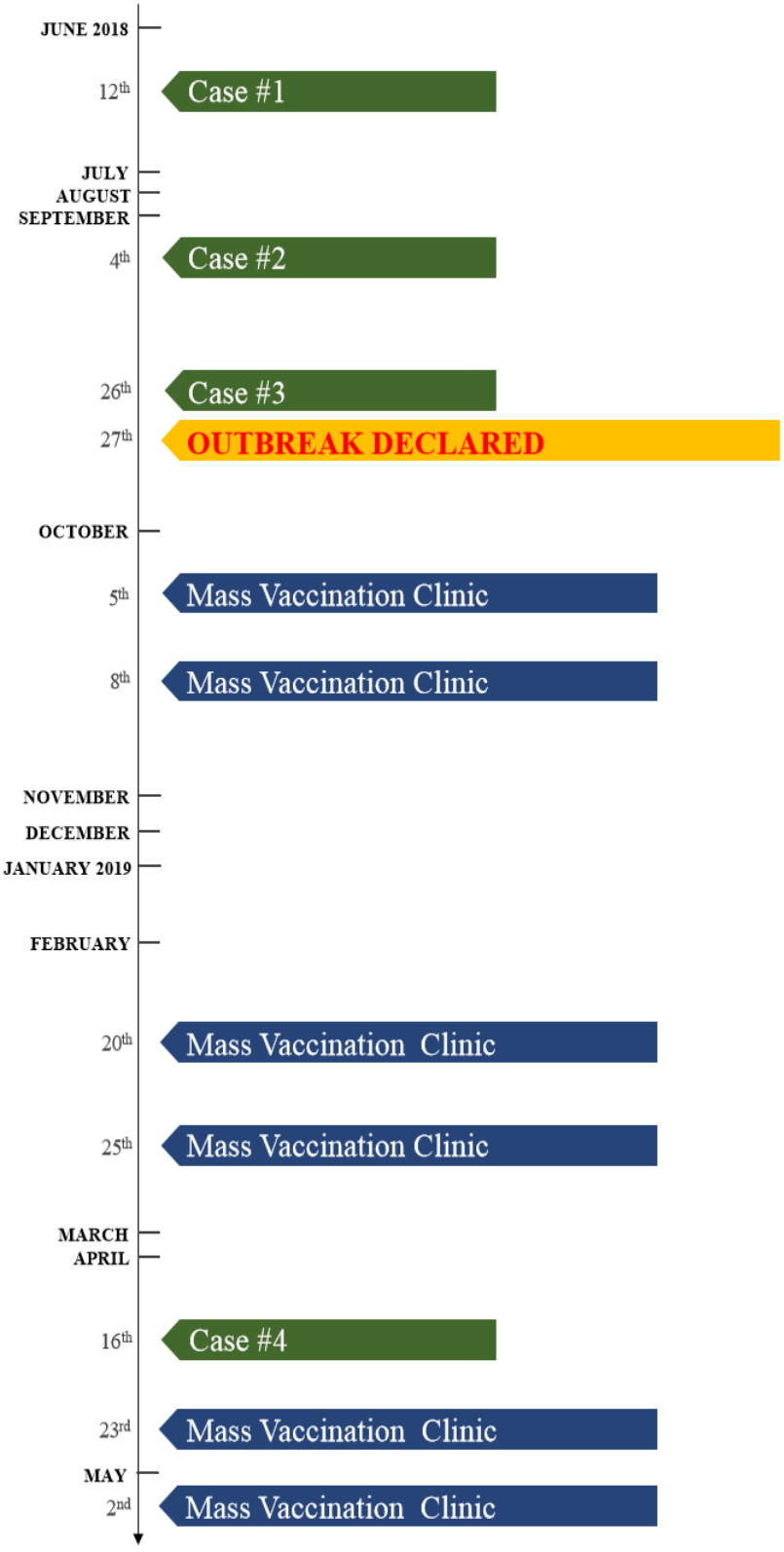
[263] "Walgreens Warns SDSU Students They May Have Received Ineffective Meningitis Vaccines," *KPBS*, October 19, 2018.
[264] "Meningococcal Vaccination for Adolescents: Information for Healthcare Professionals," Center for Disease Control and Prevention, accessed October 1, 2019, https://www.cdc.gov/vaccines/vpd/mening/hcp/adolescent-vaccine.html.
[265] County of San Diego, *SDSU MenB Outbreak Status Report*, June 28, 2019.
[266] "SDSU, County HHSA Partner to Encourage Meningococcal Vaccinations," *KPBS*, December 5, 2018.
[267] County of San Diego, *SDSU MenB Outbreak Status Report*, June 28, 2019.
[268] "SDSU Announces Possible Meningitis Exposure during Weekend Greek Events," *KPBS*, April 18, 2019.
[269] County of San Diego, *SDSU MenB Outbreak Status Report*, June 28, 2019.
[270] *Ibid*.
[271] "SDSU to Require MenB Vaccine for all Incoming Students Effective Fall 2019," *SDSU News Center*, May 30, 2019.
[272] County of San Diego, *SDSU MenB Outbreak Status Report*, June 28, 2019.

San Diego State University - 2018



2019

Rutgers University

Rutgers experienced its second outbreak in early 2019 and is the only college in the U.S. that has experienced two MenB outbreaks. The first case of MenB was diagnosed on February 3 and the second case on February 19.[273] The outbreak was declared on March 27, 2019.[274] Mass vaccination clinics were held in April, May, September, and October of 2019.

The university partnered with Walgreens Company for both the 2016 and 2019 outbreaks. In addition to vaccinating students at off-campus locations, the company provided staff to assist with the on-campus clinics. The university contacted local pharmacies and primary care practices to alert them that students might arrive seeking MenB vaccination. Minors were vaccinated at the on-campus clinics or at primary care doctor offices.

The two FDA-approved MenB vaccinations, Bexsero and Trumenba, were administered at the clinics during the 2019 outbreak, whereas only Bexsero had been administered for the 2016 outbreak. The 2016 outbreak decision algorithm had to be modified for 2019 for several reasons. First, Bexsero and Trumenba are not interchangeable, meaning that a person would have had to have received the full course of either respective vaccination in order to be fully immunized. Second, the previous outbreak had resulted in an unknown number of people in the at-risk population who might not have received the full two doses of Bexsero. Third, health officials determined that everyone should receive at least a booster because the time period between the two outbreaks was long enough that some people may not have maintained immunity for the 2019 outbreak.

By early fall 2019, 830 doses, including both Bexsero and Trumenba, were purchased for $82,636.50 and intended for use at three campuses in New Brunswick. As of September 27, 2019, 37 percent of doses had been utilized.

On January 13, 2020, New Jersey approved a new law, which amended the existing New Jersey statute by tying college students' meningococcal immunization requirements to ACIP recommendations.[275] Unchanged by the enactment was existing language that requires institutions of higher education (IHEs) to either offer immunization through their student health services programs or through contractual agreements with community health care providers. New Jersey also requires four-year IHEs to provide educational material to their students, including information about serogroup B meningococcal disease and the serogroup B vaccine. The New Jersey Vaccine Preventable Disease Program (VPDP) has prepared a meningococcal educational brochure for use by IHEs that references the following:

[273] Catherine Carrera, "Rutgers Students Urged to Get Additional Meningitis Vaccination after Outbreak on Campus," *North Jersey Record*, March 13, 2019.
[274] Lynn Fryer, APN-C, Rutgers University, email to Commission staff, October 16, 2019.
[275] N.J. Rev. Stat. § 18A:62-15.1.

(c) All four year institutions of higher education shall also collect and maintain documentation of the meningitis information/education, meningococcal vaccination, and the response of each new student in a format either specified or approved by the Department of Health and Senior Services.[276]

The New Jersey Department of Health described the response procedures for a disease outbreak as consisting of steps that involve cooperation between state and local public health authorities. In the case of meningitis outbreaks at IHEs, the institution plays an integral role as well.

The response procedures follow several steps:

1. Meningitis is immediately reportable to the local health department in New Jersey, even before lab results are available, based on symptoms that are observed in a clinical setting.

2. DOH starts to gather information and evidence about the case(s).

    a. The DOH identifies individuals who were in contact with the patient based on the infection period.

    b. The local health department will call on and interview people with whom the patient came into contact, particularly if the patient is not able to speak with case investigators.

    c. Contacts, regardless of their immunization status, will be referred to their PCPs.

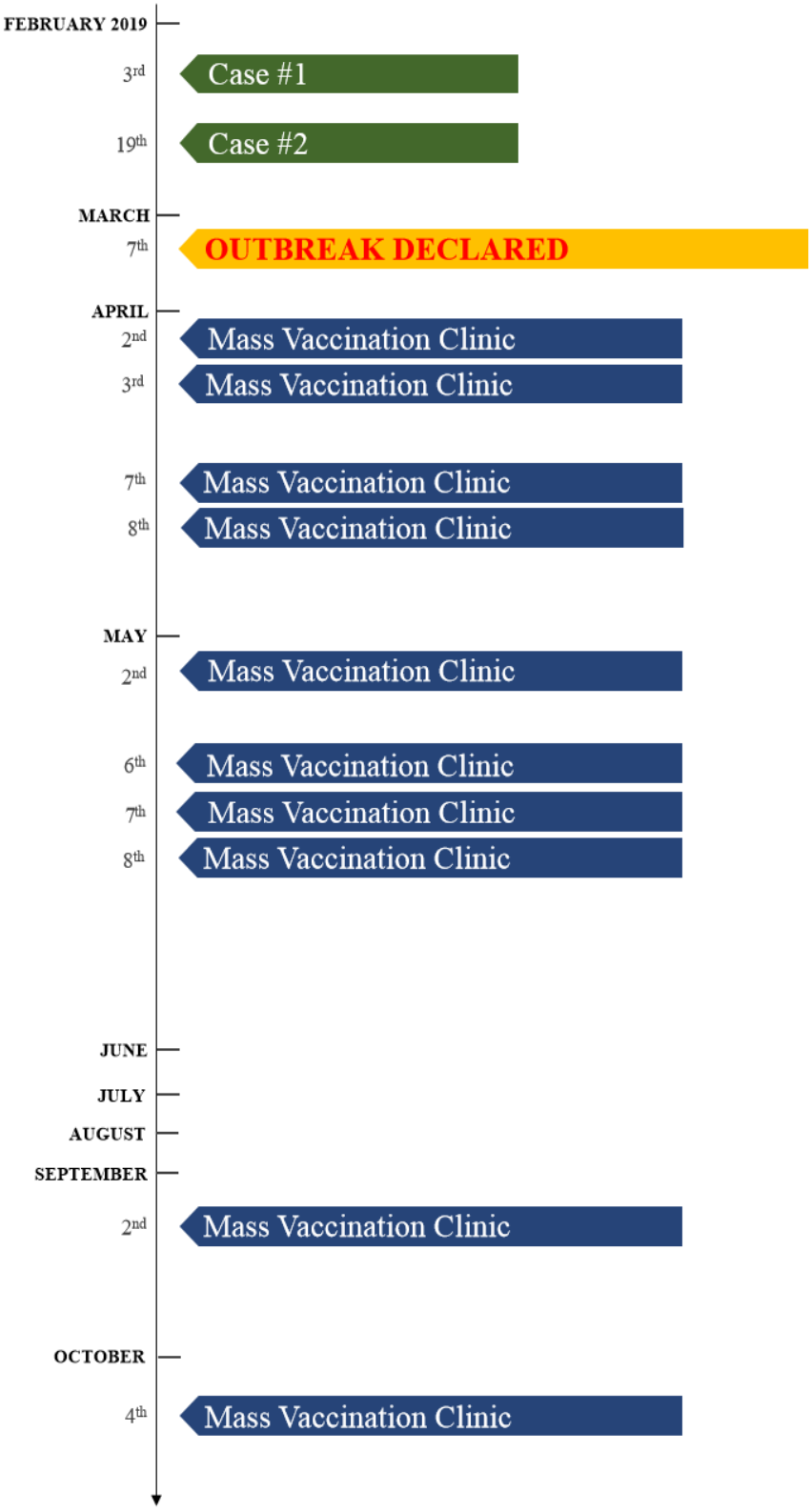
3. DOH and case investigators will look for links between the cases and where they might have shared contact. Examples of situations where contact might have occurred include Greek life, dorms and university housing, parties, shared drinks, shared "smokes," etc.

