Delaware LabOrator

Published by the Delaware Public Health Laboratory

2016-2017 Influenza Season more intense than past 12

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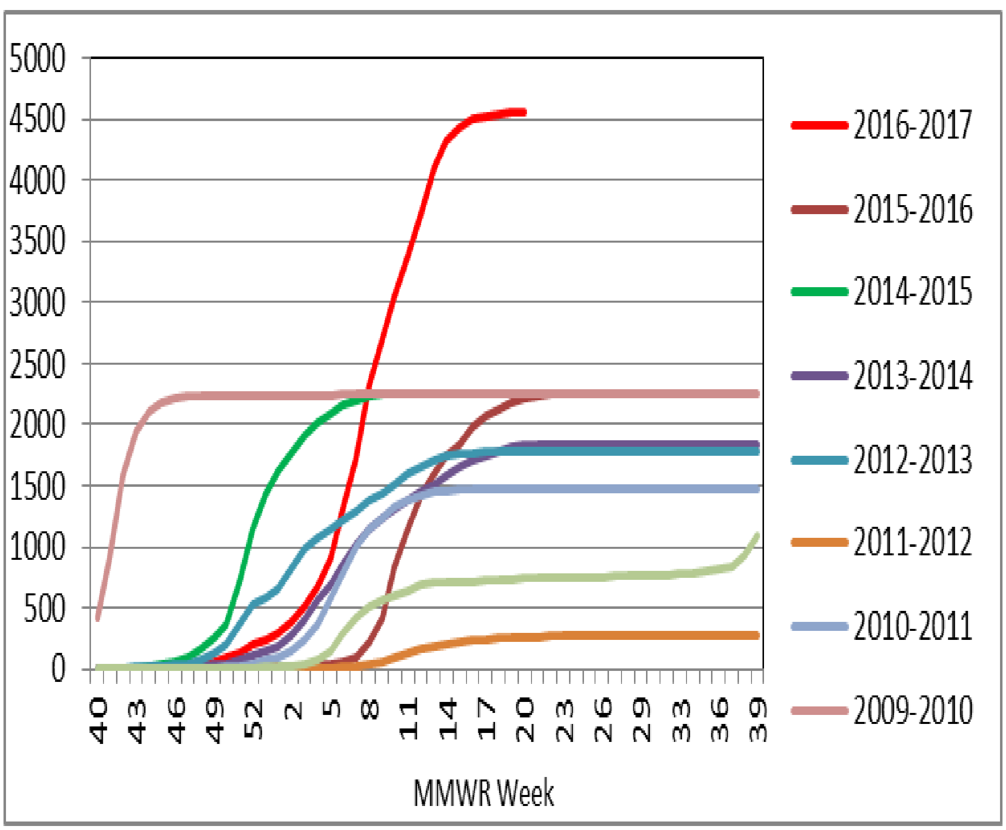
The 2016-2017 influenza season was more intense than the past 12 seasons, bringing 4,554 confirmed cases of the flu to Delaware. The next highest season occurred in 2014-2015 with 2,390 cases; then in 2015-2016 with 2,251 cases; and lastly in 2009-2010 with 2,247 cases.

The high number of cases reflects what happened across the United States, as well as a greater number of laboratories reporting confirmatory test results.

During Delaware's 2016-2017 season, there were 15 flu-related deaths, compared to six during the 2015-2016 season and 28 in the 2014-2015 season.

Cumulative Number of Influenza Cases by MMWR Week and Season, Delaware, 2009-2010 to 2016-2017



Source: Delaware Electronic Reporting and Surveillance System (DERSS)

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DELAWARE HEALTH AND SOCIAL SERVICES
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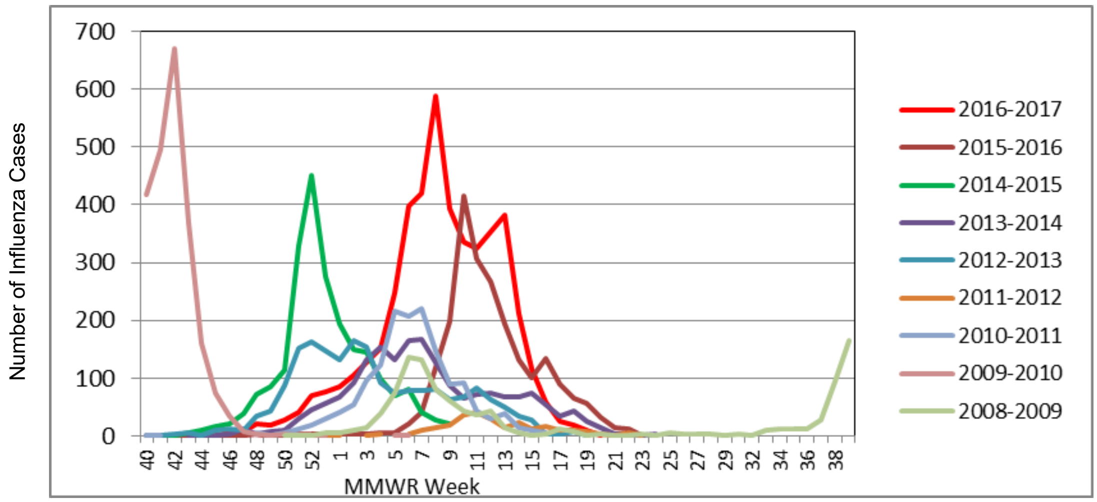
Summary of 2016-2017 Influenza Season from page 1

