Master of Public Health

Integrative Learning Experience Report

Analysis of communicable disease reports and public education through COVID-19 contact tracing

by

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submitted in partial fulfillment of the requirements for the degree

MASTER OF PUBLIC HEALTH

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2021

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Summary/Abstract

This report summarizes the Integrated Learning Experience of a public health project completed at the Cincinnati Health Department in Cincinnati, Ohio. The public health project consisted of three main areas of work: 1) monthly reporting on reportable diseases, 2) annual reporting on the 2019-2020 influenza season, and 3) contact tracing as part of the COVID-19 public health response. Eight monthly communicable disease surveillance summary data reports representing June 2020 to February 2021 were created during the field experience. Major trends included steady increases in COVID-19 cases and dramatic decreases in influenza-associated hospitalizations. An annual report for the 2019-2020 influenza season was created as well. This report includes important demographic data and identifies possible targets for future public health interventions. Contact tracing efforts were performed through a total of 75 phone calls made to persons under investigation and close contacts. Observed obstacles to the COVID-19 public health response included community knowledge discrepancies and compassion fatigue among public health professionals.

Subject Keywords: Reportable, Surveillance, COVID-19, Influenza, Contact, Investigation

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Chapter 1 - Literature Review

Introduction

My Applied Practical Experience was completed with the Cincinnati Health Department in Cincinnati, Ohio. The Cincinnati Health Department, led by Health Commissioner Melba R. Moore and overseen by the Cincinnati Board of Health, works diligently to protect and improve the health of the people of Cincinnati. My work was overseen by supervising epidemiologist Maryse Amin, PhD, MS— who was promoted to Assistant Health Commissioner during the course of my project—and I had direct supervisors in each of my project areas. Dr. Amin has worked as a supervising epidemiologist at the Cincinnati Health Department for six years following her completion of a PhD in Epidemiology. My project consisted of three separate areas of work: 1) monthly reporting on reportable diseases, 2) annual reporting on the 2019-2020 influenza season, and 3) contact tracing as part of the COVID-19 public health response.

Cincinnati Demographics

The city of Cincinnati is located in southwestern Ohio along the Ohio River. After Columbus and Cleveland, Cincinnati has the third highest population in Ohio with an estimated 300,357 residents. Estimates report 155,531 females and 144,826 males living in Cincinnati. The total population is estimated to include 160,145 White residents, 136,592 Black residents, 7,819 Asian residents, and 2,626 American Indian or Alaskan Native residents. 289,296 residents identify as non-Hispanic and/or non-Latino, while 11,061 identify as Hispanic and/or Latino. The largest fraction of the population is made up of individuals in the 18-49 year age group with 146,540 residents, followed by the 50-64 year age group with 51,639 residents, the 5-17 year age group with 43,844 residents, the 65-plus year age group with 36,513 residents, and the 0-4 year age group with 21,821 residents.[1]

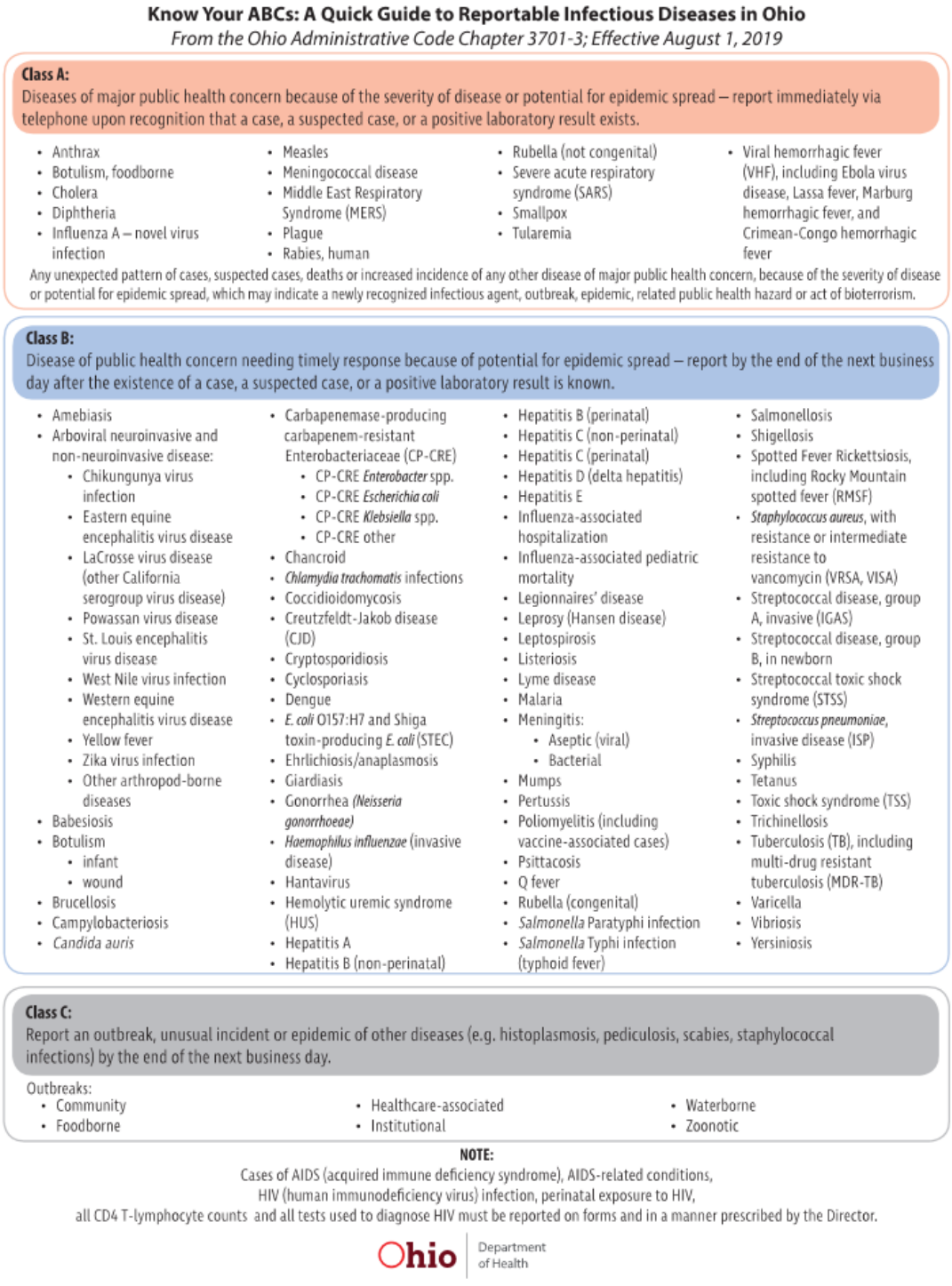
Reportable Diseases

In the United States, each state health department has its own responsibility to mandate the diseases that must be reported by healthcare providers, laboratorians, or local health jurisdictions to the state jurisdiction.[2] These diseases are chosen based on their severity, potential for epidemic spread, or need for timely response.[3] Reportable diseases must be identified quickly to initiate immediate disease control, disease prevention, and identification of outbreaks.[2] A state may choose to voluntarily report notifiable disease cases to the Centers for Disease Control and Prevention (CDC) via the National Notifiable Diseases Surveillance

System (NNDSS), an online platform for collecting, analyzing, and sharing data to monitor for health threats on a national level.

The Cincinnati Health Department is required by law to report confirmed or probable cases of certain infectious diseases to the Ohio Department of Health. A comprehensive list of class A, class B, and class C reportable conditions for Ohio is shown below in Figure 1.1. Class A reportable diseases must be reported immediately by phone call, whereas class B and C diseases can be entered into the Ohio Disease Reporting System (ODRS), which is maintained by the Ohio Department of Health and provides real-time secure access for state and local public health practitioners to report infectious diseases, by the end of the next business day.[2] The Cincinnati Health Department publishes monthly summaries of reportable conditions for which at least one case was reported in either the current or previous year. Sexually-transmitted infections, human immunodeficiency virus (HIV) infections—including acquired immune deficiency syndrome (AIDS)—and tuberculosis are investigated and reported by Hamilton County Public Health and are not included in Cincinnati Health Department reports.

Figure 1.1 List of Reportable Diseases in Ohio[3]



Know Your ABCs: A Quick Guide to Reportable Infectious Diseases in Ohio

From the Ohio Administrative Code Chapter 3701-3; Effective August 1, 2019

Class A:

Diseases of major public health concern because of the severity of disease or potential for epidemic spread – report immediately via telephone upon recognition that a case, a suspected case, or a positive laboratory result exists.

- Anthrax
- Botulism, foodborne
- Cholera
- Diphtheria
- Influenza A – novel virus infection
- Measles
- Meningococcal disease
- Middle East Respiratory Syndrome (MERS)
- Plague
- Rabies, human
- Rubella (not congenital)
- Severe acute respiratory syndrome (SARS)
- Smallpox
- Tularemia
- Viral hemorrhagic fever (VHF), including Ebola virus disease, Lassa fever, Marburg hemorrhagic fever, and Crimean-Congo hemorrhagic fever

Any unexpected pattern of cases, suspected cases, deaths or increased incidence of any other disease of major public health concern, because of the severity of disease or potential for epidemic spread, which may indicate a newly recognized infectious agent, outbreak, epidemic, related public health hazard or act of bioterrorism.

Class B:

Disease of public health concern needing timely response because of potential for epidemic spread – report by the end of the next business day after the existence of a case, a suspected case, or a positive laboratory result is known.

- Amebiasis
- Arboviral neuroinvasive and non-neuroinvasive disease:
  - Chikungunya virus infection
  - Eastern equine encephalitis virus disease
  - LaCrosse virus disease (other California serogroup virus disease)
  - Powassan virus disease
  - St. Louis encephalitis virus disease
  - West Nile virus infection
  - Western equine encephalitis virus disease
  - Yellow fever
  - Zika virus infection
  - Other arthropod-borne diseases
- Babesiosis
- Botulism
  - infant
  - wound
- Brucellosis
- Campylobacteriosis
- *Candida auris*
- Carbapenemase-producing carbapenem-resistant Enterobacteriaceae (CP-CRE)
  - CP-CRE *Enterobacter* spp.
  - CP-CRE *Escherichia coli*
  - CP-CRE *Klebsiella* spp.
  - CP-CRE other
- Chancroid
- *Chlamydia trachomatis* infections
- Coccidioidomycosis
- Creutzfeldt-Jakob disease (CJD)
- Cryptosporidiosis
- Cyclosporiasis
- Dengue
- *E. coli* O157:H7 and Shiga toxin-producing *E. coli* (STEC)
- Ehrlichiosis/anaplasmosis
- Giardiasis
- Gonorrhea *(Neisseria gonorrhoeae)*
- *Haemophilus influenzae* (invasive disease)
- Hantavirus
- Hemolytic uremic syndrome (HUS)
- Hepatitis A
- Hepatitis B (non-perinatal)
- Hepatitis B (perinatal)
- Hepatitis C (non-perinatal)
- Hepatitis C (perinatal)
- Hepatitis D (delta hepatitis)
- Hepatitis E
- Influenza-associated hospitalization
- Influenza-associated pediatric mortality
- Legionnaires' disease
- Leprosy (Hansen disease)
- Leptospirosis
- Listeriosis
- Lyme disease
- Malaria
- Meningitis:
  - Aseptic (viral)
  - Bacterial
- Mumps
- Pertussis
- Poliomyelitis (including vaccine-associated cases)
- Psittacosis
- Q fever
- Rubella (congenital)
- *Salmonella* Paratyphi infection
- *Salmonella* Typhi infection (typhoid fever)
- Salmonellosis
- Shigellosis
- Spotted Fever Rickettsiosis, including Rocky Mountain spotted fever (RMSF)
- *Staphylococcus aureus*, with resistance or intermediate resistance to vancomycin (VRSA, VISA)
- Streptococcal disease, group A, invasive (IGAS)
- Streptococcal disease, group B, in newborn
- Streptococcal toxic shock syndrome (STSS)
- *Streptococcus pneumoniae*, invasive disease (ISP)
- Syphilis
- Tetanus
- Toxic shock syndrome (TSS)
- Trichinellosis
- Tuberculosis (TB), including multi-drug resistant tuberculosis (MDR-TB)
- Varicella
- Vibriosis
- Yersiniosis

Class C:

Report an outbreak, unusual incident or epidemic of other diseases (e.g. histoplasmosis, pediculosis, scabies, staphylococcal infections) by the end of the next business day.