The essential components of the public health response remain in place from one outbreak to the next, although revisions are made based on experience and lessons learned. For example, public communications have made notable improvements, with the established focus being "one voice, one message." The 2016 Rutgers outbreak public communications response exhibited an expanded role for students as communicators. Their input was sought because student involvement with the Princeton response had contributed to positive outcomes.

The second of the two outbreaks to hit Rutgers University was declared over in early 2020, according to the university's website. "As of February 2020, no new cases associated with this outbreak have been identified. Therefore, Rutgers University – New Brunswick is no longer considered to be experiencing an outbreak of serogroup B meningococcal disease. The risk of serogroup B meningococcal disease at Rutgers University – New Brunswick is now considered the same as at any other university." Students were reminded of the importance of vaccination and of following the recommendations of the ACIP.[277]

[276] N.J. Admin. Code § 8:57-6.16 (Lexis Advance through the New, Jersey Register, Vol. 51 No. 19, October 7, 2019).
[277] "Health Advisory – Serogroup B Meningococcal Disease ('Meningitis B')," Rutgers Student Affairs, Student Health, last modified February 2020, http://health.rutgers.edu/meningitis/.

Rutgers University - 2019



Costs

The largest single cost in an outbreak is the purchase of the vaccine. In some instances, such as at Princeton, the University of California Santa Barbara, and Providence, the university paid for either a portion or all of the vaccine. The costs of the vaccine at Princeton remain undisclosed as part of a confidential agreement between the university, the federal government, and vaccine manufacturers. The University of California Santa Barbara spent over $1 million, but not all of this was on vaccine. According to the UCSB, the cost of the vaccine was the largest single item in that $1 million expense, but a breakdown of costs is unavailable. Providence paid for the first round of the vaccine out of existing university contingency funds. In other instances, the vaccine was provided by the CDC through the state's Department of Health. This was the case at the University of Wisconsin where the first round of the vaccine was made available to students for free because of the provision by the CDC. The CDC also paid for subsequent rounds of vaccine at Providence College and it is unclear whether the agency reimbursed the college for the first dose. Students at the University of Wisconsin were then encouraged to get the subsequent doses at their private providers with payment through insurance. Santa Clara University provided the MenB vaccine free of charge to its students through section 317 federal funding.

In many instances, IHEs relied on private health insurance to cover the cost of the vaccine. At initial University of Oregon clinics, the university billed the students and then provided them with the paperwork to send to their insurance providers. In subsequent clinics, the private pharmacy billed insurance directly. During the subsequent Oregon State University outbreak, Oregon state law was amended so that insurance companies were required to cover vaccination costs in the event of an outbreak. Rutgers utilized students' insurance coverage to pay for the vaccine. Relying upon insurance was a challenge for out-of-state students and international students at Rutgers. The University of Massachusetts also used students' insurance to pay for the vaccination. Once an outbreak was declared, insurance readily covered the cost of the vaccine and administering the vaccine. In general, where students were uninsured or underinsured, the county, the state, or the university provided the vaccine.

Another cost in each outbreak was the cost to staff the vaccination clinics. Existing staff were heavily tasked during these times. At the University of Massachusetts and Providence College, the medical reserve corps was called upon and volunteered significant man hours. Other universities, such as the University of California Santa Barbara, contracted with nurses to staff the clinics. For UCSB, the contracted cost of the nurses was a portion of the $1 million spent.

University costs for auxiliary items varied greatly. The institutions consistently mentioned signage, iPads, other technical equipment as costs incurred while conducting communication and education campaigns to address the outbreak.

MEASURES TO INCREASE VOLUNTARY VACCINATION RATES

Senate Resolution 292 directs that the Commission "evaluate potential measures to ensure higher voluntary immunization rates for meningitis ACWY and meningitis B. . ." Barriers to adult vaccination include several that have been identified by practitioners. These are:

- Lack of regular assessment of patients' vaccination statuses
- Lack of provider knowledge of current recommendations
- Cost
- Insufficient stocking
- Financial disincentives for vaccinating in the PC setting
- Limited use of electronic health records
- Missed opportunities
- Patient hesitancy
- Vaccine refusal [278]

Reducing and removing barriers can be accomplished by coordinating three approaches: enhance access to vaccination services, increase community demand, and incorporate interventions into the primary care setting.[279] Access can be enhanced by making home visits, reducing patient costs, and providing vaccines through community programs. It has been recommended that physicians be aware of current recommendations and guidelines, and make use of patient education and awareness resources that are available through groups like the CDC, the American College of Physicians, and the Society of Teachers of Family Medicine.

Being aware of current guidelines appears to be insufficient alone, however. Guidelines plus an interactive component, e.g., recording vaccinations and comparing rates with target rates, appears to successfully motivate physicians to increase vaccination rates among their patients. Research supports the role of a physician's influence in vaccination rates among his and her patients. One of the strongest predictors of whether a patient gets a flu vaccine is the physician's recommendation.[280] Further, it is important that a physician tailor his or her means of intervention

[278] Pamela G. Rockwell, D.O., "What you can do to improve adult immunization rates," *The Journal of Family Practice*, Vol. 64 no. 10, (October 2015): 626.
[279] Pamela G. Rockwell, D.O., "What you can do to improve adult immunization rates," *The Journal of Family Practice*, Vol. 64 no. 10, (October 2015): 626.
[280] Sanford R. Kimmel, MD, Ilene Timko Burns, MD, MPH, et al, "Addressing Immunization Barriers, Benefits, and Risks," *The Journal of Family Practice*, Vol. 56, no. 2, (February 2007): S62.

to the culture of the patient population, which has been demonstrated to increase vaccination rates.[281]

Given the current misinformation and mistrust about vaccinations, along with endemic lack of concern regarding health among college students, it is noteworthy that successful immunization campaigns during MenB outbreaks were motivated by the urgency of the crises and the immediacy with which the universities acted. Of particular importance is how public health authorities and providers communicate the benefits of vaccination. It is known that when doctors make strong recommendations to their patients, the patients are more likely to agree to vaccination.[282]

Just as provider system-based interventions are built around teams which include doctors, nurses, social workers, pharmacists, and other staff, so too are university interventions that coordinate different entities' responses within the university community. Student health offices engage with public local, state, and if necessary, federal public health authorities and also with university leadership, communications offices, security offices, and physical plant managers. Doctors engage an "encouraging communication style," that uses persuasion and information in terms that are familiar and understood by patients.[283] In successful vaccination campaigns, university staff seeks and makes use of input from student leaders in the form of focus groups and communication techniques and content that will resonate with young adults in the college community.

The use of immunization information systems (IIS) is seen as a critical component of efforts to increase adult vaccination rates.[284] Essentially,

- At the point of clinical care, an IIS can provide consolidated immunization histories for use by a vaccination provider in determining appropriate client vaccinations.

- At the population level, an IIS provides aggregate data on vaccinations for use in surveillance and program operations, and in guiding public health action with the goals of improving vaccination rates and reducing vaccine-preventable disease.[285]

[281] Richard K. Zimmerman, MD, MPH, Mary Patricia Nowalk, PhD, RD, et al, "Tailored Interventions to Increase Influenza Vaccination in Neighborhood Health Centers Serving the Disadvantaged," *American Journal of Public Health*, Vol 93, no. 10, (October 2003), doi: 10.2105/ajph.93.10.1699, 1699-1705.
[282] Pamela G. Rockwell, D.O., "What you can do to improve adult immunization rates," The Journal of Family Practice, Vol. 64 no. 10, (October 2015): 628.
[283] Pamela G. Rockwell, D.O., "What you can do to improve adult immunization rates," The Journal of Family Practice, Vol. 64 no. 10, (October 2015): 629.
[284] Pamela G. Rockwell, D.O., "What you can do to improve adult immunization rates," The Journal of Family Practice, Vol. 64 no. 10, (October 2015): 628.
[285] "About Immunization Information Systems," Immunization Information Systems, CDC website, June 7, 2019, https://www.cdc.gov/vaccines/programs/iis/about.html.

Immunization registries, like an IIS, can prompt providers to recommend and administer vaccines to patients and have been shown to increase immunization rates among adults.[286] All states, except for New Hampshire, have fully functioning IISs. At this time, NH does not have a fully functioning IIS, and uses the vaccine ordering management module of its IIS.[287]

Pennsylvania's IIS, referred to as the Pennsylvania Statewide Immunization Information System (PA-SIIS) is managed by the Pennsylvania Department of Health. It provides access to and training in the use of the registry at no cost to users, which may include school nurses. Birth records are automatically uploaded weekly and patient records exist for all Pennsylvania births starting with 1996. Healthcare providers are responsible for uploading records for people born prior to 1996.