The 2016-2017 season peaked at MMWR Week 8 with 587 confirmed influenza cases. The 2016-2017 peak occurred two weeks earlier than the 2015-2016 season and eight weeks later than the 2014-2015 season.

Number of Influenza Cases by MMWR Week and Season, Delaware, 2008-2009 — 2016-2017



Source: Delaware Electronic Reporting and Surveillance System (DERSS)

Nearly half of the cases were identified in New Castle County (2,177 or 47.8 percent), with 1,379 from Kent County (30.3 percent) and 998 from Sussex County (21.9 percent). Incidence rates by population show that Kent County had the highest incidence rate at 7.8 cases per 1,000 population, followed by Sussex County at 4.5 per 1,000 population, and New Castle County at 3.9 per 1,000 population.

Numbers of Influenza Cases and Incidence Rates per 1,000 population, by Delaware County, 2016-2017

	Confirmed Influenza Cases		Incidence Rate / 1,000 Population	Population Estimates*
	Number	Percent		
New Castle	2,177	47.8%	3.9	563,423
Kent	1,379	30.3%	7.8	176,650
Sussex	998	21.9%	4.5	221,611
Delaware	**4,554**	**100%**	**4.7**	**961,684**

* - Delaware Population Consortium Annual Population Projections, 10/27/2016

Source: DERSS and DE population consortium

Twenty-one percent (777) of cases of influenza required hospitalization during the 2016-2017 season. Even though the 5-to-24-year-old age group presented the greatest proportion of cases (36.6 percent), those age 65 or older required the most hospitalizations (58.3 percent) in the same time span.

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Summary of 2016-2017 Influenza Season from page 2

Age Distribution of Confirmed Hospitalized Influenza Cases, Delaware, 2016-2017 Season

Age Group	Confirmed Influenza Cases		Hospitalized Influenza Cases	
	Number	Percent	Number	Percent
0 - 4	816	17.9%	38	4.9%
5 - 24	1669	36.6%	68	8.8%
25 - 49	742	16.3%	73	9.4%
50 - 64	539	11.8%	145	18.7%
65+	788	17.3%	453	58.3%
Total	**4,554**		**777**	

Source: DERSS and Delaware Health Information Network (DHIN)

Over the entire 2016-2017 season, 3,210 (70.5 percent) involved Influenza A and 1,341 (29.4 percent) involved Influenza B. Three cases were co-infected with A and B. The majority of Influenza A cases were non-subtyped (2,470 or 76.9 percent); 733 were H3N2 (22.8 percent); and seven were H1N1 (0.2 percent). Most of the influenza B cases did not have lineage (1,196 or 89.1 percent); 123 (9.2 percent) were Yamagata and 23 (1.7 percent) were Victoria lineage.

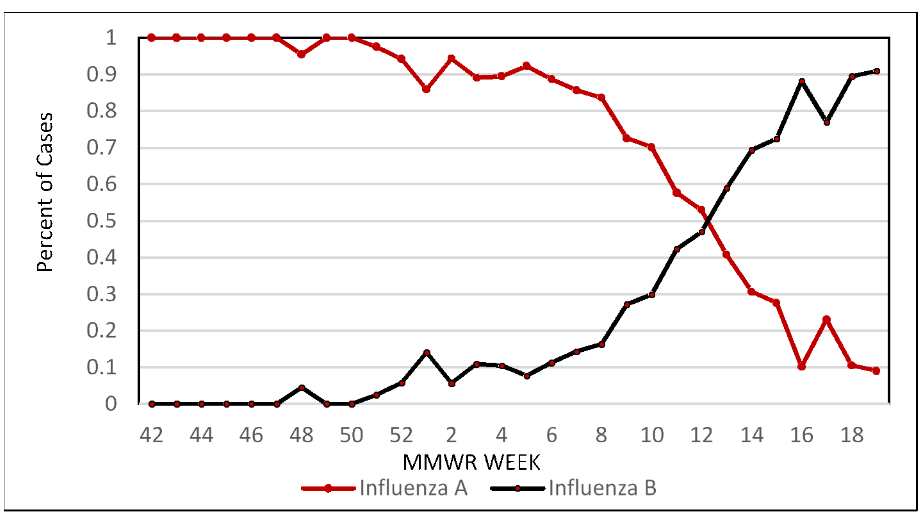
Distribution of Influenza Cases by Subtype (Influenza A) and Lineage (Influenza B), Delaware, 2016-2017 Season