Outbreaks:

- Community
- Foodborne
- Healthcare-associated
- Institutional
- Waterborne
- Zoonotic

NOTE:

Cases of AIDS (acquired immune deficiency syndrome), AIDS-related conditions, HIV (human immunodeficiency virus) infection, perinatal exposure to HIV, all CD4 T-lymphocyte counts and all tests used to diagnose HIV must be reported on forms and in a manner prescribed by the Director.

Ohio Department of Health

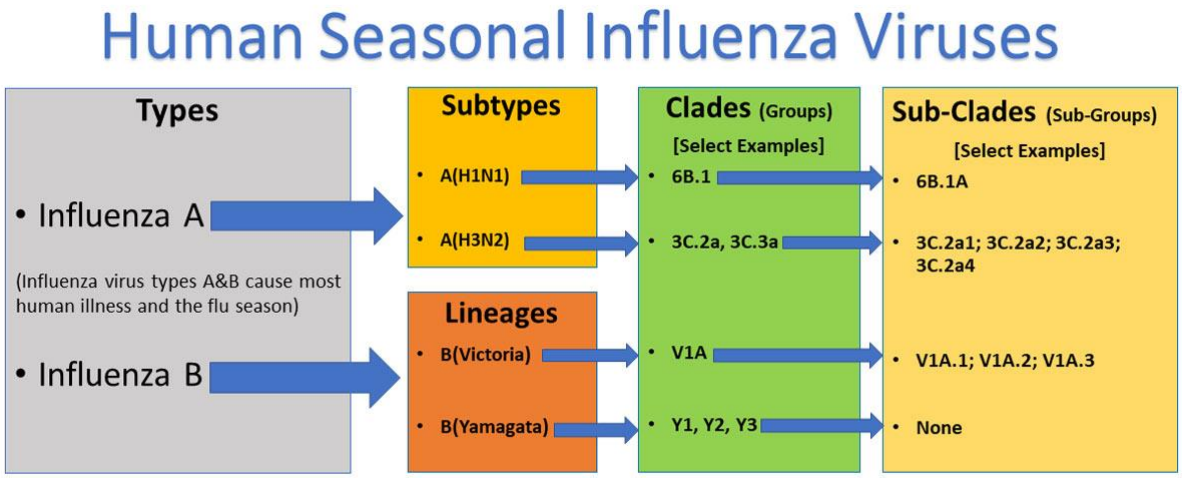
Influenza

Influenza is a viral respiratory disease caused by influenza viruses of the family *Orthomyxoviridae*. Clinical symptoms of influenza include fever, chills, cough, sore throat, runny or stuffy nose, muscle or body aches, headaches, and fatigue. Disease can range from mild to severe, with the most severe cases resulting in hospitalization or death. Young children, older adults, and immunocompromised people are at high risk of influenza complications. As a respiratory disease, influenza is transmitted mainly through inhalation of droplets made when infected individuals cough, sneeze, or talk.[4] The CDC recommends that everyone 6 months and older receive an influenza vaccine to reduce influenza illnesses, doctors' visits, and missed work and school due to influenza, as well as prevent influenza-associated hospitalizations and deaths.[5]

There are four types of influenza viruses: A, B, C, and D. Of these, influenza A and influenza B viruses are responsible for seasonal epidemics of disease in humans during winter in the United States. Influenza A viruses are categorized further based on the combination of the virus's surface proteins: hemagglutinin and neuraminidase. Hemagglutinin has 18 different subtypes, and neuraminidase has 11 different subtypes. A(H1N1) and A(H3N2) are the most frequently diagnosed subtypes in the U.S. population. In contrast, influenza B viruses are categorized further based on lineages of distinct antigenicity. The two lineages are B/Victoria and B/Yamagata, named after the geographic locations of their first representatives.[6] Influenza viruses can be further categorized by clade and sub-clade (Figure 1.2).

When influenza is suspected in a clinical patient, diagnostic testing is available to determine the type and/or subtype of the virus. Molecular assays (including rapid molecular assays and reverse transcription polymerase chain reaction) and antigen detection tests (including rapid influenza diagnostic tests and immunofluorescence assays) are two detection methods used in clinical practice. Molecular assays are used to differentiate between influenza A and influenza B and identify specific influenza A subtypes.[7]

Figure 1.2 Types of Human Seasonal Influenza Viruses[8]



Influenza Surveillance

Most cases of seasonal human influenza are not reportable, since influenza is not one of the infectious diseases that Ohio law mandates be reported to public health authorities. However, in Ohio, influenza-associated hospitalizations of persons of any age, influenza-associated pediatric deaths, and isolation of a novel influenza strain from a human patient must be reported to the Ohio Department of Health. Public health authorities do not draw on a single data source to measure the incidence and impact of influenza; instead, influenza surveillance requires review of multiple data sources.

The U.S. influenza surveillance system is a collaborative effort between local, state, and federal public health agencies, including the CDC. The system includes surveillance of virologic activity, outpatient illness, hospitalizations, mortality, and geographic spread of influenza. Each of these components assists in guiding vaccine development, treatment, and public health interventions.[9] The CDC compiles weekly seasonal updates in the FluView online report. Laboratory-confirmed influenza hospitalizations are monitored though the Influenza Hospitalization Surveillance Network (FluSurv-NET), which receives data from 14 states including Ohio.[9] The U.S. influenza surveillance season runs from the 40th week of the year (using the CDC's *Morbidity and Mortality Weekly Report* calendar) through the 20th week of the next year. For the 2019-2020 season, week 40 (denoted 19-40) began on September 29, 2019 and week 20 (denoted 20-20) ended on May 16, 2020.

To get a broad view of the impact of influenza on local communities, the CDC partners with clinics and medical practices in a voluntary program called ILINet through which the number of individuals with certain symptoms similar to influenza ("Influenza-Like Illness", or ILI)

are reported weekly along with the total number of patients seen at the clinic or practice. For ILINet, ILI in a patient is defined as "fever (temperature of 100 degrees Fahrenheit or greater) and a cough and/or a sore throat without a known cause other than influenza."[9] This voluntary "sentinel" reporting allows for the calculation of the percentage of outpatient visits attributable to ILI. In Cincinnati, three sites participate in this program: two full-scale primary care health centers and a school-based health center at a high school. The Cincinnati Health Department coordinates their participation.

In the early 2019-2020 influenza season, virologic surveillance showed that the predominant circulating influenza virus was influenza B/Victoria. Between September 29 and December 28, 2019, influenza B viruses made up 59.2% of positive influenza tests nationwide with 97.9% of these influenza B isolates belonging to influenza B/Victoria.[10] This was unusual, as the three previous influenza seasons—2016-2017, 2017-2018, and 2018-2019—had much lower incidence of influenza B with influenza B isolates accounting for less than 10% of total influenza virus isolates nationally. Additionally, influenza B viruses tend to circulate later in the season.[10] According to FluView, influenza A isolates accounted for 58.8% (27,616/46,973) of total isolates in the United States, while influenza B isolates accounted for 41.2% (19,357/46,973) of total isolates, as of the end of the season on May 16, 2020. In Ohio, the total number of isolates were categorized into 59.2% (957/1,616) positive for influenza A viruses and 40.8% (659/1,616) positive for influenza B viruses, as of the end of the season on May 16, 2020.[11] Both the national and state numbers note abnormally high seasonal incidences of influenza B.

COVID-19

Coronavirus disease 2019 (COVID-19) is a viral respiratory disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) of the family *Coronaviridae*. Clinical symptoms of COVID-19 include fever, cough, headaches, fatigue, muscle or body aches, loss of taste or smell, sore throat, nausea, and diarrhea. Severe cases may progress to include difficulty breathing, chest pain or pressure, confusion, and cyanotic lips and/or face. Older adults and people who have severe co-morbidities like heart disease, lung disease, or diabetes are believed to be at higher risk for developing serious complications.[12] Similar to influenza, COVID-19 is transmitted mainly through inhalation of respiratory droplets made when infected individuals cough, sneeze, or talk.[13] Preventive measures for COVID-19 include vaccination, wearing face masks, handwashing, limiting exposure in public places, and physically distancing at least six feet apart from persons outside the household. Priority groups became eligible to

receive newly developed COVID-19 vaccines starting in December 2020. On April 19, 2021, vaccine eligibility guidelines widened to include all adults in the United States.[14]

The World Health Organization (WHO) characterized COVID-19 as a pandemic on March 11, 2020 following the disease's rapid spread after its initial detection in the city of Wuhan in the Hubei province of China in December 2019.[15] The ongoing pandemic has necessitated national case surveillance efforts to learn how to prevent cases and spread of disease. Similar to influenza surveillance, the U.S. COVID-19 surveillance system is a collaborative effort between local, state, and federal public health agencies. As COVID-19 is a nationally notifiable disease, the CDC aggregates COVID-19 case data using the NNDSS described above. COVID-19 is a reportable disease in Ohio, so the Cincinnati Health Department reports cases to the Ohio Department of Health.

COVID-19 Contact Tracing

Contact tracing is the process of working with a patient who has been diagnosed with an infectious disease in order to identify and provide support to potential contacts who may have been exposed and subsequently infected with the infectious pathogen. The goal of contact tracing is to prevent the spread of disease by separating exposed and/or infected people from the general population until it is safe for them to rejoin.[16] Johns Hopkins University hosts a COVID-19 contact tracing course on Coursera to teach the best practices of contact tracing during the COVID-19 pandemic. Instructor Emily Gurley, PhD, MPH teaches that COVID-19 contact tracing is an opportunity to support the person who is infected, to ensure that they have access to medical care and social services, and to encourage them to change their behavior and limit their contact with other people for the overall goal of reducing risk of transmission. It is important that the people who have been exposed to the infected person are also supported in order to make sure that they have adequate access to medical care and social services as well.[17]