Patient information that is available through the PA-SIIS registry includes: [288]

- An official immunization record for each patient
- List of patients coming due or past due for immunizations
- Information for HEDIS reporting[289]
- Various clinical information reports such as monthly shot administration counts and immunization coverage level reports
- Immunization recommendation at time of vaccination

The February 2018 meeting of the ACIP included the presentation of "Epidemiology of Meningococcal Disease among College Students, US 2014-2016," to the Meningococcal Work Group. The discussion that followed included comments from participants, who stated that an obstacle to vaccination is the difficulty of holding the discussion between parents and physicians. Evidently, because meningitis is transmitted through secretions, parents are uneasy to talk with their family doctors about what their children will do while away at college. Comments noted in the minutes included, ". . .the discussion regarding individual risk factors was very difficult to have," and "[H]aving a conversation with a pediatrician about what a student will do while away at college is exceedingly difficult. CDC will continue to endeavor to gather more information, but it is not likely that anything they can gather will make this a simple conversation."[290] There was some sentiment that part of the solution may lie in producing guidelines to pediatricians on how to have the difficult conversations.

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[286] Karen L. Jones, Anne L. Hammer, Carolyn Swenson, et al, "Improving adult immunization rates in primary care clinics." *Nursing economic$*, 26 6 (2008): 404-7.

[287] Email to Commission staff from Donna McKean, IIS Program Manager, Immunization Program, Bureau of Infectious Disease Control, New Hampshire Division of Public Health Services, Department of Health and Human Services, December 10, 2019.

[288] Pennsylvania DOH website, "PA-SIIS Frequently Asked Questions," https://www.health.pa.gov/topics/Reporting-Registries/PA-SIIS/Pages/FAQ.aspx.

[289] HEDIS is the Healthcare Effectiveness Data and Information Set, a data collection and analysis system that is used by the healthcare industry as a performance measurement and improvement tool. It is managed by the National Committee for Quality Assurance (NCQA).

[290] Sarah Meyer, "Epidemiology of Meningococcal Disease Among College Students, US 2014-2016," Advisory Committee on Immunization Practices Meeting (February 22, 2018), 173.

It seems, however, that preparing pediatricians, among others, for having the conversation with patients and their parents might not, in itself, be an effective means of either prompting conversations or of increasing vaccination rates.

The CDC is home to an advisory board called the Community Preventive Services Task Force (CPSTF), whose function is to review scientific studies and make recommendations on a variety of public health matters. Among these is included the broad topic "Vaccinations."[291] Fundamentally, with respect to vaccinations, the CPSFT seeks to accomplish three goals:

- Identify and promote effective strategies to improve access to vaccinations
- Increase community demand
- Encourage providers to regularly administer vaccines

In pursuit of these goals, since 2009 the CPSTF has published a comprehensive *Community Guide* that includes reviews and recommendations on measures to increase vaccination coverage in the U.S.

The *Community Guide* includes CPSTF's reviews of 19 packages of interventions studied by dozens of rigorous research projects to determine the interventions' efficacy in increasing vaccination rates.[292] In most cases, the CPSTF review does not mention whether an intervention would be more or less effective at increasing vaccinations rates for a particular vaccine. This may be an important consideration if, for example, an intervention that reminds pediatricians to discuss vaccines with their patients' parents might work for measles but not for meningitis, given the supposed reticence of some pediatricians to broach the topic of meningitis because of its common transmission vector.

The CSPTF has a three-tiered ranking for its conclusions about the different interventions: Recommended, Insufficient Evidence, and Recommended Against. None of the 19 reviews resulted in a finding of Recommended Against. The reviews are grouped as depicted in Table 6.

CPSTF Findings on Vaccinations

The Community Preventive Services Task Force (CPSTF) has released the following findings on what works in public health to improve vaccination rates. These findings are compiled in The Guide to Community Preventive Services (The Community Guide) and listed in the table below. Use the findings to identify intervention strategies you could use for your community.

[291] Community Preventive Services Task Force, "Vaccination" The Community Guide, Community Preventive Services Task Force, CDC, https://www.thecommunityguide.org/topic/vaccination.
[292] Some were solitary interventions, while others were applied in groups.

Table 6

What Works: Increasing Appropriate Vaccination, Evidence-Based Interventions for Your Community

Recommended	Insufficient Evidence	Recommend Against

Intervention	CPSTF Findings
Enhancing Access to Vaccination Services	
Vaccination programs in WIC settings	Recommended
Home visits to increase vaccination rates	Recommended
Reducing client out-of-pocket costs	Recommended
Vaccination programs in schools & organized child care centers	Recommended
Expanded access in healthcare settings when used alone	Insufficient Evidence
Increasing Community Demand for Vaccinations	
Client or family incentive rewards	Recommended
Client reminder & recall systems	Recommended
Vaccination requirements for child care, school & college attendance	Recommended
Community-based interventions implanted in combination	Recommended
Community-wide education when used alone	Insufficient Evidence
Monetary sanction polices	Insufficient Evidence
Client-held paper immunization records	Insufficient Evidence
Clinic-based education when used alone	Insufficient Evidence
Provider or System-Based Interventions	
Health care system-based interventions implanted in combination	Recommended
Immunization information systems	Recommended
Provider assessment & feedback	Recommended
Standing orders when used alone	Recommended
Provider reminders	Recommended
Provider education when used alone	Insufficient Evidence

Source: Community Preventive Services Task Force, "What Works: Increasing Appropriate Vaccination, Evidence-Based Interventions for Your Community," The Community Guide, Community Preventive Services Task Force, CDC, last modified November 2017, https://www.thecommunityguide.org/resources/what-works-increasing-appropriate-vaccination.

The CPSTF identified four fundamental types of intervention that are proven to increase vaccination rates. These top level recommendations are "global," that is, they provide the overall framework for how stakeholders, (e.g., public health authorities, health care systems, providers, and insurers) should approach the goal of increasing population vaccination rates. The recommendations are grouped into four evidence-based pillars that have been proven to improve vaccination rates: enhance access to services, increase community demand, use provider- or system-based interventions, and combine interventions at the community level.

Enhanced Access to Services

Access to vaccines and vaccination services can be enhanced through a number of interventions. First, vaccination rates have been improved when patients' out-of-pocket costs have been reduced or eliminated. Studies have researched the effects of reducing or eliminating copayments, of adding or increasing health benefits coverage, and in some cases, of offering incentives to patients who get vaccinated. Second, vaccination rates have shown improvements when vaccines are offered in settings where target populations are easily reachable by health care providers, such as in schools and child care centers. Third, coordination with social and public health services such as WIC has proven effective at increasing rates. Fourth, home visits are proven effective when providers arrange to meet people in their homes to administer vaccinations.

In July 2015, CPSTF published a review of seven studies that looked at the effectiveness of incentives on vaccination rates. The review studied the hypothesis that small rewards (food vouchers, lottery prizes, baby products, gift cards) are effective incentives to motivate clients or families to obtain recommended vaccinations.[293] Results showed that vaccination rates across the seven studies increased by a median of eight percentage points. Two studies that assessed the effectiveness of incentive rewards independently, that is, without being a component of multi-pronged interventions, showed vaccination rate increases of 8.5 and 9 percentage points. CPSTF found that the evidence is applicable to a wide range of both clinical and community settings, and across ages from children to adults. Various types of incentive rewards were effective.

Further, there was some belief among researchers that overall client health care may improve through increased contact with providers as spurred by the vaccination program. CPSTF recognized that incentives may be seen as coercive to the extent that patients' circumstances may be such that they cannot afford to not take the incentive, and thereby have the potential to bias clients' informed decision making.

The median intervention cost was $372 per person per year. The median cost for each additional vaccinated person ranged from $248 to $2,447. As with all interventions related to community and population health, health system interventions combined with community based interventions are stronger together than when applied separately. CPSTF concluded that further research could provide evidence of the strength and duration of the reward interventions, especially with regard to teenagers and adults.

In March 2016, CPSTF reviewed 23 studies that hypothesized whether vaccination rates can be improved when home visitors assess clients' vaccination status, discuss the importance of recommended vaccinations; and either provide vaccinations to clients in their homes or refer them to available immunization services. Across studies, home visits were found to be an effective

[293] Community Preventive Services Task Force, "Increasing Appropriate Vaccination: Client or Family Incentive Rewards" The Community Guide, Community Preventive Services Task Force, CDC, last modified July 15, 2015, https://www.thecommunityguide.org/findings/vaccination-programs-client-or-family-incentive-rewards.

intervention.[294] The median increase in vaccination rates was 11 percentage points.[295] Further, increases in rates were comparable between visits focused on children and visits focused on adults.

However, home visits are intensive and expensive uses of resources to increase vaccination rates. Home visits may be "logistically challenging" because of clients' privacy concerns, concerns of having a stranger enter their house, refusing services, timing, and client availability. The median cost per person visited was $56.30 and the median cost of additional person vaccinated was $786.79. While no specific harms were identified in the studies reviewed by the task force, concerns remain for potential difficulty in managing adverse reactions to vaccines and potential stigmatization of "socially or economically disadvantaged clients identified as needing special services."[296] Overall, CPSTF concluded that home visits are an effective means of increasing vaccination rates, especially among communities with concentrations of low rates and "where coverage disparities exist." A stepped approach of starting with less invasive, less expensive interventions, such as phone calls and reminder systems that target the populations identified for home visits may help conserve resources by decreasing the number of more expensive home visits.

According to CPSTF, school and daycare based intervention programs contain at least two of these four components:

- immunization education and promotion,
- assessment and tracking of vaccination status,
- referral of under-immunized school or child care center attendees to vaccination providers, and
- provision of vaccinations."[297]

In theory and based on evidence, vaccination rates can be improved through application of these interventions. CPSTF reviewed 27 studies that researched the effectiveness of these interventions in schools and daycare centers. The programs included one or more of these:

- provided vaccinations on site,
- were administered by a range of providers including school health personnel, health department staff, and other vaccination providers,
- were delivered in a variety of different school and organized child care settings,
- delivered one or more of a range of vaccines recommended for children and adolescents, and

[294] Community Preventive Services Task Force, "Increasing Appropriate Vaccination: Home Visits to Increase Vaccination Rates: What the CPSTF Found," The Community Guide, Community Preventive Services Task Force, CDC, last modified March 4, 2016, https://www.thecommunityguide.org/findings/vaccination-programs-home-visits-increase-vaccination-rates.
[295] Community Preventive Services Task Force, "Increasing Appropriate Vaccination."
[296] *Ibid.*
[297] Community Preventive Services Task Force, "Increasing Appropriate Vaccination: Vaccination Programs in Schools and Organized Child Care Centers," The Community Guide, Community Preventive Services Task Force, CDC, last modified October 10, 2015, https://www.thecommunityguide.org/findings/vaccination-programs-schools-and-organized-child-care-centers.

- included additional components such as education, reduced client out-of-pocket costs, and enhanced access to vaccination services."

Vaccines were administered in 23 of the 27 studies. In 16 of these studies, the median increase in vaccination rates was 41 percentage points.