Influenza A			Influenza B		
Subtype	**Number**	**Percent**	**Lineage**	**Number**	**Percent**
H1N1 (Swine)	7	0.2%	Yamagata	123	9.2%
H3N2	733	22.8%	Victoria	23	1.7%
no subtype	2,470	76.9%	no lineage	1,195	89.1%
	3,210			**1,341**	

Source: DERSS

As observed in previous seasons, as the 2016-2017 season progressed, Influenza B became the predominant etiologic agent.

Changes in Distribution of Influenza A and Influenza B Cases by MMWR Week, Delaware, 2016-2017 Season



Source: Delaware Electronic Reporting and Surveillance System (DERSS)

Which Came First, the Mosquito or the Arbovirus?

by Emily Hanlin, B.S., Laboratory Manager, Delaware Public Health Laboratory

With the onset of West Nile Virus (WNV) in New York City in 1999, Congress disseminated funds for Arbovirus surveillance through the Centers for Disease Control (CDC), Epidemiology and Laboratory Capacity (ELC) Grant. Arboviruses are a group of viruses that include African swine fever virus; dengue virus; Japanese Encephalitis Virus; Rift Valley Fever Virus; Tick-Borne Encephalitis Virus; West Nile Virus (WNV); Yellow Fever Virus; Zika Virus; and Chikungunya Virus (CHIKV). State public health labs received these funds, which supported laboratory testing and, during early 2000, the creation of ArboNET, a nationwide system for reporting arbovirus test results (Hadler, J 2015).

Once funded, the Delaware Public Health Laboratory (DPHL) began to test mosquitoes for WNV. Over time, the Laboratory expanded from just WNV testing to also include Saint Louis Encephalitis (SLE), Dengue Virus, Chikungunya Virus (CHIKV), and Zika virus in humans. Animal testing was also expanded to include Eastern Equine Encephalitis (EEE) in horses, expired birds, and sentinel chickens.

As happens with many emerging infectious diseases, the level of interest and funding for arbovirus surveillance flourished and waned over time until Zika virus with its risk of congenital birth defects (microcephaly) appeared. Its appearance raised many significant questions among the public health community professionals. Had arbovirus surveillance been sufficient? Could new and emerging arboviral infections be detected early enough to allow for preventive measures? With the risk of microcephaly and other birth defects, Zika presented an important public health challenge that, not surprisingly, resulted in increased Federal funding to states.

It was known that Zika virus could be transmitted by the *Aedes aegypti* (a.k.a. yellow fever mosquito). Delaware does not have an active population of *Aedes aegypti* mosquitoes. However, Delaware has a second type of mosquito that can be a competent vector for Zika - *Aedes albopictus* (a.k.a. Asian tiger mosquito) (CDC, 2017).

Experts from the Delaware Department of Natural Resources and Environmental Control (DNREC), Division of Fish and Wildlife Mosquito Control Section approached DPHL and recommended that Zika funding be used to test mosquito pools for WNV and for Zika virus. Historically, five years prior, testing for WNV in mosquito pools had been suspended due to funding cuts. The Molecular Virology lab, which had always been receptive to new challenges, agreed to do this work. In the second week of July 2017, the laboratory began testing up to 50 *Aedes albopictus* mosquito pools with 50 mosquitoes in each pool. Part of the work involved DNREC interns who did speciation and grouping of mosquitos into "pools" that were submitted to the DPHL for testing. On receiving these pools, the DPHL personnel first rehydrated the mosquitos in buffer solution and then broke them up into smaller fragments. The buffered mosquito solution was then used to extract any viral nucleic acid for testing by real-time Reverse Transcriptase Polymerase Chain Reaction.

Currently, mosquito surveillance is done through the summer months into late fall. More recently, DNREC has focused mosquito collection efforts on geographic areas identified as having high mosquito populations and on areas that have prolonged standing pooled water (tire yards, irregular surface areas, junk containers, etc.).