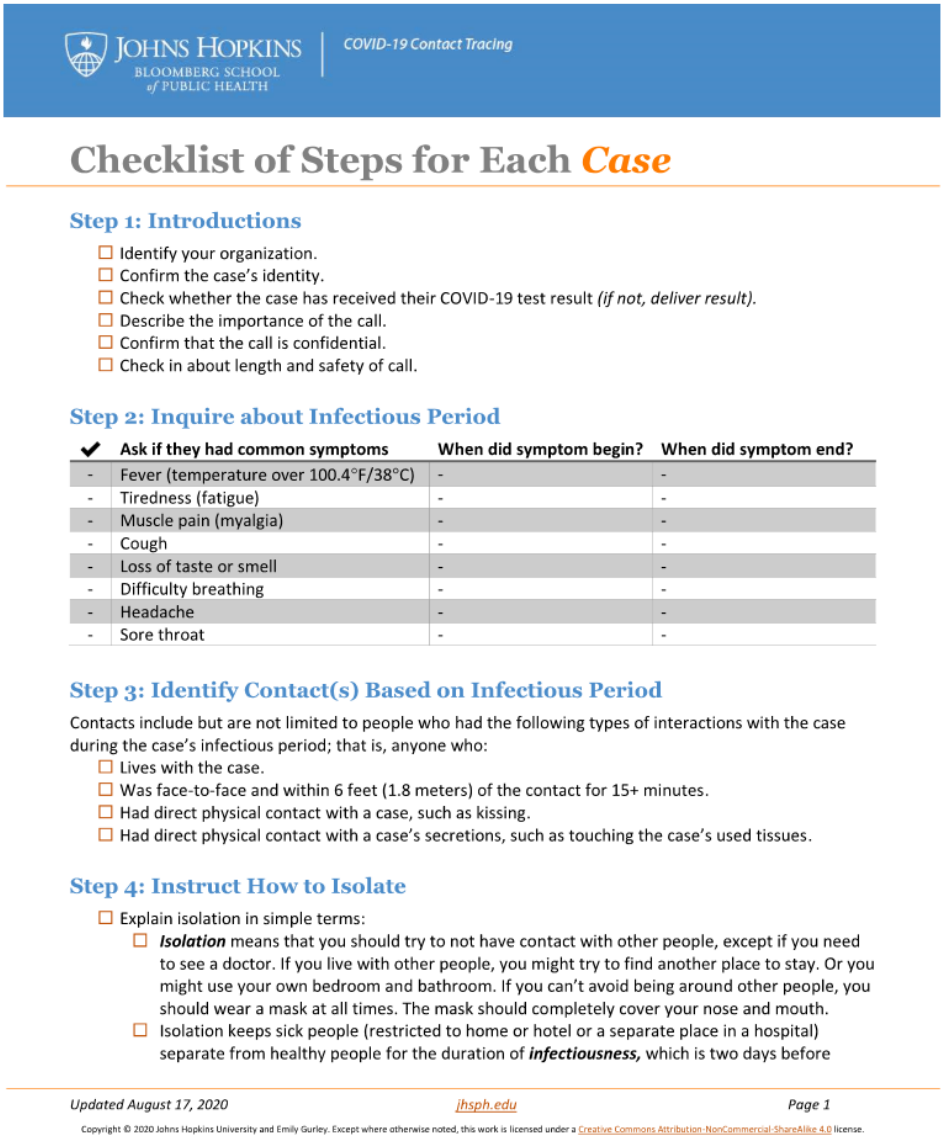
The definition of a case and a close contact are important when discussing contact tracing related to the COVID-19 pandemic. A case is a person who has been diagnosed with COVID-19, either confirmed by a laboratory test or probable based on symptoms and scenario. The Cincinnati Health Department uses the term "person under investigation," or PUI, to refer to cases. close contact is an individual who has been within six feet of a PUI, with or without the use of face masks. In addition, timing matters, and the physical closeness must be for a cumulative total of 15 minutes or more over a 24-hour period in the time period since two days

before the infected individual's symptom onset.[18] Isolation and quarantine measures are used for infected and exposed individuals, respectively, to limit opportunity for transmission to others.

It is best to follow a defined list of steps when initiating conversations with infected individuals in order to not lose track of the information contact tracers need to gather from and share with individuals. The Johns Hopkins course lists six steps to case investigation: 1) introduce, 2) inquire, 3) identify contacts, 4) isolate, 5) initiate contact tracing, and 6) implement regular check-ins.[17] Specific instructions for each step are shown below in Figure 1.3.

Communication is an important aspect of contact tracing. Throughout the contact tracing call, active listening—defined as paying close attention to a person's words and nonverbal cues like emotion and tone— should be employed to fully understand what the individual is saying, feeling, needing, and requesting. Active listening leads to effective and efficient communication. Additionally, it is necessary to use language that can be easily understood by members of the public with little to no science or health background. Terms like "incubation period" and "close contact" should be avoided when speaking with members of the public as their definitions are not commonly known outside of the scientific community. Instead, a series of interview questions about the individuals' recent activities can help reach the same answers. Both active listening and the use of common language yield an audience-centered approach that allows for more meaningful conversations.[17]

Figure 1.3 Checklist of Steps for Each COVID-19 Case[17]



JOHNS HOPKINS BLOOMBERG SCHOOL of PUBLIC HEALTH | *COVID-19 Contact Tracing*

Checklist of Steps for Each *Case*

Step 1: Introductions

- ☐ Identify your organization.
- ☐ Confirm the case's identity.
- ☐ Check whether the case has received their COVID-19 test result *(if not, deliver result).*
- ☐ Describe the importance of the call.
- ☐ Confirm that the call is confidential.
- ☐ Check in about length and safety of call.

Step 2: Inquire about Infectious Period

✔	Ask if they had common symptoms	When did symptom begin?	When did symptom end?
-	Fever (temperature over 100.4°F/38°C)	-	-
-	Tiredness (fatigue)	-	-
-	Muscle pain (myalgia)	-	-
-	Cough	-	-
-	Loss of taste or smell	-	-
-	Difficulty breathing	-	-
-	Headache	-	-
-	Sore throat	-	-

Step 3: Identify Contact(s) Based on Infectious Period

Contacts include but are not limited to people who had the following types of interactions with the case during the case's infectious period; that is, anyone who:

- ☐ Lives with the case.
- ☐ Was face-to-face and within 6 feet (1.8 meters) of the contact for 15+ minutes.
- ☐ Had direct physical contact with a case, such as kissing.
- ☐ Had direct physical contact with a case's secretions, such as touching the case's used tissues.

Step 4: Instruct How to Isolate

- ☐ Explain isolation in simple terms:
  - ☐ ***Isolation*** means that you should try to not have contact with other people, except if you need to see a doctor. If you live with other people, you might try to find another place to stay. Or you might use your own bedroom and bathroom. If you can't avoid being around other people, you should wear a mask at all times. The mask should completely cover your nose and mouth.
  - ☐ Isolation keeps sick people (restricted to home or hotel or a separate place in a hospital) separate from healthy people for the duration of ***infectiousness,*** which is two days before

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onset and at least 10 days after onset of illness. Isolation can end when symptoms are improving, and the sick person has not had fever within the past 24 hours without using fever-reducing medication.

- ☐ Help them make a plan to isolate.
- ☐ Identify challenges that may stop the case from following your isolation instructions.
- ☐ Offer resources to improve the case's chances of following your isolation instructions.
- ☐ Answer the case's questions.
- ☐ Make a plan to follow up.

Step 5: Initiate Contact Tracing

- See *Checklist of Steps for Each Contact.*

Step 6: Implement Regular Check-Ins

- ☐ Have the case's symptoms improved or worsened?
- ☐ Has the case had new contacts?
- ☐ Support the case in continuing to isolate (see Step 4).

Quick Reminders

Symptoms Requiring Immediate Emergency Care

- Bluish lips or face.
- Faster breathing.
- Trouble breathing.
- Persistent pain or pressure in the chest.
- New confusion or difficulty waking up.

The Infectious Period for Patients with Symptoms

- ***Infectious period starts:*** 48 hours prior to the first symptom.
- ***Infectious period ends:*** when it's been at least 10 days after the first symptom, and they have no fever for at least 24 hours without medications and their other symptoms have improved.

Phrases for Building Rapport

- *This is a difficult time.*
- *Everything is happening so fast.*
- *I hear you.*
- *I hear you when you say ...*

Active Listening Techniques

Paraphrasing: repeating what was just said to you, in your own words.

- *What I'm hearing is ...*
- *It sounds like ...*
- *You said ...*

Restating: putting words to the emotions being expressed to you.

- *You're scared/worried/angry.*

Silence: being quiet so that the other person can finish talking or thinking.

Chapter 2 - Learning Objectives and Project Description

Introduction

Prior to beginning the project, my expectations were to gain experience in three different areas of work within the Cincinnati Health Department: 1) monthly reporting on reportable diseases, 2) annual reporting on the 2019-2020 influenza season, and 3) the COVID-19 public health response. I expected to attend training sessions and Cincinnati Board of Health meetings and to shadow current contact tracers. My learning objective for the first project area was to analyze data from the Ohio Disease Reporting System (ODRS). My learning objective for the second project area was to interpret data regarding influenza cases using a multidisciplinary approach. My learning objectives for the third project area were to participate in the current COVID-19 public health response, communicate with team members and community members for the benefit of public health, and use the Research Electronic Data Capture (REDCap) tool to obtain and enter contact tracing data. My work was overseen by supervising epidemiologist Maryse Amin, PhD, MS, and I had direct supervisors in each of my project areas. I completed all work remotely due to the ongoing COVID-19 pandemic.

Monthly Communicable Disease Surveillance Summary Data Reports

I worked on monthly communicable disease surveillance summary data reports between July 2020 and March 2021 with supervision and advising from epidemiologist Kimberly Wright. I completed eight reports for June 2020 to February 2021 (the August 2020 report was created by Ms. Wright). Ms. Wright provided me with exports of monthly data from the Ohio Disease Reporting System (ODRS). The exported data included observations from both individual patients and outbreaks in the Cincinnati area. Prior examples of monthly reports had been completed and posted to the Cincinnati Health Department website since January 2015, and I elected to largely maintain the same tabular, two-page format for ease of comparison to previous months. I categorized the data and presented it in readable tables with individual patient entries organized into “food or waterborne,” “vectorborne,” “vaccine-preventable,” “viral hepatitis,” and “other conditions” and outbreak entries tabulated by “dermatologic,” “gastrointestinal,” “respiratory,” “vaccine-preventable,” and “other” to match previous monthly reports. The tables included a comparison to data from the previous year along with year-to-date and annual numbers. I also updated the tables as new diseases appeared in the ODRS exports, namely COVID-19 and Multisystem Inflammatory Syndrome in Children (MIS-C), which is associated with COVID-19. The “all hands on deck” approach to the COVID-19 response in

early 2020 had caused a lapse in regular reporting, so my reports were the first ones to include COVID-19 numbers. Monthly, Dr. Amin received my reports, which were then included in the Cincinnati Board of Health meeting agenda materials.

As part of my work with the monthly communicable disease surveillance summary data reports, I remotely attended Cincinnati Board of Health meetings held on July 28, 2020, August 25, 2020, and December 8, 2020. These meetings provided me context for how medical practitioners, public health professionals, and concerned members of the community interact to share health information. They also allowed me to get a sense of the health priorities in the Cincinnati area. The meetings were dominated by constant developments in the COVID-19 pandemic and its related public health response, including rising case numbers, updates to case definitions, and new knowledge about risk factors. One important vote I witnessed was the Board's decision to support a U.S. Senate resolution to declare racism a public health crisis. This resolution has not yet been voted on by the U.S. Senate as it is currently in committee, but it is meaningful that the Board is listed as a supporting organization.

Annual Report for the 2019-2020 Influenza Season

I created the annual report for the 2019-2020 influenza season between July 2020 and March 2021 with further supervision and advising from Ms. Wright. Similarly to the monthly communicable disease surveillance summary data reports, I was provided with a large export of data from ODRS and asked to create a comprehensive report for public health professionals to use for potential interventions. The export consisted of data from individual patients who were identified as influenza-associated hospitalizations. I was also given a Microsoft Excel workbook that had several technical and formulaic errors, so I spent a lot of time learning how to use conditional formatting on Microsoft Excel via YouTube videos and applied this knowledge to clean up the Excel workbook. I created several figures that illustrated the epidemic curve, demographics of patients, sentinel data, influenza types, number of influenza vaccines administered, and home zip codes of patients in relation to clinics offering free influenza vaccines during the 2019-2020 season. I compared the Cincinnati data to statewide and national data where applicable. As there was no record of prior Cincinnati annual influenza reports for comparison, I had many questions along the way, and Ms. Wright and I communicated regularly over email and phone during the summer and fall to discuss the report.