Based on the evidence, the CPSTF found that school-based interventions could be less expensive than those applied in health care settings because of lower vaccine costs and the avoidance of lost parental income "associated with children's clinic visits." Further, the increased vaccination rates may lead to decreases in subsequent health care costs that would be avoided by immunization against disease. Further, vaccination in school and daycare settings may be more time efficient and provide communities with additional and/or supplemental access to vaccinations.

Application in a College Outbreak Setting

In the review of college and university responses to MenB outbreaks on their campuses, institutions frequently used enhanced access to services to increase the vaccination rate. Some colleges reduced or eliminated student out-of-pocket costs by completely covering the cost of the vaccination or covering the cost of one of the vaccinations in the series. Mass vaccination clinics in large, on-campus venues such as gymnasiums and health care centers were used by the institutions to make the vaccination easily accessible to students. When students were leaving campus for break, the institution could no longer provide convenient access and encouraged students to seek out vaccination providers in their home setting.

Increased Community Demand

Evidence shows that vaccination rates can be improved by increasing a community's demand through public education and notification about the benefits of immunization, and importantly, how and where they can access vaccine services. Follow-through by public health officials and providers play an important role in sustaining community demand. Similar to the recommendation to enhance access, community demand can be increased through the use of incentives. A third means of increasing demand is to do so through legislation by establishing statutes and regulations that require vaccination for attending child care, schools, and IHEs.

The CPSTF reviewed studies that considered the hypothesis that vaccination rates will increase through the uses of reminders and recalls. Reminders prompt the target population about the importance and availability of vaccinations and that they are soon due for vaccination; recalls inform people when they are past-due to receive recommended vaccinations.

A total of 29 studies were reviewed. The interventions showed strong evidence of increased vaccination rates. Encouraging results were shown for reaching children, adolescents, and adults across a range of settings and populations, and at different levels of scale, from individuals to communities. Evidence showed success across a range of types of intervention, (reminder or recall, content, theoretical basis and method of delivery) and whether interventions were used alone or as part of a comprehensive program.[298]

Results showed that the median increase in vaccination rates was 11 percentage points, including 6 percentage points when the intervention was used alone and 12 percentage points when the intervention was part of a larger comprehensive approach.

The studies' use of reminders and recalls demonstrated the median per person cost of implementing the intervention was $2.13. The median cost per additional person vaccinated was $15. Overall, these were the least expensive of the interventions recommended by the CPSTF. The CPSTF concluded that the interventions were shown to be "broadly applicable," across populations, ages, settings, delivery methods, and vaccinations, but that more research is needed to compile evidence as to the value of new means of intervention (like social media, email, and text messaging) and for vaccines specific to adolescents.[299]

A number of studies considered whether WIC could be utilized to implement intervention, such as vaccination status assessments of participating infants and children and whether the status check can effectively lead to referrals to appropriate vaccination providers. Additional interventions can include client reminder and recall systems, tracking and outreach efforts, and changes in voucher pick-up schedules that require more frequent WIC visits when vaccinations are not up to date. Further, vaccination services can be "collocated and coordinated" with WIC settings.

The CPSTF reviewed 15 studies of programs assessment and referral that were coordinated with additional interventions.[300] Eight studies showed a median increase of 10.5 percentage points in vaccination rates. Five studies included the additional intervention of changes to voucher pick-up, and four studies included the additional intervention of collocating voucher pick-up and vaccine services. Assessment and referral, when used as a stand-alone intervention, showed no change to vaccination rates. Although only urban settings were studied, CPSTF holds the opinion that the overall evidence is applicable to suburban and rural settings.[301]

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[298] Community Preventive Services Task Force, "Vaccination."
[299] Community Preventive Services Task Force, "Vaccination Programs: Client Reminder and Recall Systems," The Community Guide, Community Preventive Services Task Force, CDC, https://www.thecommunityguide.org/findings/vaccination-programs-client-reminder-and-recall-systems.
[300] Community Preventive Services Task Force, "Increasing Appropriate Vaccination: Vaccination Programs in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) Settings," The Community Guide, Community Preventive Services Task Force, CDC, last modified January 20, 2016, https://www.thecommunityguide.org/findings/vaccination-programs-special-supplemental-nutrition-program-women-infants-children-wic.
[301] *Ibid.*

In a study unaffiliated with the CPSTF, consideration of adolescents as a particular target population was the subject of a survey of parents whose children would have been attending high school during the 2017-2018 academic year.[302] The majority of parents surveyed were unfamiliar with the MenB vaccine but were willing to have their children vaccinated. Four out of five indicated a preference to receive vaccine information from their child's doctor. Recent studies, however, found that doctors are unfamiliar with MenB vaccination and consequently do not discuss it with patients. Researchers thus concluded that two salient obstacles to MenB vaccination could be identified: doctors' unfamiliarity, and parents' desire to learn about vaccines from doctors.

With these obstacles removed, it was shown that parents' awareness of, and concern about meningitis were associated with significantly higher willingness to:

- Vaccinate for MenB
- Vaccinate for ACWY
- Vaccinate for ABCWY

Low awareness among parents means doctors are responsible for initiating the discussion about MenB risks and vaccines. In general, research supports importance of provider recommendations on vaccine uptake.

The Meningitis B Action Project (MBAP), a joint initiative of the Kimberly Coffey Foundation and the Emily Stillman Foundation, engages with healthcare providers, policy makers, and the public to inform, educate, and encourage vaccination against MenB.[303] The organization lists four primary objectives of its work:

- Empower young adults with information to talk to their healthcare provider about Meningitis B and the vaccine that can help prevent it,
- Encourage healthcare providers to discuss Meningitis B and the MenB vaccine with their patients (and their parents),
- Increase awareness of Meningitis B on high school, college and university campuses,
- Engage policymakers to ensure broader access to the MenB vaccine.[304]

[302] Nicole E. Basta *et al*., "Parental Awareness of Meningococcal B Vaccines and Willingness to Vaccinate Their Teens," *Vaccine* 37, (2019): 670-676, doi: 10.1016/j.vaccine.2018.11.078.
[303] Meningitis B Action Project, https://meningitisbactionproject.org/.
[304] Meningitis B Action Project, "About the Meningitis B Action Project," https://meningitisbactionproject.org/our-mission.

As discussed in research reviewed by CPSTF, healthcare providers' knowledge gaps and unclear guidelines have been demonstrated as being obstacles to vaccination. The MBAP's activities provide examples of how these gaps may be bridged. The group has partnered with large organizations, such as health systems, as in the case with the Children's Hospital of Michigan, and professional associations, such as the American Academy of Pediatrics, the National Association of School Nurses, and the National Association of Pediatric Nurse Practitioners to deliver educational content to their members.

Further, the MBAP has contributed to an education module included in Medscape's continuing education series, "Case-by-Case: Preventing MenB Disease in Adolescents and Young Adults."[305] Public health decision makers have also been included in the Meningitis B Action Project's efforts, through its work with the American Public Health Association and the American College Health Association.

The MBAP addresses another of CPSTF's identified obstacles to immunization rates, patient knowledge. The organization has developed content for PatientPoint, a company that streams educational medical information to healthcare providers' waiting rooms and other points of contact with patients.[306] In a particularly important initiative because its audience is the population known to be most at risk for contracting MenB, the MBAP began working with College Health TV, a college health and wellness streaming channel that delivers content to IHEs in the U.S.[307]

MBAP has been an active advocate at both federal and state legislative levels. It has supported federal and state resolutions to raise awareness, for example, in the case of Congress' recognition of World Meningitis Day. The organization has also advocated on behalf of removing religious and philosophical objections from the list of vaccine exemptions in New York.

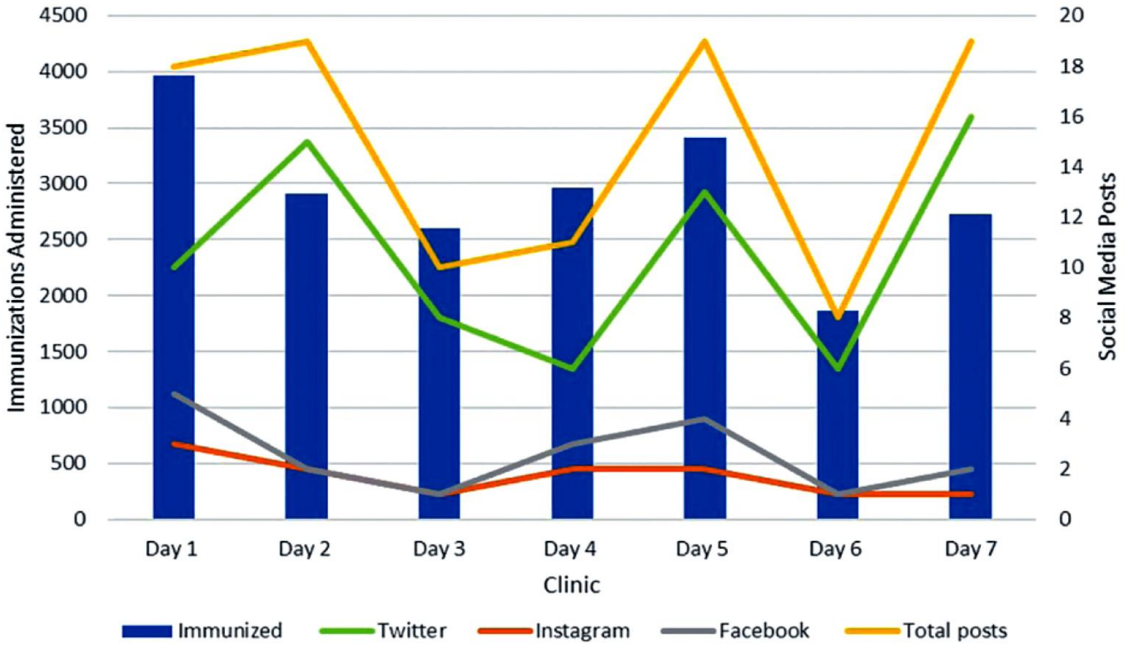
Application in a College Outbreak Setting

IHEs have carried out comprehensive and intensive public education campaigns to provide students with information about the disease and the benefits of the campaign. IHEs used social media and other electronic means of communication to convey the logistics of the mass vaccination clinics and to encourage students to get vaccination. Incentives, such as food at a mass vaccination clinic, or gear and small items given to students after getting the vaccination were used consistently. IHEs also increased community demand by requiring students to provide proof that they had been vaccinated in order to register for classes, receive their grades, or gain entrance to student housing.