To date, no mosquito pool has been found to be positive for WNV or for Zika virus. Still, testing continues to ensure that the health and well-being of all Delawareans is protected. Continuing to maintain laboratory expertise, equipment, and methodologies allows for early detection of arboviral events and more timely preventive actions.

With global travel and worldwide distribution of arboviruses, it is still plausible that these types of viruses might find their way to Delaware. Should this happen, DPHL will be ready to perform testing.

References:

Hadler, J, et al. Assessment of Arbovirus Surveillance 13 years after Introduction of West Nile Virus, United States. Retrieved from: https://wwwnc.cdc.gov/eid/article/21/7/14-0858 August 22, 2017

Centers for Disease Control and Prevention. Retrieved from: https://www.cdc.gov/zika/transmission/index.html August 22, 2017

Carbapenemase Producing Organism Testing Update for August 2017

by Debra Rutledge, MT (ASCP), MBA, Infectious Disease Laboratory Manager II

In August 2016, the Centers for Disease Control and Prevention (CDC) provided funding to all 50 states and six cities, as part of the Antibiotic Resistance Laboratory Network (ARLN), to develop the capability to detect Carbapenemase Producing Organisms (CPO). CPOs are particularly dangerous since they can inactivate a wide range of antibiotics.

Part of the funding was used to help seven designated regional laboratories develop the capability to test for antibiotic resistance in organisms that are beyond those that produce carbapenemase. Among these organisms are *Neisseria gonorrhoeae* (Gonorrhea), Resistant *Streptococcus pneumoniae*, Resistant Candida, and *Clostridium difficile*.

Delaware is part of CDC's mid-Atlantic regional network states along with Maryland, Pennsylvania, Virginia, Washington, D.C., and West Virginia. The Maryland Department of Health and Mental Hygiene Laboratory is the reference laboratory for the region. Beyond the regional lab, Delaware was the first state in the Mid-Atlantic region to successfully implement CPO testing. The only other state in the region to do so is Maryland.

In April 2017, the Delaware Public Health Laboratory (DPHL) made CPO testing a routine practice. DPHL has tested 130 isolates submitted by sentinel laboratories around the state. Eighteen of these proved to harbor *Klebsiella pneumoniae* with the carbapenemase (KPC) resistance mechanism. One of these had the mechanisms to produce New Delhi Metallo beta-lactamase (NDM), an enzyme that makes bacteria resistant to a broad range of beta-lactam antibiotics such as Amoxicillin, Imipenem, Ampicillin, Ceftazidime, Piperacillin, and Ceftolozane, among others, which are the mainstay for treating antibiotic-resistant bacterial infections.

One of the organisms found with KPC resistance was a rare form of *Pseudomonas aeruginosa* that was isolated from the urine of a patient residing in a long-term care facility. According to the CDC, this was the fifth occurrence of this organism in a patient in the United States. Because this is an infectious agent, a contact colonization study was conducted to check people who are close to the patient. None were positive.

Organisms that have the mechanisms for producing carbapenemases are a concern among public health officials and among infection control experts because the mechanism for producing carbapenemases can be transferred among bacteria and among patients through direct contact. Anyone who is infected with this type of organism should be placed in strict contact isolation, particularly if hospitalized or in a health care facility.

DPHL has already begun to work closely with the national reference laboratories. If necessary, DPHL will be able to send specimens obtained from patients in Delaware to the reference labs for multiple resistance marker testing. This includes Colistin resistance (mcr1 & mcr2) and Metallo Beta-lactamase (*bla*IMP gene).

DPHL would like to thank the sentinel laboratories that participated in this new grant initiative. Without their help, DPHL would not have been able to do this work.

New analytical testing added in the Drinking Water Laboratory

by Clover Carlisle B. A., MLT (ASCP), Environmental Laboratory Manager

The Delaware Public Health Laboratory (DPHL) strives to provide testing that helps keep drinking water safe. To reduce costs, personnel from the Public Health Environmental Laboratory embarked on implementing testing methods that could limit the amount of outsourcing done by the DPHL. This entailed developing test methods that could be done in-house, in compliance with federal standards, and that expanded drinking water testing capabilities while reducing costs and shortening turnaround times.

In January 2016, a decision was made to implement the test for Haloacetic acids (HHA5). Actions followed to do extensive work in establishing the precision, accuracy, and repeatability of the in-house test protocol, then to go through the in-house testing process, and then to become certified by the U.S. Environmental Protection Agency (EPA).