Contact Tracing as part of the COVID-19 Public Health Response

In December 2020 and January 2021, I had the opportunity to assist with the Cincinnati Health Department's COVID-19 response in the form of contact tracing with supervision from contact tracing leads Umar Durrani, MPH and Katie Brehm. I attended a remote training specific to the Cincinnati Health Department and completed the Johns Hopkins COVID-19 Contact Tracing Training course presented by Emily Gurley, PhD, MPH on Coursera. The health department training discussed the process for contact tracing once an individual is noted to be a PUI based on positive diagnosis of COVID-19, while the Johns Hopkins course provided up-to-date case definitions, information about transmission, best practices for contact tracing, and videos demonstrating dos and don'ts in contact tracing conversations. Finally, I spent several hours shadowing contact tracer Kristen Knight as she walked me through the forms for PUI and close contact interviews and allowed me to listen in on her phone calls with PUIs and their close contacts. The forms for PUIs and close contacts were completed on the Research Electronic Data Capture (REDCap) tool. An example PUI form is in Appendix 1.

Once fully trained, I began working on my own as a contact tracer. Each morning began with the Cincinnati Health Department team huddle in which Mr. Durrani and Ms. Brehm provided updates and answered case-specific questions from the team of contact tracers. Afterwards, I assigned myself to individual PUIs and used the provided phone number and lab test result to conduct phone interviews. I used Google Voice to make phone calls and leave voicemails and texts. Each conversation consisted of a brief introduction to contact tracing, a request for consent to the interview, an immediate symptoms check-in, and questions pertaining to symptom onset, demographics, hospitalization, workplace, risk factors, domestic and international travel, locations visited in the two weeks prior to symptom onset through present, and potential close contacts in the same time period. When I recognized symptoms that indicated a need for emergency services—including difficulty breathing, chest pain, confusion, and cyanotic face and/or lips—I would stop the interview and recommend that the PUI immediately visit the hospital. After the completion of the investigation aspect of the phone interview, I provided isolation or quarantine recommendations based on the protocols provided by the Cincinnati Health Department. PUIs and close contacts often had questions for me, so I had the opportunity to further educate members of the community and refer any questions above my level of expertise to the Cincinnati Health Department COVID-19 Hotline phone number. If the PUI identified close contacts, I performed follow-up calls to these individuals to let them know of their potential exposure and recommended either quarantine if they were asymptomatic or testing if symptomatic. I wrote and documented school and work exclusion

letters when applicable. Finally, I entered all information gathered into the REDCap tool so that other workers could transfer the data to both the Ohio Contact Tracing System (OCTS) and ODRS and make daily follow-up calls to all PUIs and close contacts until case resolution. In total, I completed 75 phone calls to PUIs and close contacts on behalf of the Cincinnati Health Department.

Chapter 3 - Results

Monthly Communicable Disease Surveillance Summary Data Reports

The eight monthly communicable disease surveillance summary data reports are in Appendix 2. My July 2020 and September 2020 reports have been uploaded to the Cincinnati Health Department's Infectious Disease Data section found under Community Health Data on their website here: https://www.cincinnati-oh.gov/health/community-health-data/infectious-disease-data1/. The reports were provided as both Microsoft Word and Excel documents to the epidemiologists at the Cincinnati Health Department.

For this report, I created summary figures to compare the numbers from my eight reports to the numbers from the previous year's corresponding reports (Figures 3.1 through 3.5). I chose to only include diseases with at least one case in either the current year or previous year. I used previous examples of monthly reports as a guide for assigning diseases to the categories: "food or waterborne," "vectorborne," "vaccine-preventable," "viral hepatitis," and "other conditions."[19] I excluded influenza-associated hospitalizations and COVID-19 from the figures for their respective categories "vaccine-preventable" and "other conditions" due to their inflated numbers and instead created separate figures for these two diseases. Data from August 2020, and its comparison to August 2019, are not included since the August 2020 report was completed by epidemiologist Kimberly Wright. Statistical analysis was not indicated due to low incidence of the majority of reportable diseases in the Cincinnati area.

Figure 3.1 Food or Waterborne Diseases

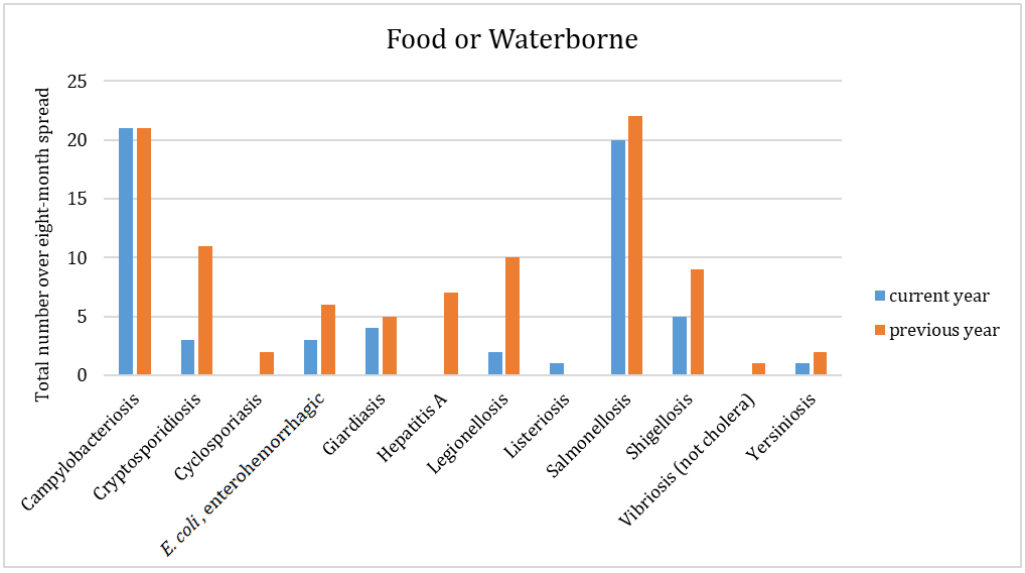

Figure 3.1. Comparison of total disease incidences for food or waterborne diseases in time period June 2020 to February 2021 ("current year") with time period June 2019 to February 2020 ("previous year").

Figure 3.2 Vaccine-Preventable Diseases

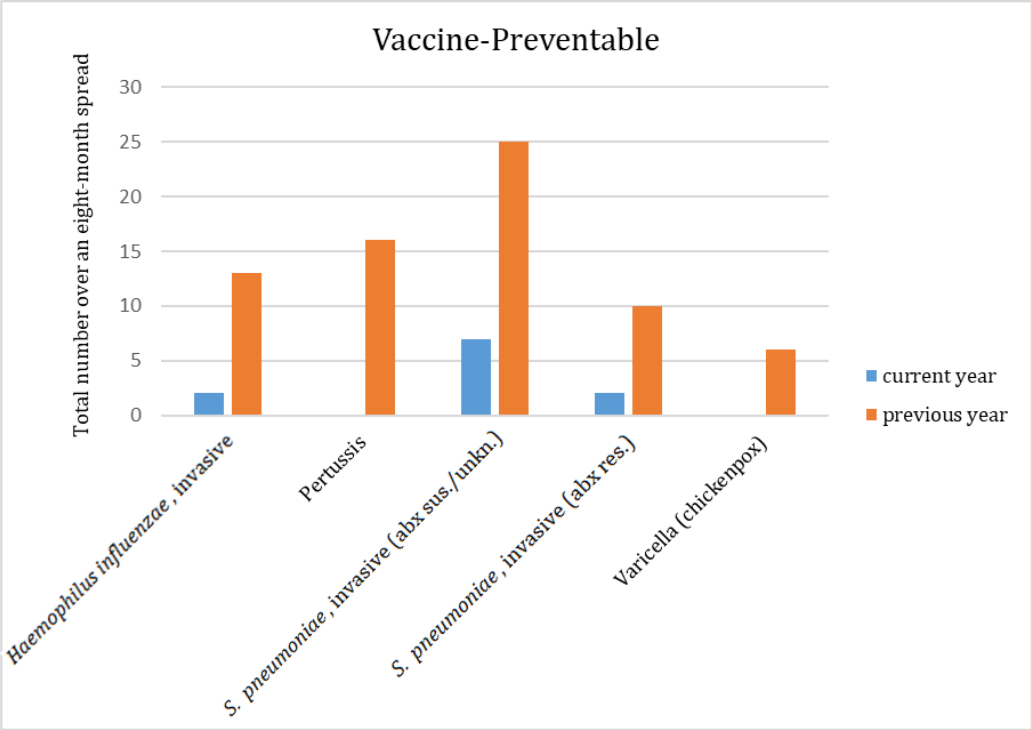

Figure 3.2. Comparison of total disease incidences for vaccine-preventable diseases in time period June 2020 to February 2021 ("current year") with time period June 2019 to February 2020 ("previous year").

Figure 3.3 Vector-borne Diseases

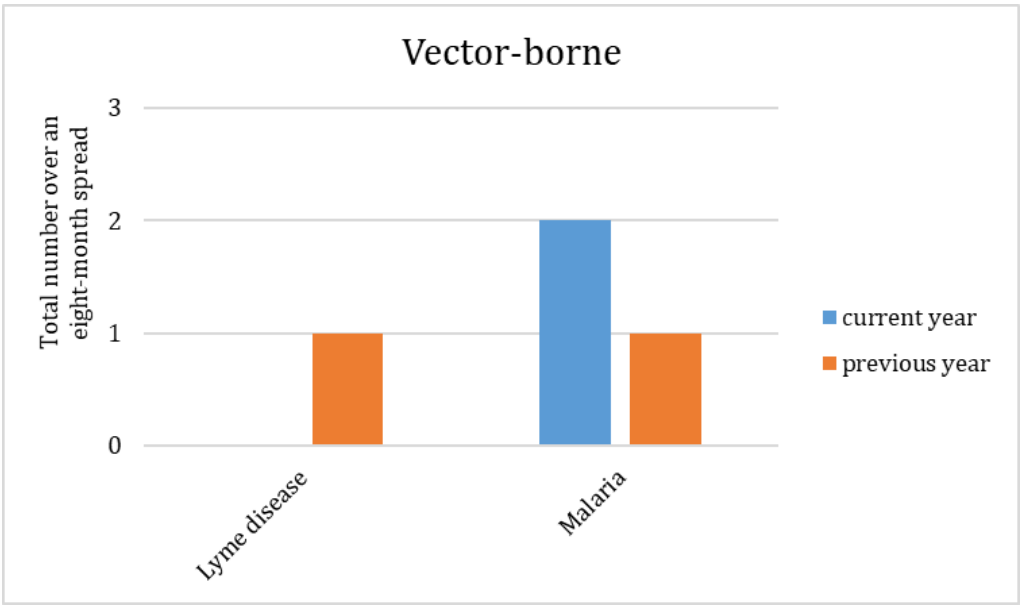

Figure 3.3. Comparison of total disease incidences for vector-borne diseases in time period June 2020 to February 2021 ("current year") with time period June 2019 to February 2020 ("previous year").