[305] Meningitis B Action Project, "MenB Vaccination Learning Module by Medscape," https://meningitisbactionproject.org/our-work.
[306] PatientPoint, "On World Meningitis Day, Patient Point and Meningitis B Action Project Launch National Campaign to Drive Awareness, Vaccinations," April 24, 2019, http://patientpoint.com/patientpoint-meningitis-b-action-project/#.XoNrYnJ7lPb.
[307] Meningitis B Action Project, "Partnership with College Health TV," https://meningitisbactionproject.org/our-work.

Chart 7

Social Media Campaigns
Promoting MenB Vaccinations



Though social media campaigns promoting MenB vaccinations are not commonly researched, a case report on the outbreak at the University of Wisconsin-Madison highlighted the effect social media posts had on vaccination rates. It found a relationship between the number of social media posts and the amount of immunizations administered in a day.[308] Twitter, Instagram and Facebook posts were combined into a total university social media posts, which is displayed in the yellow line in Chart 7. The number of immunizations administered each day is conveyed in the blue bar graph and ranges from slightly below 2,000 to slightly less than 4,000 immunizations per day. The number of immunizations administered each day follows the general trend of the number of total social media posts.

State government officials throughout the U.S. have used legislation, regulation, and administrative code to increase community awareness and voluntary demand for vaccination. The appendix contains information gathered by Commission staff on the 50 states and the District of Columbia. (p. 125) Twenty states have statutes, regulations, or administrative codes addressing meningococcal vaccination in IHEs. Separate from the focus on vaccination, thirty-two states have statutes that requires the IHEs to provide some type of educational materials on invasive meningococcal disease. Specifically, Commission staff reviewed each state to determine if the universities are required to send every student information on meningitis. In some of these thirty-

[308] Alicia M. Ritscher, *et al*., "Meningococcal Serogroup B Outbreak Response University of Wisconsin-Madison," *Journal of American College Health* 67, no.3 (2019): 191-196, doi: 10.1080/07448481.2018.1469502.

two states, students are required to prove that they received and read the information. In six states, IHEs are required to report meningococcal vaccination rates to their states' health department.

Provider- or System-based Interventions:

Provider- or system-based interventions are proven means of increasing vaccination rates. For example, computerized immunization information systems can integrate a patient's medical records with recommended and available vaccines. A second proven intervention is for health systems and insurers to send feedback to health care providers so that they are made aware of whether they are communicating effectively with their patients with regard to vaccinations. Third, research has shown that the use of chart notes, computerized alerts, and checklists to remind providers when patients are due for vaccination have been effective interventions. Fourth, health care providers and systems can increase vaccinations by establishing standing orders that allow non-physician personnel to administer vaccines.

The CPSTF released recommendations for provider education in July 2015 that were based on its review.[309] Six studies were reviewed that tested the hypothesis that educating providers, with the objective of increasing their knowledge of changing their attitudes would itself be sufficient to increase vaccination rates. The studies considered education information delivered through written materials, videos, lectures, continuing medical education programs, computer-assisted instruction, and distance-based training.

The CPSTF found insufficient evidence, based on the review of the six studies, that provider education was by itself an adequate intervention to increase immunization rates. The median increase in vaccination rates across studies was 4 percentage points after providers were educated about MenB vaccinations in particular. However, the rates were not statistically significant and were inconsistent across the small number of samples studies.

The CPSTF stated, "Provider education can be one component of an effective, combined approach to increase vaccination rates. Based on strong evidence of effectiveness identified in updated reviews, the Task Force recommends health care system-based interventions implemented in combination and community-based interventions implemented in combination."[310]

"Standing orders authorize nurses, pharmacists, and other healthcare personnel where allowed by state law, to assess a client's immunization status and administer vaccinations according to a protocol approved by an institution, physician, or other authorized provider." Based on the strong evidence shown over a number of years by 35 studies it reviewed, the CPSTF recommends the use of standing orders. Across the studies, standing orders, either as a sole

[309] Community Preventive Services Task Force, "Increasing Appropriate Vaccination: Provider Education When Used Alone," The Community Guide, Community Preventive Services Task Force, CDC, last modified July 5, 2015, https://www.thecommunityguide.org/findings/vaccination-programs-provider-education-when-used-alone.
[310] *Ibid.*

intervention or as a component of combined interventions, were shown to increase the median vaccination rate by 24 percentage points.[311]

CPSTF believes that standing orders would be effective for adolescent populations, despite their not having been included in the studies reviewed. Further, the agency concluded that standing orders may be more effective than provider reminder systems in health care settings. The median population group size studied was 11,813. The median cost of implementation per person per year was $5.55, and the median cost per additional vaccination was $29.[312]

Combined Interventions at the Community Level

Perhaps the broadest reaching recommendation from the CPSTF is to combine all of the effective interventions and apply them community-wide, so that people are met as individuals across target populations. In other words, home visits are initiated to meet the needs of people who would otherwise not be vaccinated, incentives are offered to other consumers, information systems keep providers apprised of their patients' needs, and so forth.

Between October 2016 and December 2016, authors of a study surveyed a nationally representative sample of pediatricians and family practitioners (FPs) to determine:

- Practices regarding MenB vaccine delivery,
- Factors influencing a decision to recommend the MenB vaccine, and
- Factors associated with discussing the MenB vaccine.

The survey was sent to pediatricians and FPs via Internet or mail, based on their preference, and had an overall response rate of 72% (660 responses out of 916 surveys sent out). Fifty percent of pediatricians and 31% of family practitioners always or often initiated a discussion about the MenB vaccine during routine visits for 16 to 18 year-olds with slightly more initiating discussions during precollege physical exams.[313]

About 58% of pediatricians either recommended or strongly recommended the vaccine to 16 to 18 year-olds and about 50% of family practitioners recommended or strongly recommended the vaccine to this same age group. When the group was changed to those entering college, the "strongly recommended" category increased by about 10 percent for both specialties. For both

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[311] Community Preventive Services Task Force, "Increasing Appropriate Vaccination: Standing Orders," The Community Guide, Community Preventive Services Task Force, CDC, last modified October 10, 2015, https://www.thecommunityguide.org/findings/vaccination-programs-schools-and-organized-child-care-centers.

[312] *Ibid.*

[313] Allison Kempe, MD, MPH, Mandy A. Allison, MD, MSPH, Jessica R. MacNeil, MPH, et al, "Knowledge and Attitudes Regarding Category B ACIP Recommendations Among Primary Care Providers for Children," *Acad Pediatr.* 2018 ; 18(7): 763–768, published online April 17, 2018, doi: 10.1016/j.acap.2018.04.005.

categories of physicians, initiating a discussion was highly correlated with recommending the MenB vaccine.

The most commonly reported issues that were associated with a higher likelihood of recommending were the occurrence of a MenB outbreak, the incidence of MenB disease, the effectiveness and safety of the MenB vaccine and the duration of protection of the MenB vaccine. The existence of a recommendation for another meningococcal vaccine (MenACWY) and the consistency of reimbursement were related to a lower likelihood of recommendation.[314]

Survey respondents reported some confusion over the Category B recommendation. According to ACIP, recommendations are supposed to result in individual clinical decision-making "in the context of a clinician-patient interaction." The authors of the survey pointed out that some physicians may interpret "individual clinical decision-making" to reflect their own decision about whether to initiate a discussion of the vaccine.[315] "Our data suggest that a lack of knowledge about MenB disease or awareness of the MenB vaccine may be a primary motivation for not initiating a discussion for many, rather than clinician or parent and patient assessment of the risk and benefit of these vaccines. Many primary care physicians do not appear to be familiar enough with the data required to have a well-informed discussion with parents and patients about the pros and cons of the MenB vaccination in healthy adolescents." [316]

For pediatricians and family practitioners, the primary reason for not recommending the MenB vaccine is that it was given a Category B rather than a Category A recommendation. The authors acknowledge that "the low incidence of the MenB disease might be expected to be a likely reason for not recommending these vaccines." In addition, the duration of the protection provided by the MenB vaccine is unknown and studies have revealed a rather steep decline in antibodies for both vaccines which indicates that protection might be short-lived. According to the authors, "These findings suggest a need to develop methods of better highlighting differential recommendations for the same vaccine in different patient groups."[317]

Interventions Evaluated in the College Setting

College students are at particular risk for being exposed to and falling ill with meningitis. Given that the outbreaks in the U.S. tend to be associated with college populations, particularly resident student populations, it is helpful to look at vaccination campaigns that have been developed and studied for effectiveness on increasing vaccine uptake.

[314] *Ibid.*, 4.
[315] *Ibid.*, 6.
[316] *Ibid.*, 9.
[317] *Ibid.*, 8.

One such study involved the students at Brown University, classes of 2003, 2004, and 2005.[318] The researchers sought to, "assess the impact of pre- and post-matriculation educational efforts on meningococcal quadrivalent polysaccharide vaccine immunization rates." In other words, whether an information campaign would lead to higher student vaccinations either before or after they began their academic careers at Brown. The study involved students entering in 1999, 2000, and 2001.

For each of the entering classes, 2003, 2004, and 2005, the following events and information were made available:

- Planned immunization clinics
- Vaccine available through student health services
- Information provided at parents weekend
- Student mailbox inserts
- Telephone medical advice
- Information provided through health services website
- Advice from healthcare providers
- College newspaper article

After establishing a baseline with the class of 2003, researchers added information for the classes of 2004 and 2005, which included:

- Cover letter from health services that recommended the meningococcal vaccine;
- Request for student immunization records; and
- Pamphlet giving info on meningococcal disease and vaccine.

The researchers found that that pre-arrival vaccination rates increased from the Class of 2003 to Class of 2004, and from 2004 to 2005. On-campus immunizations decreased from 2003, to 2004-05. Rates increased for pre- and post-arrival students. The increase could be attributed to the pre-arrival educational materials.

"We believe that mailing educational material to students before they arrived on campus had the greatest impact on immunization rates . . . when students were provided with educational materials on the risks of meningococcal disease and its prevention before they arrived on campus."[319] The authors found that the results agreed with previous studies that showed vaccine acceptance increases with education.

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[318] LoriAnn Collins *et al*., "The Impact of Educational Efforts on First-Year University Students' Acceptance of Meningococcal Vaccine," *Journal of American College Health* 52, no. 1 (July/August 2003): 41-43, doi: 10.1080/07448480309595722.
[319] *Ibid.*

The authors noted that they did not assess the impact of parents, family practitioners, printed literature, or (news) media on students' decisions. The authors reasoned that parents' and family practitioners' influence will be stronger on students when they are still living at home. They recommended that educational material be mailed separately from other college information to help ensure that parents and students pay more attention to it.[320]

A more recent study of educating college students about the dangers of meningococcal disease in hopes of increasing voluntary vaccination rates was conducted at the University of South Florida. In "College Students' Knowledge about Meningococcal Disease and Preferences for Health Information," researchers sought to determine students' knowledge of the disease and what their preferences are for receiving information about it.[321]

Researchers surveyed 519 students taking online graduate courses in public health at the university with an online survey that assessed four topic areas:

- Knowledge about the disease,
- Preferences for learning more about it,
- Perceived risk, and
- Vaccine intentions.