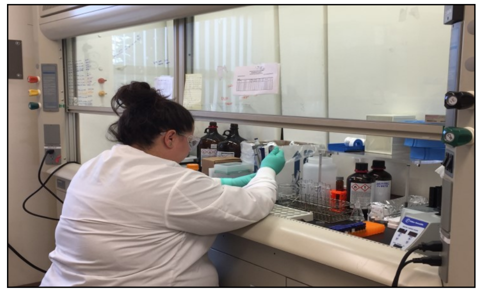
By July 2017, after significant work by Katia Vechorkina, the effort proved successful and the DPHL Environmental Laboratory Section received federal certification to test public waters for Haloacetic acids.

These acids are formed as a byproduct of the drinking water treatment plant disinfection process. They arise whenever naturally-occurring organic and inorganic materials in water react with disinfectants such as chlorine, chloramine, and bromine.

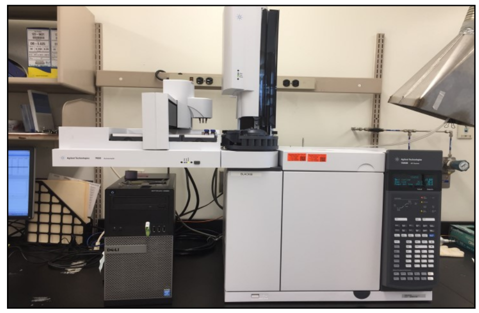
Five Haloacetic acids are regulated by the U.S. EPA:

1. Monobromoacetic acid (MBAA)
2. Monochloroacetic acid (MCAA)
3. Dibromoacetic acid (DBAA)
4. Dichloroacetic acid (DCAA) and
5. Trichloroacetic acid (TCAA)

Drinking water that contains Haloacetic acids has the potential to cause skin and eye irritation and, over time, increase the risk of cancer. For this reason, the EPA has set a standard for the sum of all five Haloacetic acids in drinking water to be no greater than 0.06 milligrams per liter.



Chemist Sandra Sewitsky extracting an HAA5 sample.



EC/GCD Instrumentation

In testing for these acids, the DPHL follows EPA method 552.2 – “*Determination of Haloacetic acids and Dalapon in Drinking Water by Liquid-Liquid Extraction, Derivatization and Gas Chromatography with Electron Capture Detection*.” The process involves first establishing whether HAA compounds are present in drinking water. If so, the samples are extracted with an organic solvent using a micro liquid-liquid extraction process that is derivatized (by application of heat and allowing for a reaction with acidic methanol) to the methyl ester forms. Once derivatized, they are separated and detected by using gas chromatography using an electron capture detector.

This effort demonstrates how the DPHL continues to provide Delaware residents with the most up-to-date drinking water tests implementing cost-saving, in-house testing methods.

The next endeavor for DPHL’s Environmental Section is to certify additional testing that covers herbicides, pesticides, and semi-volatile organic compounds.
Stay tuned!

For more information, visit the Office of Drinking Water website at http://www.dhss.delaware.gov/dph/hsp/odw.html and the Delaware Drinking Water Watch website at https://drinkingwater.dhss.delaware.gov/.

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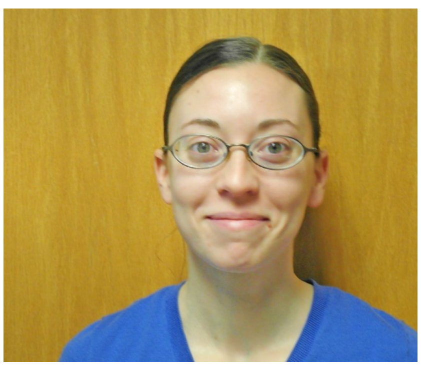
Employee News

Happy retirement, Susan!

Susan Dee, Microbiologist III with the Molecular Virology Section, retired on September 30 after 30 years with the Division of Public Health. Susan is looking forward to enjoying her retirement traveling and spending time with her children and grandchildren. While we can still see her working at Boscov's, we will miss her very much here at DPHL. Congratulations and good luck, Susan!

Good luck, Beth!



Elizabeth "Beth" Clifton, our Molecular Microbiologist, departed DPHL to work full-time at the medical marijuana compassion center in Wilmington. We wish her much luck and success in the future!

Welcome, Becca!

DPHL would like to welcome **Rebecca Savage** to the Molecular Virology Section. Rebecca is working on her Master's degree at the University of Delaware and received her bachelor's degree in pre-veterinary medicine at UD. She has experience as a research assistant and teacher. We look forward to working with her here at DPHL.