Figure 3.4 Viral Hepatitis Diseases

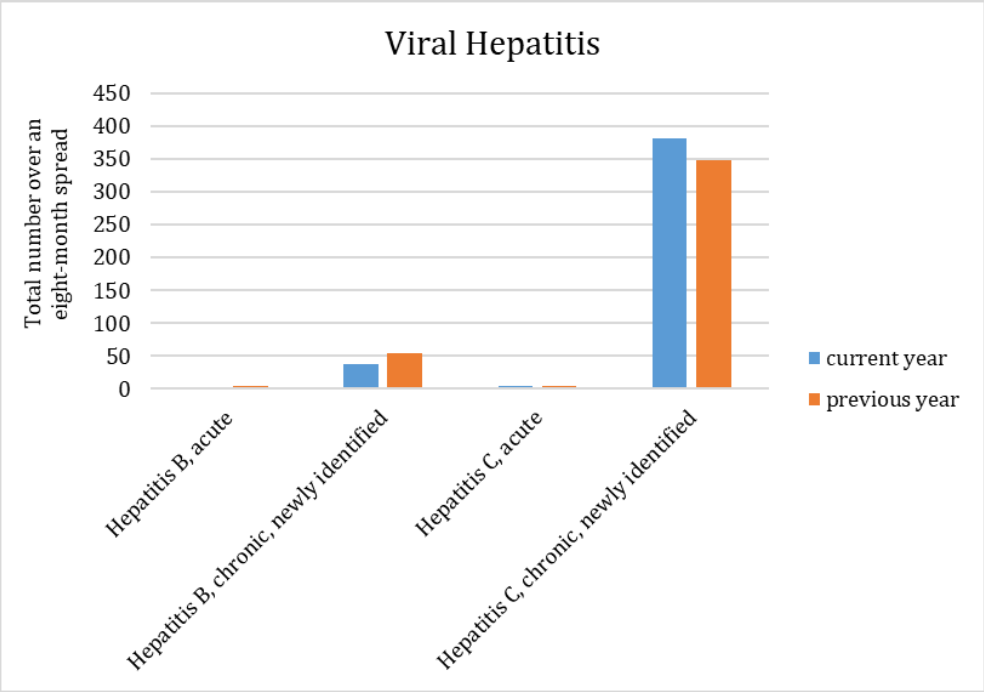

Figure 3.4. Comparison of total disease incidences for viral hepatitis diseases in time period June 2020 to February 2021 (“current year”) with time period June 2019 to February 2020 (“previous year”).

Figure 3.5 Other Conditions

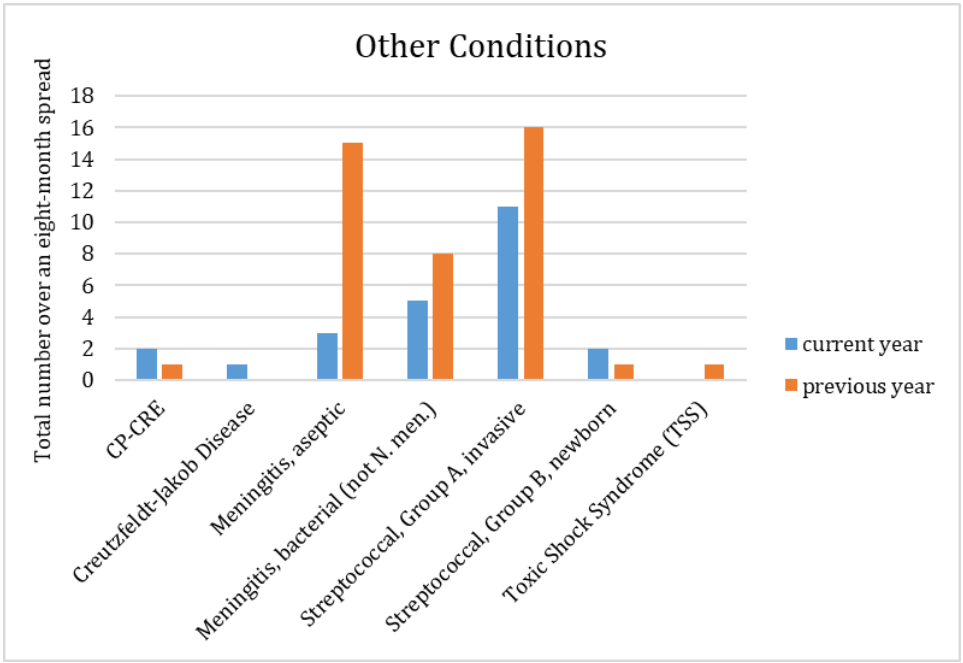

Figure 3.5. Comparison of total disease incidences for other conditions in time period June 2020 to February 2021 (“current year”) with time period June 2019 to February 2020 (“previous year”).

The largest differences were noted for COVID-19 and influenza-associated hospitalizations, as seen Figures 3.6 and 3.7. Zero COVID-19 cases were reported in Cincinnati in the period between June 2019 and February 2020 compared to 21,255 total COVID-19 cases between June 2020 and February 2021 (Figure 3.6). On the other hand, 329 influenza-associated hospitalizations were reported in Cincinnati in the period between June 2019 and February 2020 compared to one total influenza-associated hospitalization between June 2020 and February 2021 (Figure 3.7).

Figure 3.6 COVID-19 Cases by Month

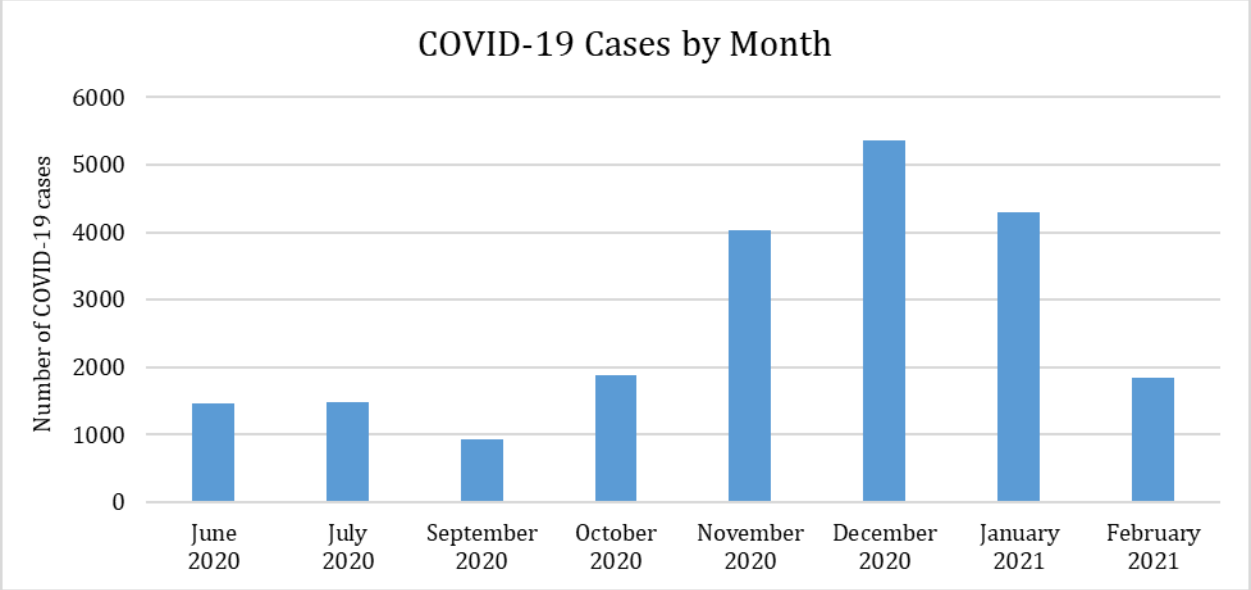

Figure 3.6. COVID-19 cases by month during time period June 2020 to February 2021.
Note: August 2020 is omitted as Ms. Kimberly Wright completed the August 2020 report.

Figure 3.7 Influenza-Associated Hospitalizations by Month

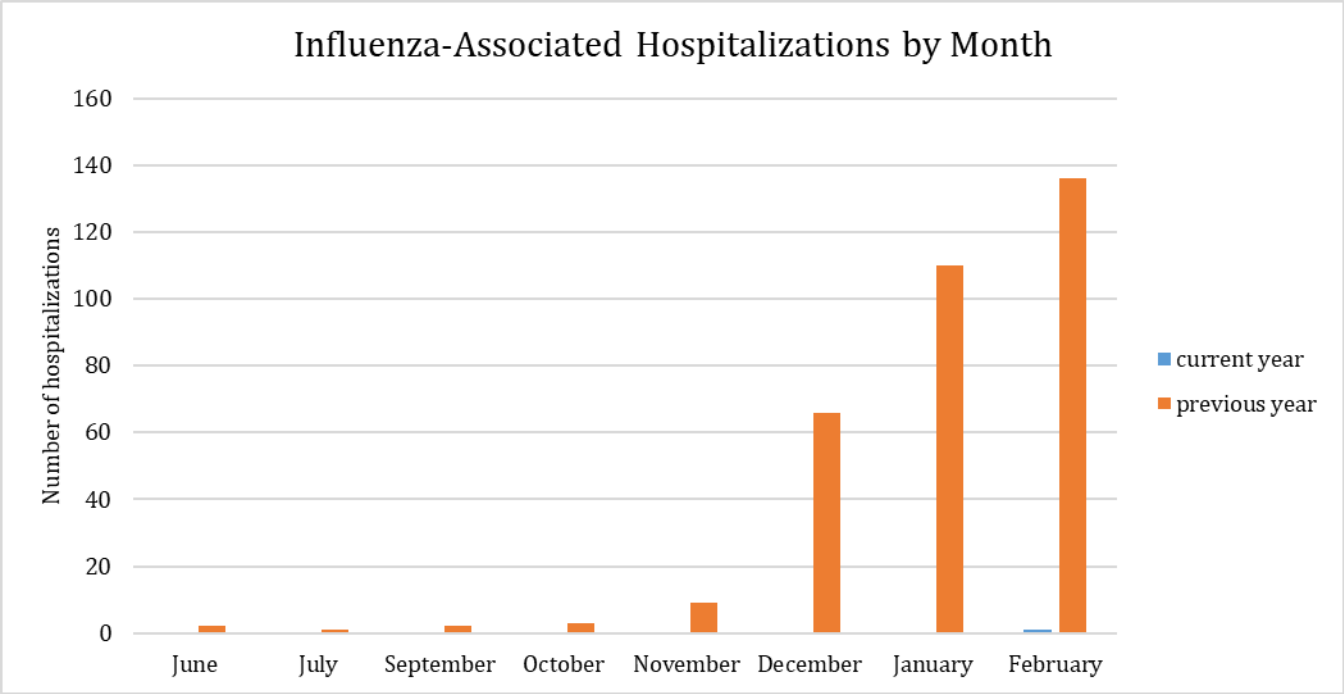

Figure 3.7. Comparison of incidences of influenza-associated hospitalizations in time period June 2020 to February 2021 ("current year") with time period June 2019 to February 2020 ("previous year").
Note: August is omitted as Ms. Kimberly Wright completed the August 2020 report.

Annual Report for the 2019-2020 Influenza Season

I created nine figures and two tables for presentation in a comprehensive report of the 2019-2020 influenza season (Appendix 3). In total, there were 404 Cincinnati residents hospitalized for ILI with the highest number of hospitalizations occurring in February 2020 and January 2020 followed by March 2020 and December 2019. The epidemic curve (Figure 3.8) shows the number of cases by week defined by the CDC's *Morbidity and Mortality Weekly Report* calendar.