Two demographic questions asked whether students lived on campus and how many roommates they had. Results showed that most respondents lived off campus and did not live in high-density settings. Over one-third did not have a roommate, and approximately one-fourth had one roommate.

Results, in Table 6, showed a fairly even spread of responses to questions about how students preferred to receive information about meningitis. Students indicated that their top preferences were about the same for receiving information through an online presentation in Blackboard, a presentation during orientation, and a broadcast e-mail.[322]

[320] *Ibid.*

[321] Sharon Bernecki DeJoy, MPH *et al*., "College Students' Knowledge about Meningococcal Disease and Preferences for Health Information," *Florida Public Health Review* 5, no. 15 (October 2008): 96-98, http://publichealth.usf.edu/fphr.

[322] BlackBoard is an online information management system that can be used to provide course materials, communication tools, online assessments, grades, and the ability to submit assignments electronically.

Table 6

College Students' Knowledge about Meningococcal Disease and Preferences for Health Information

How would you prefer to receive additional information (about meningococcal disease)?	**N=514**
Online presentation posted in Blackboard	122 (23.7%)
Presentation during orientation	113 (22.0%)
Broadcast e-mail	106 (20.6%)
Brochure available at Student Health Services	55 (10.7%)
Elective online course	48 (9.3%)
No information needed	37 (7.2%)
All other responses	33 (6.5%)

Source: Sharon Bernecki DeJoy, MPH et al., "College Students' Knowledge about Meningococcal Disease and Preferences for Health Information," Florida Public Health Review 5, no. 15 (October 2008): 96-98, http://publichealth.usf.edu/fphr.

Researchers found a high level of knowledge about risk factors, although they admit there may be bias because "many students taking public health courses at USF are interested in a medical career." Only about one-third had received the vaccine, and one-third expressed intent to receive it. However, it is not known whether those students followed-up. There is a cost to receiving the vaccine from the student health services, which may be an obstacle to some students.

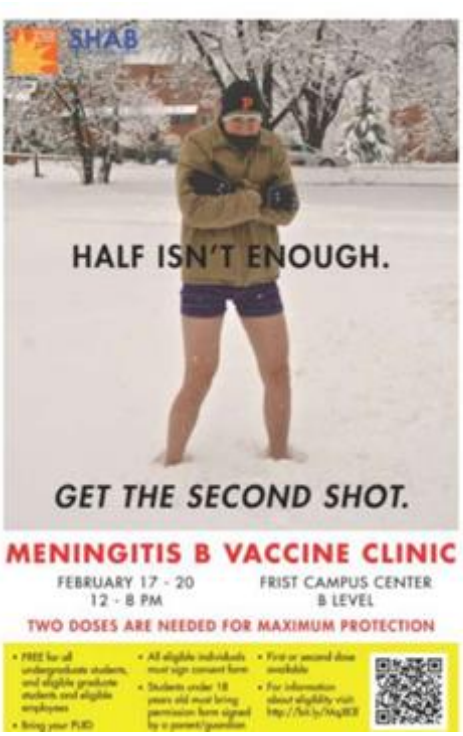
Most respondents expressed a need for more information, and the USF College of Public Health responded with plans to develop an online learning module.

Marketing Campaigns used in Outbreaks in College Settings

During the review of outbreaks on U.S. college campuses, Commission staff came across numerous examples of social media campaigns. University's used graphics electronically in Twitter feeds and Instagram accounts as well as on small give-away items such as plastic cups and bracelets. The images below represent some of the marketing campaigns used by universities during outbreaks.

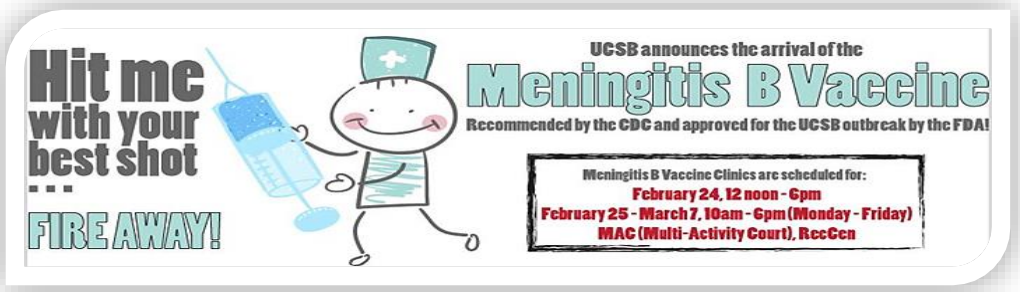
As Princeton's outbreak in 2013 was the first in the U.S. to utilize the unapproved MenB vaccine, Princeton was not allowed to compel anyone to get the vaccine, so its vaccination awareness and encouragement campaign was an important initiative. In the fall of 2013, Princeton distributed these cups reading, "Mine. Not yours." to bring awareness to the risk associated with sharing drinks during an outbreak and to encourage students to pursue healthy habits.[323]

Princeton's Student Health Advisory Board, comprised of students interested in medicine, created posters to promote the second dose clinics using humorous examples that illustrated why "half isn't enough."[324] Princeton's communications team found that the best place to hang posters was in dorm bathrooms on the inside of every stall. More content-heavy signs warned of the transmission and symptoms of MenB.[325]



[323] Jacqueline Wagner, "A University's Response to an Outbreak of Meningitis," Lecture, June 2014, accessed November 1, 2019, https://absaconference.org/wp-content/uploads/2014/06/II-3-J-Wagner-1010.pdf.
[324] *Ibid.*
[325] *Ibid.*

University of California Santa Barbara also was faced with the challenge of promoting a vaccination not approved for general use within the U.S. In its 2013 outbreak, UCSB promoted its vaccine clinics in February with this graphic on its graduate news website, "UCSB GradPost."[326]

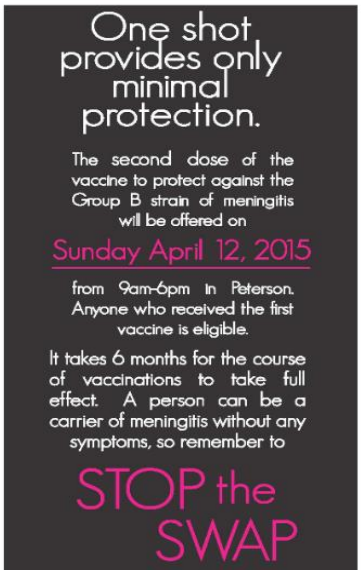


UCSB had also used UCSB GradPost to promote healthy habits to stop the spread of MenB in January.[327]

University of Oregon advertised its 2015 mass vaccination clinics by using images of student athletes with adhesive bandages to encourage other students to get vaccinated.[328] Another version of the poster with male athletes was also circulated.[329] These posters were placed in popular public places on campus.[330]

[326] Ryan Dippre, "Dates Announced for Meningitis B Vaccine Clinic," *UCSB GradPost*, February 6, 2014.
[327] "Meningococcal Disease Prevention and Response: Message from Dr. Mary Ferris," *UCSB GradPost*, January 9, 2014.
[328] Julie Brown, "Volunteers Needed for October Meningitis Vaccination Clinics," *Around the O*, September 14, 2015.
[329] Jeff Barnard, "Officials Urge Meningitis Shots at University of Oregon (Update)," *Medical Press*, March 19, 2015.
[330] Blair Capitano, Krista Dillon, Andre LeDuc, et al., "Experience Implementing a University-Based Mass Immunization Program in Response to a Meningococcal B Outbreak," *Human Vaccines and Immunotherapeutics* 15, no. 3 (2019): 717-724, doi: 10.1080/21645515.2018.1547606.

Students at Providence College in Rhode Island created the "Stop the Swap Campaign" for the 2015 outbreak to educate students on the transmission of MenB, with a variety of posters showing risky behaviors. The college also circulated this information through email.[331]



[331] Catherine M. Kelleher R.N. and Suzanne Bornschein M.D., "Stop the Swap!" Lecture, Providence College October 28, 2015, accessed November 1, 2019, https://www.nyscha.org/files/2015/handouts/WE-2.02%20-%20Stop%20the%20Swap.%20Group%20B%20Meningitis%20Response.pdf.

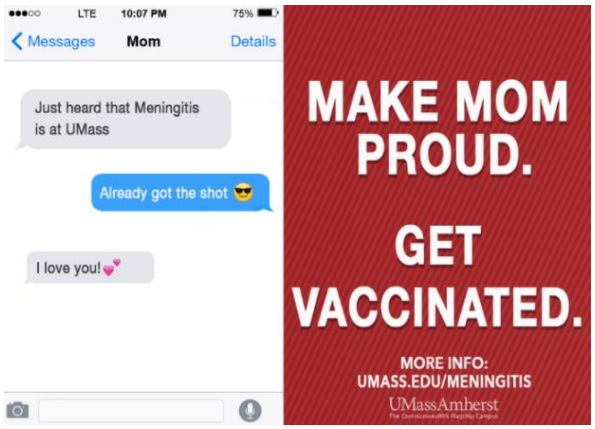
Santa Clara University in California handed out stickers during its 2016 mass vaccinations that featured the university's mascot Bucky the Bronco, saying "Buck Up! I Got the Shot!"[332] Other social media promotion strategies included creating a cardboard frame to pose with sporting the same caption. The student newspaper noted that the silliness of the stickers and the photo ops dispelled the heavy and scary atmosphere of the outbreak and mass vaccination events.[333]

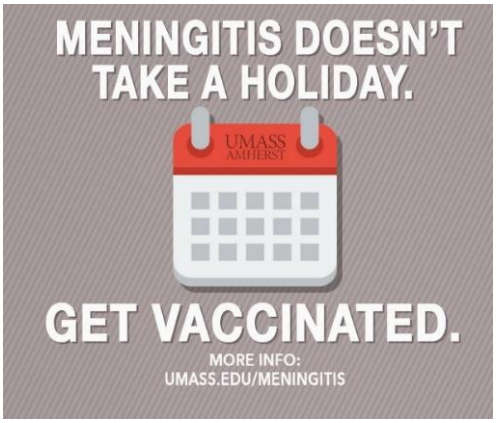
Rutgers in New Jersey tweeted this graphic during its 2016 outbreak from the Rutgers Student Affairs Twitter Account. It features the Rutgers mascot, Henry the Scarlet Knight, encouraging students to get vaccinated. The Rutgers Student Affairs account currently has 4,414 followers, so the tweet reached a large audience, though digital interaction was low. The tweet garnered only twelve likes and twelve retweets, which is not unexpected due to the way college students interact with digital content from university pages.[334]

The University of Wisconsin-Madison used social media in 2016 along with conventional messaging to promote mass vaccinations to its students. A Snapchat filter was created and the university's Instagram page advertised the success of the vaccination events. Informational cards and bookmarks were distributed and students were given stickers after receiving the vaccine.[335]

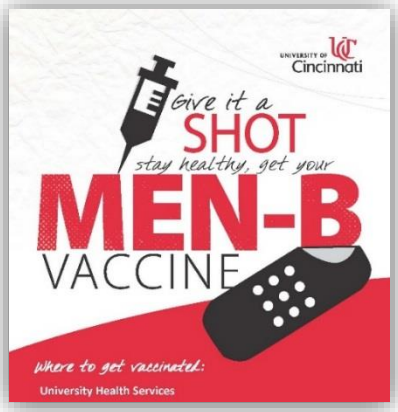
[332] "Meningitis Vaccination Information for SCU Campus," Santa Clara University, last modified February 3, 2016, accessed November 1, 2019, https://www.scu.edu/news-and-events/feature-stories/2016/stories/meningitis-vaccination-information-for-scu-campus.html.
[333] Sophie Mattson, "Nearly One-Half of Student Population Receives Meningitis Vaccine," *The Santa Clara*, February 5, 2016.
[334] Rutgers Student Affairs, Twitter post, June 29, 2016, 11:00 AM, https://twitter.com/RutgersSA/status/748214601892904960.
[335] Susann Ahrabi-Fard, M.S., "A Serogroup B Meningococcal Disease Outbreak on a Wisconsin University Campus and the Mass Vaccine Campaign Response," Lecture, Council of State and Territorial Epidemiologists, Vaccine Preventable Diseases Subcommittee Meeting, February 28, 2017.

The University of Massachusetts at Amherst Twitter account, which has 15,400 followers, tweeted the above graphics in December 2017 to promote vaccination events, however, it garnered little digital interaction.[336] The "Make Mom Proud" post on Facebook in December of 2017 received positive attention from mothers tagging their children in the comments and encouraging them to get vaccinated.[337]





The University of Cincinnati had no outbreak on campus. However, in response to a few cases in the community created this graphic and posted it on its website to encourage voluntary vaccinations at the University Health Services Offices.[338]



[336] UMass Amherst, Twitter post, October 12, 2018, 6:00 AM, https://twitter.com/umassamherst/status/1050732826629296128; UMass Amherst, Twitter post, December 3, 2017, 6:38 PM, https://twitter.com/umassamherst/status/937511277978533888.
[337] UMass Amherst, Facebook post, December 1, 2017, https://www.facebook.com/UMassAmherst/posts/walk-in-meningitis-b-vaccination-clinics-continue-in-the-student-union-today-fro/10155096782668671/.
[338] "Meningococcal B Disease," Department of University Health Services, accessed November 1, 2019, https://www.med.uc.edu/uhs/resources/meningococcal-b-disease.

CONCLUSION

While meningococcal meningitis outbreaks appear to be rare in the U.S. when compared to the global community, the well-documented string of meningitis outbreaks that have been occurring within colleges and universities across the country for over two decades cannot be ignored. Consequently, the attendant effects of meningitis are becoming a grave concern to those residing on college campuses who face increased risk of contracting the disease, especially as these outbreaks continue to crop up across college campus settings.

Current Pennsylvania law addresses the importance of meningitis immunization on college campuses to the extent that it requires all of its institutions of higher education to prohibit students from residing on campus unless they receive a one-time vaccination against meningococcal meningitis. As this report's data show, many universities seek compliance with the law's requirement. However, the same data reveal that compliance across the board is far from complete. More can be done to improve compliance and to further safeguard the Commonwealth's postsecondary campus student populations from meningococcal meningitis outbreaks and their occasional deadly outcomes.

Pennsylvania can ultimately learn how to achieve higher immunization rates, as well as efficient outbreak response measures by reviewing the successes and failures born out in college outbreaks nationwide, as summarized within this report. The Commonwealth can also learn from the report's extensive review of current CDC and ACIP guidelines, as well as the emerging legislative efforts of other states to minimize the risks of meningitis outbreaks among their own colleges and universities. Some of these efforts necessarily include educating students and their parents on the importance of immunization, improving immunization record keeping and verification, state-level review and coordination with CDC and ACIP recommendations, and improved outbreak response measures on college campuses. All of these efforts and the resources suggesting them are discussed within this report.

While there are numerous ways the Commonwealth can improve its meningococcal meningitis immunization and outbreak response measures, it is important to note that, as of right now, there is no one-size-fits-all solution.

RECOMMENDATIONS

Recommendation: ACIP meningococcal vaccination recommendations have changed since the General Assembly enacted the College and University Student Vaccination Act in 2002. The Commission recommends that the statute be amended so that Pennsylvania's Secretary of Health can update vaccination recommendations based on the guidelines of the ACIP. This will clarify vaccination requirements now and ensure that they remain relevant in the future. The draft amendment can be found in the appendix. (p. 121)

Recommendation: The Department of Health should provide Pennsylvania IHEs with online education packets about vaccinations that the IHEs can post to their web pages as student and parent resources. The packets should include clear information and guidelines from the CDC about MenACWY and MenB.

Recommendation: The Department of Health should assist Pennsylvania IHEs' outbreak responses by providing a model database for tracking student vaccinations that are administered during an outbreak. Both Rhode Island and Massachusetts Departments of Health used databases to track MenB vaccinations during college outbreaks.

Recommendation: The Department of Health and the Pennsylvania Emergency Management Agency should develop a tabletop exercise for Pennsylvania IHEs to use when creating their response plans for infectious disease outbreaks such as meningitis. Tabletop exercises are credited with helping the University of California at Santa Clara's rapid response to a MenB outbreak.

Recommendation: Efforts should be made to increase the response rate on the PA Department of Health's survey of the vaccination status of college students in the Commonwealth. The Department should shift from a paper-based instrument to an electronic survey and include several waves of departmental staff follow-ups to increase response rates. Alternatively, IHEs could be statutorily required to submit vaccination and waiver data to the Department annually. Section 3 of the amendment in the appendix contains a draft of this language. (p. 122)

Recommendation: Pennsylvania IHEs outbreak response plans should include best practices that were shown to be effective in other states or for other situations. Some IHEs have relied on processes developed and used for flu vaccination clinics and other Point of Dispensing plans. Strong communications with all stakeholder groups that are developed prior to an outbreak were mentioned multiple times. Pennsylvania IHEs should create and regularly update infectious disease response plans that create lines of communication between local, state, and federal public health authorities, plans to inform their college and local communities, and plans to organize mass vaccinations. Student buy-in and contributions to communication campaigns were acknowledged as improving outcomes. Institutions report successful mass vaccination campaigns when clinics are held on-campus and ownership of the clinics remains with the university.

APPENDICES

PRIOR PRINTER'S NO. 1615 PRINTER'S NO. 2023

THE GENERAL ASSEMBLY OF PENNSYLVANIA

SENATE RESOLUTION

No. 292 Session of 2018

INTRODUCED BY WHITE, EICHELBERGER, RAFFERTY, MENSCH, DINNIMAN, McILHINNEY AND ALLOWAY, MARCH 28, 2018

SENATOR EICHELBERGER, EDUCATION, AS AMENDED, SEPTEMBER 25, 2018

A RESOLUTION

Directing the Joint State Government Commission to study the issue of immunization policies for students residing at institutions of higher education, conduct a comprehensive analysis of compliance with existing immunization requirements, examine the need for updating immunization policies, suggest options for enhancing voluntary immunization rates for students and report its findings and recommendations to the Senate.

WHEREAS, This Commonwealth is home to some of the finest higher education institutions in the world; and

WHEREAS, Each year thousands of individuals matriculate at colleges and universities throughout this Commonwealth to pursue a degree to prepare them for a future career; and

WHEREAS, Many individuals who enroll in an institution of higher education will face numerous academic and nonacademic adversities associated with obtaining a college, graduate or professional degree; and

WHEREAS, The College and University Student Vaccination Act requires students residing in housing at institutions of higher education to receive a one-time vaccination against meningococcal meningitis disease unless the student seeks an

exception to the requirement; and

WHEREAS, The Advisory Committee on Immunization Practices within the Centers for Disease and Control Prevention has revised its guidelines on meningococcal meningitis vaccine recommendations since the enactment of the College and University Student Vaccination Act; and

WHEREAS, The Senate recognizes the seriousness of a meningococcal meningitis disease outbreak at colleges and universities throughout this Commonwealth and wants to study the issue; therefore be it

RESOLVED, That the Joint State Government Commission conduct a comprehensive analysis to evaluate the compliance of each institution of higher education throughout this Commonwealth with the College and University Student Vaccination Act; and be it further

RESOLVED, That the Joint State Government Commission determine and report the vaccination rates for meningitis ACWY AND MENINGITIS B by each institution of higher education; and be <-- it further

RESOLVED, That the Joint State Government Commission determine if institutions of higher education throughout this Commonwealth are advising and monitoring the need for a catch-up dose of the meningitis ACWY or meningitis B vaccination OR DOSES <-- OF BOTH; and be it further

RESOLVED, That the Joint State Government Commission examine meningitis breakouts at institutions of higher education throughout the United States and report the fiscal impact of outbreaks on institutions of higher education; and be it further

RESOLVED, That the Joint State Government Commission evaluate potential measures to ensure higher voluntary immunization rates

for meningitis ACWY and meningitis B; and be it further

RESOLVED, That the Joint State Government Commission report its findings and recommendations to the Senate within 18 months of the adoption of this resolution.