Figure 3.8 Epidemic Curve

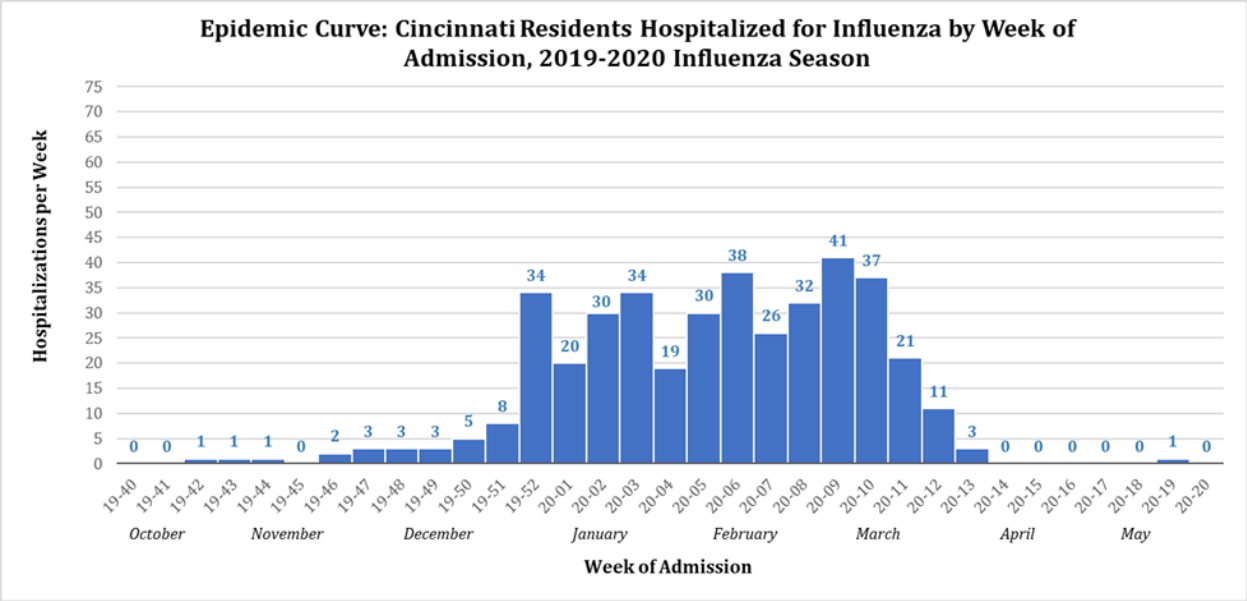

Figure 3.8. Number of Cincinnati residents hospitalized for influenza by week of admission during the 2019-2020 influenza season (n=404).

Rates per 100,000 persons are shown in Table 3.1 to account for the current population distribution in Cincinnati. Values for the current population distribution are in Chapter 1. FluSurv-NET reports the 2019-2020 Ohio rates of laboratory-confirmed influenza hospitalizations as 45.3 per 100,000 persons for the 0-4 year age group, 36.9 per 100,000 for the 5-17 year age group, 33.2 per 100,000 for the 18-49 year age group, 89.7 per 100,000 for the 50-64 year age group, and 147.1 per 100,000 for the 65-plus year age group.[20] These age brackets are used to report influenza-associated hospitalizations at both national and state levels as shown in the CDC's FluView and FluSurv-NET online platforms. FluSurv-NET does not report rates based on sex, race, or ethnicity as this report does.

Table 3.1 Number of Influenza-Associated Hospitalizations by Demographics

	Category	Number	Percentage	Rate[1]	LL[2] (95% CI)	UL[3] (95% CI)	Std. error
Sex	Male	174	43.1%	120.1	102.3	138.0	9.1026
	Female	229	56.7%	147.2	128.2	166.3	9.7226
	Unknown	1	0.2%	N/A	N/A	N/A	N/A
Race	Asian	2	0.5%	25.6	0.0	61.0	18.0846
	American Indian / Alaskan Native	0	0.0%	0.0	0.0	0.0	0.0000
	Black	250	61.9%	183.0	160.4	205.7	11.5650
	White	131	32.4%	81.8	67.8	95.8	7.1441
	Other	13	3.2%	270.8	123.8	417.9	75.0139
	Unknown	8	2.0%	N/A	N/A	N/A	N/A
Ethnicity	Hispanic or Latino	11	2.7%	99.4	40.7	158.2	29.9699
	Non-Hispanic or Non-Latino	323	80.0%	111.7	99.5	123.8	6.2089
	Unknown	70	17.3%	N/A	N/A	N/A	N/A
Age	0-4 years	48	11.9%	220.0	157.8	282.1	31.7152
	5-17 years	31	7.7%	70.7	45.8	95.6	12.6945
	18-49 years	106	26.2%	72.3	58.6	86.1	7.0233
	50-64 years	111	27.5%	215.0	175.0	254.9	20.3806
	65+ years	107	26.5%	293.0	237.6	348.5	28.2883
	Unknown	1	0.2%	N/A	N/A	N/A	N/A
	Total	**404**	**100.0%**	**134.5**	**121.4**	**147.6**	**6.6875**

[1] Rates shown per 100,000 persons to account for the current population distribution in Cincinnati; population figures obtained from the U.S. Census Bureau 2018 ACS 5-Year Estimates.

[2] "LL" indicates the lower limit of the 95% confidence interval.

[3] "UL" indicates the upper limit of the 95% confidence interval.

Further figures detail ILI for specific demographics. Female patients made up 56.7% (229/404) of influenza-associated hospitalizations, while male patients made up 43.1% (174/404) of the hospitalizations (Figure 3.9). The rate among female residents was 147.2 per 100,000 persons compared to 120.1 per 100,000 persons for male residents (Table 3.1).

Figure 3.9 Influenza-Associated Hospitalizations by Sex

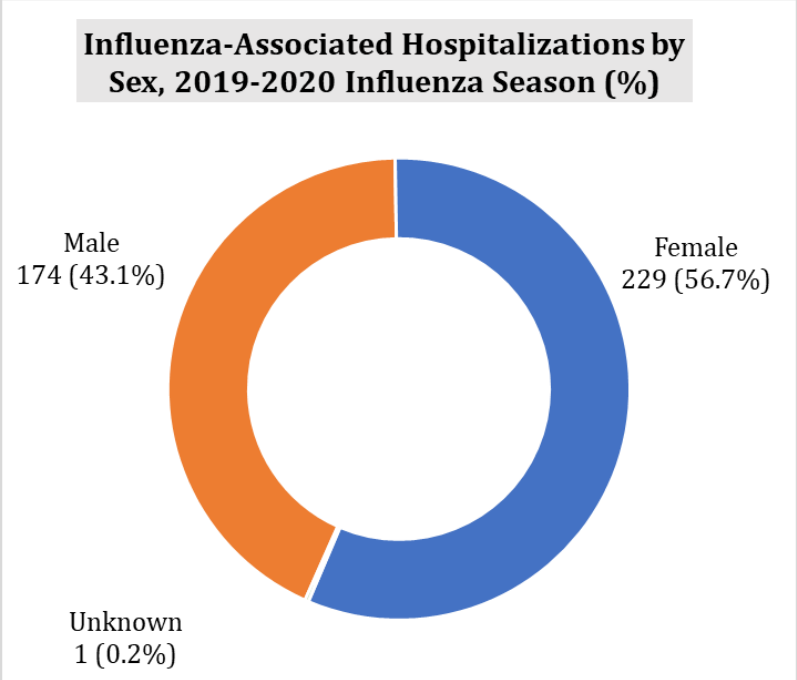

Figure 3.9. Influenza-associated hospitalizations by sex during the 2019-2020 influenza season (n=404).

Patients identifying as Black made up 61.9% (250/404) of the total hospitalizations at a rate of 183.0 per 100,000 persons. This was appreciably higher than the total hospitalizations and rates among White and Asian residents, which were 32.4% (131/404) with a rate of 81.8 per 100,000 and 0.5% (2/404) with a rate of 25.6 per 100,000, respectively (Figure 3.10 and Table 3.1). Patients identifying as non-Hispanic and/or non-Latino made up 80.0% (323/404) of cases at a rate of 111.7 per 100,000 persons, while patients identifying as Hispanic and/or Latino made up 2.7% (11/404) of cases at a rate of 99.4 per 100,000 persons (Figure 3.11 and Table 3.1).

Figure 3.10 Influenza-Associated Hospitalizations by Race

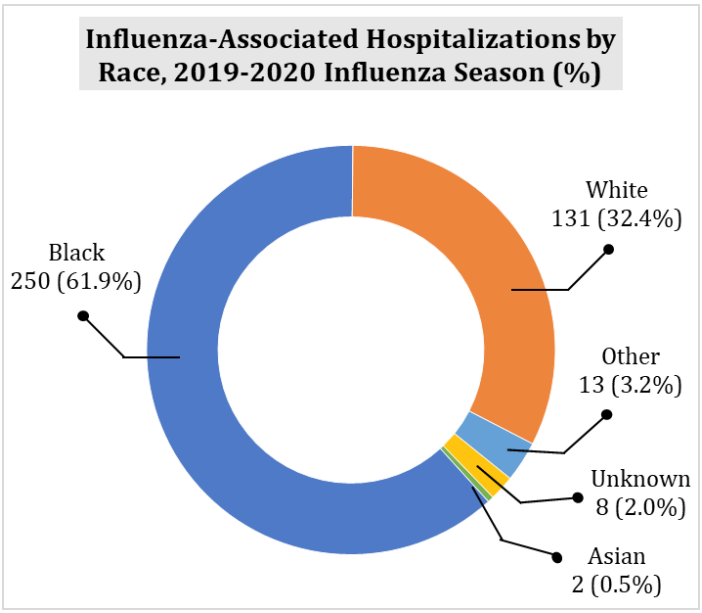

Figure 3.10. Influenza-associated hospitalizations by race during the 2019-2020 influenza season (n=404).

Figure 3.11 Influenza-Associated Hospitalizations by Ethnicity

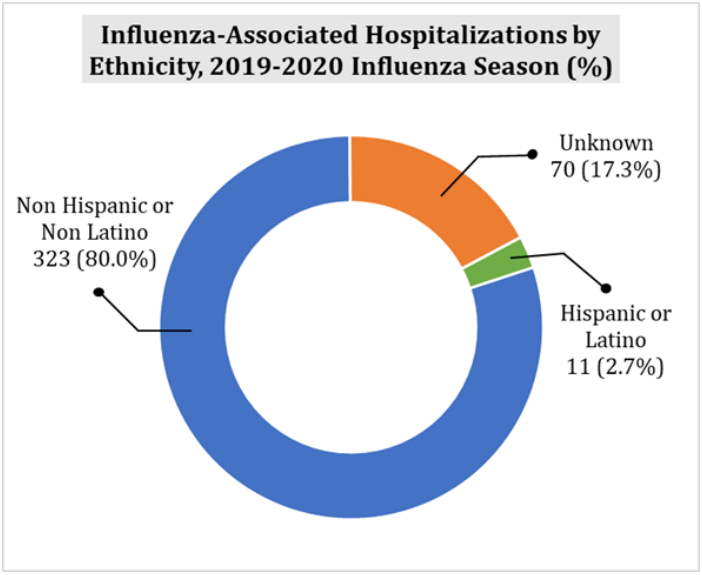

Figure 3.11. Influenza-associated hospitalizations by ethnicity during the 2019-2020 influenza season (n=404).