PIHE "Unknown" MenACWY VACCINATION RATES

Pennsylvania Institutions of Higher Education "Unknown" MenACWY Vaccination Rates 2018-2019 School Year	
Name of Institution	
Bloomsburg University	Mount Aloysius College
California University of PA	Pittsburgh Technical College
California University of PA	Point Park University
Carnegie Mellon University	Redformed Episcopal Seminary
Cedar Crest College	Rosemont College
Central Penn College	Saint Joseph's University
Cheyney University	Slippery Rock University
Clarion University of PA	Seton Hill University
Clarks Summit University	Shippensburg University
East Stroudsburg University	St. Tikhon's Orthodox Theological Seminary
Edinboro University	Thaddeus Stevens College of Technology
Harcum College	United Lutheran Seminary
Immaculata University	University of Pittsburgh at Bradford
Indiana University of Pennsylvania	University of Pittsburgh at Johnstown
Kutztown University	University of Pittsburgh at Titusville
Lancaster Bible College	University of Valley Forge
Lancaster Theological Seminary	Ursinus College
Lebanon Valley College	Villanova University
Lock Haven University	Washington & Jefferson College
Lycoming College	West Chester University
Mansfield University	Wilson College
--	York College of Pennsylvania

PIHE "Unknown" MenB
VACCINATION RATES

Pennsylvania Institutions of Higher Education "Unknown" MenB Vaccination Rates 2018-2019 School Year	
Name of Institution	
Alleghney College	Lebanon Valley College
Alvernia University	Lincoln University-PA
Arcadia University	Lock Haven University
Bloomsburg University	Lycoming College
Cabrini University	Manor College
Cairn University	Mansfield University
California University of PA	Marywood University
Cedar Crest College	Mercyhurst University
Central Penn College	Messiah College
Chatham University	Misericordia University
Cheyney University	Moravian College
Clarion University of PA	Mount Aloysius College
Clarks Summit University	Muhlenberg College
Curtis Institute of Music	Northampton Community College
DeSales University	Pennsylvania College of Technology
Dickinson College	Pittsburgh Technical College
Drexel University	Point Park University
Duquesne University of the Holy Spirit	Redformed Episcopal Seminary
East Stroudsburg University	Robert Morris University
Eastern University	Rosemont College
Edinboro University	Saint Charles Borromeo Seminary
Franklin and Marshall College	Saint Francis University
Grove City College	Saint Joseph's University
Harcum College	Seton Hill University
Holy Family University	Shippensburg University
Immaculata University	Slippery Rock University
Indiana University of Pennsylvania	St Vincent college

Pennsylvania Institutions of Higher Education "Unknown" MenB Vaccination Rates 2018-2019 School Year	
Name of Institution	
Jefferson University East Falls	St. Tikhon's Orthodox Theological Seminary
Juniata College	Swarthmore College
Keystone College	Temple University
King's College	Thaddeus Stevens College of Technology
Kutztown University	The Pennsylvania State University
La Salle University	United Lutheran Seminary
Lancaster Bible College	University of Pittsburgh
Lancaster Theological Seminary	University of Pittsburgh at Bradford
Thaddeus Stevens College of Technology	Ursinus College
The Pennsylvania State University	Valley Forge Military College
United Lutheran Seminary	Villanova University
University of Pittsburgh	Washington & Jefferson College
University of Pittsburgh at Bradford	Waynesburg University
University of Pittsburgh at Johnstown	West Chester University
University of Pittsburgh at Titusville	Westminster College
University of the Arts	Widener University
University of Valley Forge	Wilson College
University PITT at Greensburg	York College of Pennsylvania

DRAFT AMENDMENT TO THE COLLEGE AND UNIVERSITY STUDENT VACCINATION ACT

AN ACT

Amending the act of June 28, 2002 (P.L.494, No.83), known as the College and University Student Vaccination Act, further providing for immunizations against meningococcal disease.

The General Assembly of the Commonwealth of Pennsylvania hereby enacts as follows:

Section 1. Section 1 of the act of June 28, 2002 (P.L.494, No.83), known as the College and University Student Vaccination Act is amended to read as follows:

Section 1. Definitions.

The following words and phrases when used in this act shall have the meanings given to them in this section unless the context clearly indicates otherwise:

* * *

"Institution of higher education." An independent institution of higher education, a community college, a State-owned institution or a State-related institution, any of which is approved by the Department of Education.

* * *

<u>"Meningococcal disease." Any illness caused by the bacteria *Neisseria meningitidis*, also known as meningococcus.</u>

* * *

Section 2. Section 3 of the act of June 28, 2002 (P.L.494, No.83), known as the College and University Student Vaccination Act is amended to read as follows:

Section 3. Vaccination requirement.

(a) General rule.—Except as provided in subsection (b), an institution of higher education shall prohibit a student from residing in a dormitory or housing unit unless the student has received [a one-time vaccination against meningococcal disease. If the student is a minor, the vaccination may only be administered with the consent of the student's parent or guardian] vaccination for meningococcal disease as directed by the Pennsylvania Secretary of Health. The Secretary shall determine the number and timing of vaccine doses by regulation, in a manner that reviews and considers the most recent recommendations of the Advisory Committee on Immunization Practices of the United States Centers for Disease Control and Prevention.

(a.1). Dissemination of information.—Each institution of higher education shall:

(1) Provide, at the time of enrollment, information on the risk associated with meningococcal disease to each enrolled student who is at least 18 years of age, and the parent or guardian of each enrolled student who is a minor.

(2) For each student who resides in a dormitory or housing unit, require a written affirmation of receipt of the information under paragraph (1) from each student who is at least 18 years of age, and the parent or guardian of each student who is a minor.

* * *

Section 3. The act of June 28, 2002 (P.L.494, No.83), known as the College and University Student Vaccination Act is amended by adding a section to read as follows:

Section 3.1. Reporting.

(a) Annual report.--By October 31 of each year, each institution of higher education shall provide a report to the Pennsylvania Department of Health on forms provided by the department

that contains the total number of students who reside in a dormitory or housing unit and who have enrolled in the previous 12-month period, and the total number of those students who submitted:

(1) written proof of vaccination for meningococcal disease; or

(2) a written waiver of vaccination under Section 3(b).

(b) Method of reporting.—Reports may be submitted on written forms or via electronic means on the Department of Health's website.

Section 4. This act shall take effect on the first day of the fall term of any institution of higher education that occurs after this act is approved.

OTHER STATES STATUTE REGULATION OR CODE

OTHER STATE STATUES
March 2020

State	Do they have a statute, regulation or code on Meningococcal vaccination?	Will the IHE be penalized for violating the MenVax requirement?	Do they have a statute on Meningococcal education?	Are IHEs annually required to report MenVax rates back to the states' Health Department?	Are student exemptions limited to Religious or Medical reasons only?	Can students sign a waiver in lieu of vaccination?	Year of Enactment or Year Most Recently Amended	Citation
Alabama	no	--	no	--	no	no	--	--
Alaska	no	--	yes	no	no	yes	July 2017	AS § 14.48.165
Arizona	no	--	no	--	no	no		
Arkansas	no	--	yes	no	no	no	July 2019	A.C.A § 6-61-123
California	no	--	yes	no	no	yes	October 2001	CA Hlth & SD. 105, Pt. 2, Ch. 1.1, § 120381
Colorado	no	--	yes	no	no	yes	August 2004	C.R.S.A. § 23-5-128
Connecticut	yes	no	yes	no	yes	yes	January 2015	C.G.S.A. § 10a-155b
Delaware	yes	no	yes	no	no	yes	January 2017	16 Del.C. § 509
Dist of Columbia	yes	no	yes	no	no	yes	May 2008	D.C. Mun. Regs. Sub. 22-B, § 153
Florida	yes	no	yes	no	no	yes	January 2003	FL ST § 1006.69
Georgia	yes	no	yes	no	no	yes	July 2015	Ga. Code Ann., § 31-12-3.2
Hawaii	yes	yes	no	yes	yes	yes	August 2019	HAR, Title 11, Chap. 11-157 §11-157-3
Idaho	no	--	yes	no	no	no	2004	I.C.A. § 139A.26
Illinois	no	--	yes	--	no	no	January 2002	110 ILCS 520/11 *
Indiana	yes	yes	no	yes	yes	yes	July 2017	IC 21-40-5-2
Iowa	no	--	yes	yes	no	yes	January 2004	I.C.A. § 139A.26
Kansas	yes	no	no	no	no	yes	July 2007	K.S.A. 76-761a
Kentucky	no	--	yes	no	no	no	July 2004	KRS § 164.2867
Louisiana	yes	no	yes	no	yes	yes	August 2008	LSA-R.S. 17:170.1
Maine	no	--	yes	no	no	no	June 2008	20-A M.R.S.A. § 10008
Maryland	yes	no	yes	no	no	yes	April 2002	MD Code, Health - General, § 18-102
Massachusetts	yes	no	yes	no	yes	yes	July 2008	M.G.L.A. 111 § 219
Michigan	no	--	yes	--	no	no	October 2017	M.C.L.A. 388.1875c
Minnesota	no	--	yes	--	no	no	May 2015	MSA § 135A.14, Subd. 6a
Mississippi	no	--	no	--	no	no	--	--
Missouri	yes	no	no	no	yes	yes	October 2016	V.A.M.S. 174.335
Montana	no	--	no	--	no	no	--	--
Nebraska	no	--	yes	no	no	yes	2003	Neb.Rev.St. § 85-902
Nevada	yes	no	no	no	no	yes	February 2020	NAC 441A.755
New Hampshire	no	--	no	--	no	no	--	--
New Jersey	no	--	yes	no	yes	yes	January 2004	N.J.S.A. 18A:61D-7
New Mexico	no	--	no	--	no	no	--	--
New York	no	--	yes	no	no	yes	August 2003	NY PUB HEALTH § 2167
North Carolina	no	--	yes	no	no	yes	June 2003	N.C.G.S.A. § 116-260
North Dakota	yes	no	yes	no	no	no	November 2016	NDSBHE Policy No. 506.1(2)
Ohio	no	--	yes	no	no	yes	July 2004	R.C. § 1713.55

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Oklahoma	no	--	yes	no	no	yes	November 2003	70 Okl.St.Ann. § 3243
Oregon	no	--	no	--	no	no	--	--
Pennsylvania	yes	no	no	no	no	yes	August 2002	35 P.S. § 633.1 et seq.
Rhode Island	yes	no	no	yes	yes	yes	September 1979	R.I. R23-1-IMM/COL, 3.3.5
South Carolina	no	--	yes	no	no	no	2002	Code 1976 § 59-101-290
South Dakota	no	--	no	--	no	no	--	--
Tennessee	yes	no	no	no	yes	yes	April 2017	T. C. A. § 49-7-124
Texas	yes	no	yes	yes	yes	yes	May 2001	V.T.C.A., Education Code § 51.9191-2.
Utah	no	--	no	--	no	no	--	--
Vermont	yes	yes	no	yes	yes	yes	July 2017	18 V.S.A. § 1123; VT Reg. 7.4.3.
Virginia	no	no	yes	no	no	yes	October 2016	VA Code Ann. § 23.1-800
Washington	no	--	yes	no	no	no	July 2004	RCWA 70.54.370
West Virginia	no	--	yes	no	no	no	July 2017	W. Va. Code, § 18B-1B-4
Wisconsin	yes	no	yes	no	no	yes	February 2020	W.S.A. 252.09
Wyoming	no	--	no	--	no	no	--	--

* Ill. Rev. Stat. ch. 110 § 305/21, 520/11, 660/5-115, 665/10-115, 670/15-115, 675/20-120, 680/25-115, 685/30-125, 690/35-120 (2001) r
Illinois has multiple meningitis statutes for specific universities.

Information prepared by JSGC Staff March 2020