Finally, patients in the 50-64 year age group made up 27.5% (111/404) of hospitalizations followed closely by the 65-plus age group at 26.5% (107/404), the 18-49 year age group at 26.2% (106/404), the 0-4 year age group at 11.9% (48/404), and the 5-17 year age group at 7.7% (31/404) (Figure 3.12).The rate among residents aged 65-plus was 293.0 per 100,000 persons followed by a rate of 220.0 per 100,000 persons among residents aged 0-4 years, a rate of 215.0 per 100,000 persons among residents aged 50-64 years, a rate of 72.3 per 100,000 persons among residents aged 18-49 years, and a rate of 70.7 per 100,000 persons among residents aged 5-17 years (Table 3.1). The Cincinnati rates of hospitalization for each age group are higher than the corresponding rates for each age group across the entire state of Ohio.

Figure 3.12 Influenza-Associated Hospitalizations by Age Group

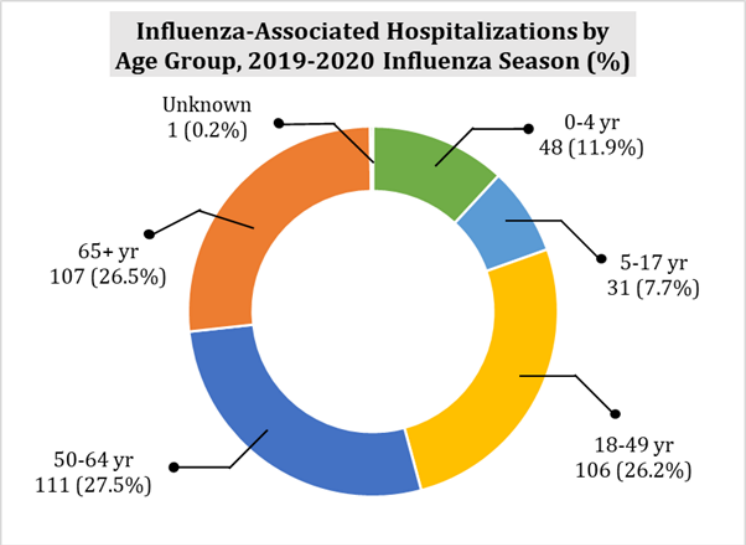

Figure 3.12. Influenza-associated hospitalizations by age group during the 2019-2020 influenza season (n=404).

Sentinel data was provided up until March 9, 2020 during the 2019-2020 influenza season. In total, 103 patients meeting the definition of ILI were reported to the Cincinnati Health Department from the three local sentinel influenza sites: two full-scale primary care health centers and a school-based health center at a high school. The percentage of outpatient visits due to ILI did not surpass the regional epidemic threshold of 1.8% and peaked right at 1.8% during week 19-48 (Figure 3.13).

Figure 3.13 Percentage of Outpatient Visits due to ILI by Week

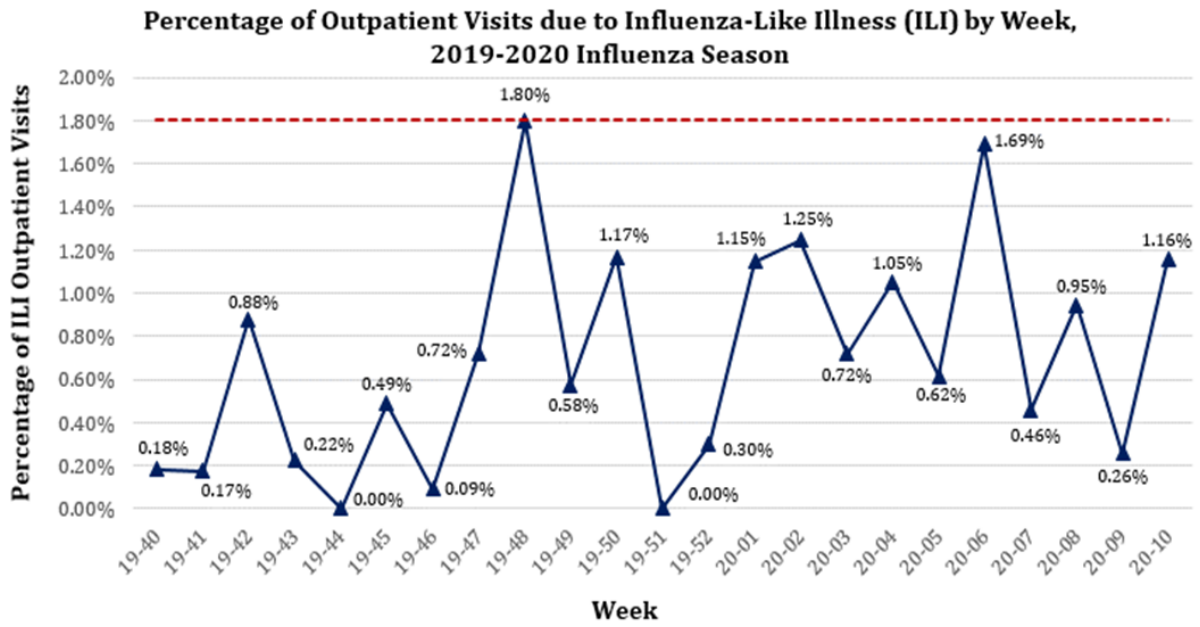

Figure 3.13. Percentage of outpatient visits due to influenza-like illness by week during the 2019-2020 influenza season. The red dotted line indicates the regional epidemic threshold of 1.8%.

Figure 3.14 illustrates the number of influenza-associated hospitalizations by influenza type. There is a peak in influenza B earlier in the season and a later peak in influenza A around week 20-09. Of the samples collected during the 2019-2020 season, 263 were positive for influenza A with 37 of those further subtyped as H1N1. 137 samples tested positive for influenza B, and 38 samples were marked as unknown (Figure 3.14).

Figure 3.14 Influenza-Associated Hospitalizations by Influenza Type

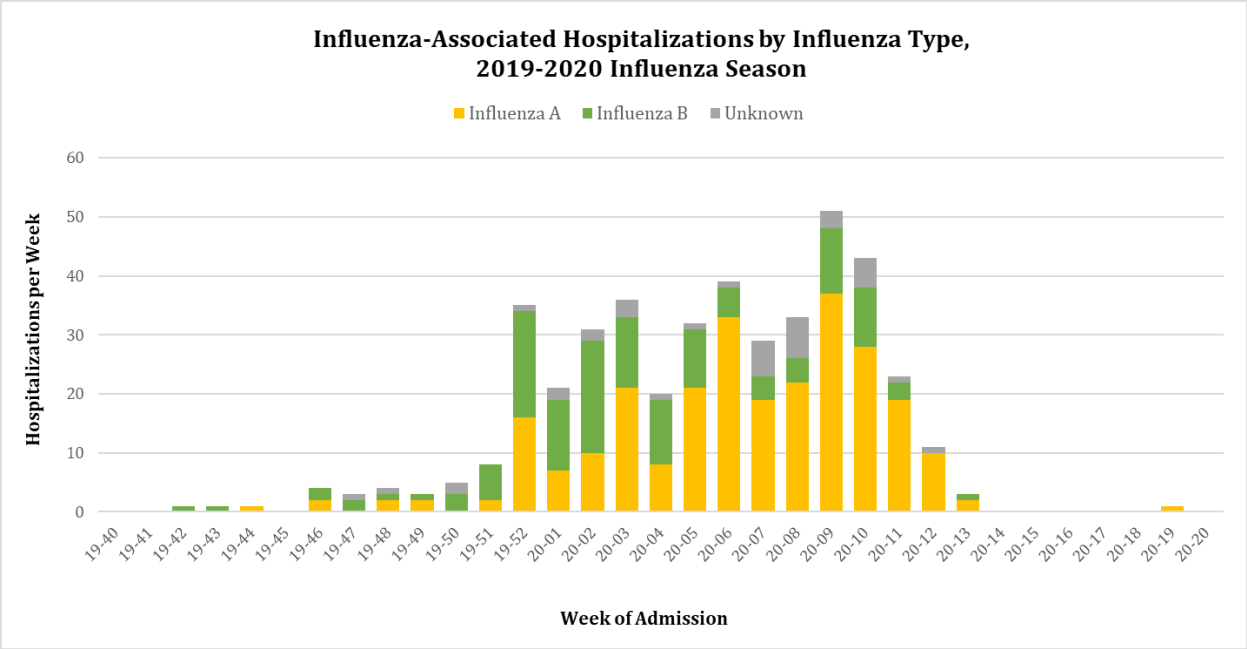

Figure 3.14. Influenza-associated hospitalizations by influenza type for the 2019-2020 season (n=438). Influenza A made up 60.0% of the total types identified, and influenza B made up 31.3% of the total types identified.

Note: 34 of the 404 total hospitalizations were reported to have identified both influenza A and influenza B viruses; therefore, the total number of hospitalizations in the figure sum to 438.

The number of administered influenza vaccines by age group per week in the Cincinnati Community Primary Care (CCPC) health centers is illustrated below in Figure 3.15. A total of 9,049 influenza immunizations were administered during the 2019-2020 season as of May 16, 2020. Data shows the highest number of vaccines were administered throughout the month of October during the early weeks of the influenza season. After the initial peak and subsequent decrease over the next couple months, there was another vaccination peak during week 20-03 in mid-January (Figure 3.15). The group with the highest number of total vaccines throughout the season was seen in those aged 5-24 years at 4,094 vaccines, while the group with the lowest number of total vaccines was seen in those aged 65-plus years at 484 vaccines (Figure 3.15). When adjusted for population distribution, the vaccination rate among residents aged 5-24 years was 4,883.6 per 100,000 persons, while the rate among residents aged 65-plus years was 1,325.6 per 100,000 persons. The highest vaccination rate was observed among residents aged 0-4 years at 8,730.1 per 100,000 persons or 1,905 total vaccines.

Figure 3.15 Number of Administered Influenza Vaccines by Week

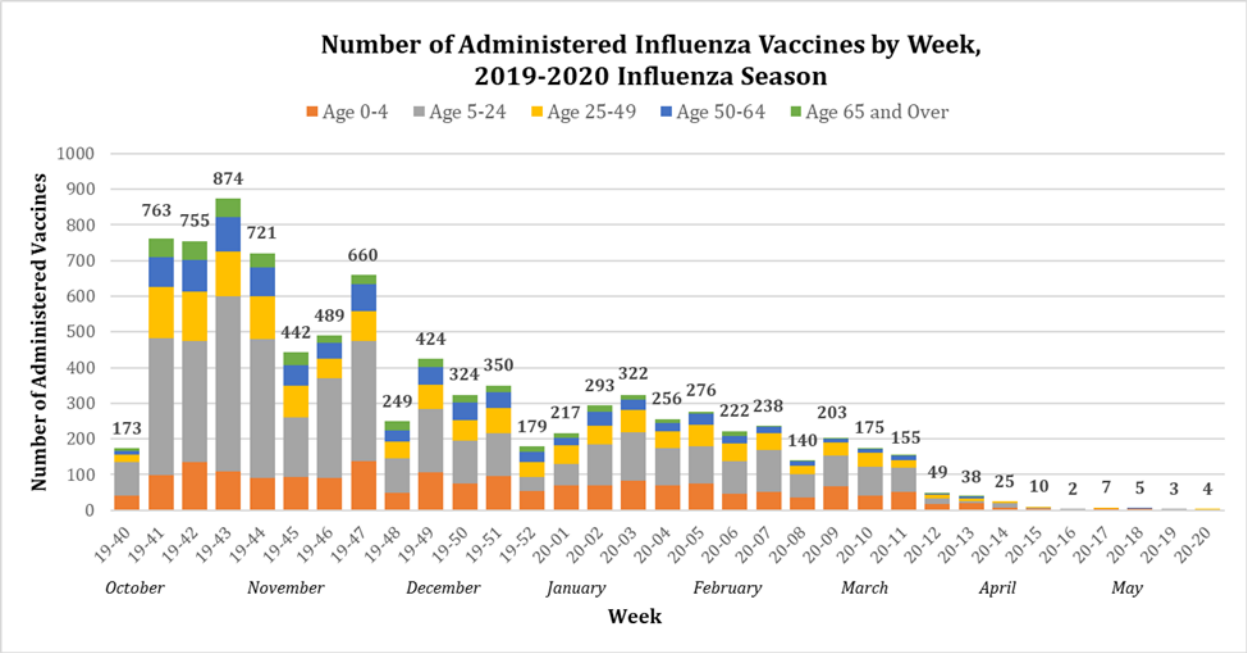

Figure 3.15. Number of administered influenza vaccines by week during the 2019-2020 influenza season (n=9,049).

Figure 3.16 is a heat map of the home zip codes of the 404 patients hospitalized for ILI. The zip codes with the highest patient numbers were 45211, 45229, and 45237 (Figure 3.16). The dark green dots indicate the locations of the six CCPC health centers (Ambrose H. Clement Health Center, Elm Street Health Center, Braxton F. Cann Memorial Medical Center, Hopple Street Neighborhood Health Center, Northside Health Center, and Price Hill Health Center) offering free influenza vaccinations during the 2019-2020 season. Zip codes 45211 and 45237 had two of the three highest patient numbers per zip code, and large portions of the areas are physically distant from a health center. The zip codes where the CCPC health centers are present—45229, 45202, 45227, 45225, 45223, and 45204—had between 13 and 38 residents hospitalized for ILI. These results do not account for population distribution across zip codes.

Figure 3.16 Number of Influenza-Associated Hospitalizations by Patient Zip Code

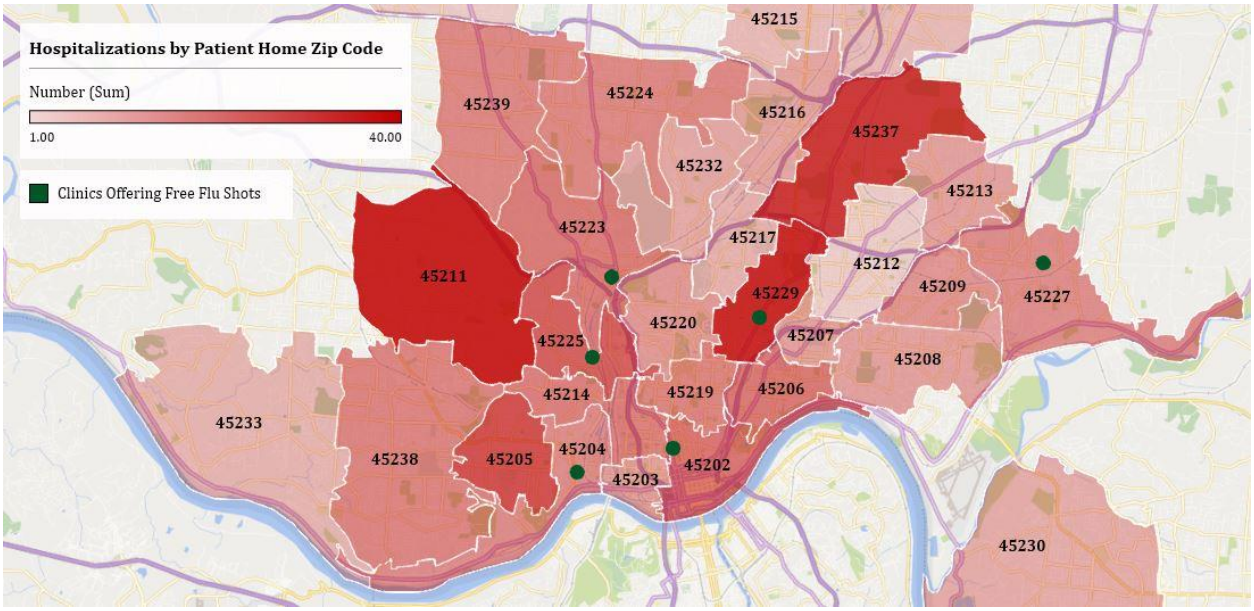

Figure 3.16. Number of influenza-associated hospitalizations by patient home zip code for the 2019-2020 influenza season (n=404). Green dots indicate the six Cincinnati Community Primary Care (CCPC) health centers (Ambrose H. Clement Health Center, Elm Street Health Center, Braxton F. Cann Memorial Medical Center, Hopple Street Neighborhood Health Center, Northside Health Center, and Price Hill Health Center) where free shots were offered throughout the season.

Contact Tracing as part of the COVID-19 Public Health Response

I successfully completed 75 phone calls on behalf of the Cincinnati Health Department with 68 interviews with PUIs and seven calls to close contacts. I attempted to reach out to about 130 individuals, and those who I could not reach were followed up by other health department employees. I wrote eight school and work exclusion letters to professors and supervisors of PUIs and close contacts. In some cases, PUIs did not wish to volunteer information about their close contacts or maintained that no one fit the definition of a close contact in their case. However, in the large majority of cases, PUIs had close contacts who were family members, close friends, or roommates and had already received positive tests at the same time or shortly after and were presumably contacted, or soon to be contacted, as PUIs by other contact tracers.

Chapter 4 - Discussion

Change in Scope of Work

When the Cincinnati Health Department first agreed to host my Applied Practical Experience, we planned for my experience to include three components: 1) complete at least one monthly report on reportable diseases, 2) complete an annual report on the 2019-2020 influenza season, and 3) explore and quantify the COVID-19 response as it relates to both domestic and zoo animals in the Cincinnati area. For the third component, I was tasked with creating a report focused on COVID-19 diagnostic testing of animals in Cincinnati with information about the organizations collecting data, the number of animals tested, the species tested, the rationale for testing, and advice regarding precautions for veterinarians in the area.

In order to complete this COVID-19 report, I contacted Dr. Greg Levens, a veterinarian at the Cincinnati Zoo, Dr. Tony Forshey, the state veterinarian with the Ohio Department of Agriculture, and Dr. Amber Singh, the state public health veterinarian with the Ohio Department of Health. I spoke with the Animal Disease Diagnostic Laboratory, which operates as part of the Ohio Department of Agriculture, and the Diagnostic and Clinical Microbiology Service at the Veterinary Medical Center of The Ohio State University. As of August 2020, the state of Ohio had tested zero animals for SARS-CoV-2, and the state veterinarian recommended against diagnostic testing of SARS-CoV-2 in domestic or exotic animals due to the belief that SARS-CoV-2 does not affect animals. With an absence in data to report, this component of my project was lost.

I planned to finish my Applied Practice Experience in late August 2020, but I continued working with the Cincinnati Health Department into the fall 2020 and spring 2021 semesters as my scope of work shifted focus. I completed a higher number of monthly communicable disease reports and chose to pursue COVID-19 contact tracing to replace the third component of my original plan. It was important to me to participate in the COVID-19 public health response during the ongoing pandemic. Dr. Amin and Ms. Wright provided me the opportunity to be flexible and creative in shifting the scope of my work and connected me with the Cincinnati Health Department contact tracing team.

Monthly Communicable Disease Surveillance Summary Data Reports

My eight monthly communicable disease surveillance summary data reports serve as comprehensive overviews of the reportable diseases reported to the Cincinnati Health Department each month. Each monthly report included a comparison to its corresponding

month from the previous year. Most reportable diseases occurred at incidences that were too low to perform statistical tests to assess differences. Some of these low incidences may be artifacts of underreporting due to lack of education about individual disease surveillance systems, misdiagnoses, or instances where disease data is gathered by an organization outside of ODRS. The two most apparent differences between the period from June 2020 to February 2021 and the period from June 2019 to February 2020 are seen in the reported increased numbers of COVID-19 cases and decreased numbers of influenza-associated hospitalizations.

I chose to use the time period from June 2020 to February 2021 as the "current year" and June 2019 to February 2020 as the "previous year" to compare disease incidences specifically for the reports I made. Data from March 2020 to May 2020 was not available as there had been a lapse in reporting due to the COVID-19 pandemic. In practice, I would have preferred to use full, consecutive annual years (i.e., June 2019 to June 2020 and June 2020 to June 2021) in order to better describe the case data and provide more intuitive comparison to past years, future years, and national and state data if the full year data had been available to me.

In regards to COVID-19, these two time periods can be thought of as "post-COVID-19" and "pre-COVID-19," respectively. According to the Cincinnati Health Department's COVID-19 Case Tracker, the first COVID-19 case in Cincinnati was reported on March 19, 2020. The presence of COVID-19 in the area led to increased surveillance measures as case numbers steadily climbed throughout the summer, fall, and winter. Now, in spring 2021, I anticipate that COVID-19 as a disease will soon move from the "Other Conditions" category to the "Vaccine-Preventable" category with the development of effective vaccines and increasing vaccination rates in the Cincinnati area.

The dramatic decrease in influenza-associated hospitalizations in the current year compared to the past year must be interpreted through the lens of the COVID-19 pandemic as well. Both are respiratory diseases and their symptoms overlap. Social distancing, mask mandates, work-from-home, online school for kindergarten through college, and other preventive measures for COVID-19 that are equally effective at preventing ILI have diminished influenza-associated hospitalizations.[21] Other reportable infectious diseases were likely impacted similarly by COVID-19 prevention measures, but the low incidences prevent the differences from being as obvious as influenza-associated hospitalizations.

Annual Report for the 2019-2020 Influenza Season

The annual report for the 2019-2020 influenza season serves as a source of accessible data that can be used for public health interventions or as comparative data in future years. As there was no record of an annual report for the 2018-2019 influenza season, I am hopeful that my report will make the process of creating the annual report for the 2020-2021 season more efficient and intuitive. In particular, the demographic data identifies groups of people who may benefit from targeted public health interventions including low-cost flu clinics, educational efforts, and further discussions about why these groups exhibited higher rates of disease requiring hospitalization. For example, individuals aged 65-plus exhibited the highest hospitalization rates and the lowest rates of vaccination when adjusted for population distribution. Individuals aged 65-plus may opt for vaccination outside of the CCPC health centers at other healthcare locations or they may have difficulties accessing the CCPC health centers. The heat map showing density of hospitalizations by patient home zip code is designed to show possible areas that may benefit from either a permanent or pop-up vaccine clinic during the parts of the season with the highest transmission in order to get more people in those areas vaccinated. Minimally, this report serves as a historical document showing trends at this point in time of potential value to those analyzing influenza-related data in the future.

One of the most important and actionable health disparities shown in the annual influenza report is the observation that Black residents exhibited hospitalization rates more than double those of White residents in Cincinnati at 183.0 per 100,000 persons compared to 81.8 per 100,000 persons. There is opportunity to assess reasons for this discrepancy and identify subsequent interventions. To better understand whether the reasoning behind the difference lies in differences in exposure rates, disease severity, or preventive measures, I would start by gathering racial demographic data on influenza vaccinations administered in the CCPC health centers. If the result is that Black residents are receiving influenza vaccines at lower rates than White residents, I would target interventions towards increasing vaccination rates among the Black population. This could include implementing pop-up vaccine clinics in residential areas with predominantly Black populations or partnering with community organizations that support the Black population in Cincinnati. These interventions would help address disparity caused by differences in exposure rates as well as decrease the risk of exposure progressing to severe disease that warrants hospitalization. On a broad scale, differences in education and access to healthcare among racial groups have been documented and threaten public health. It is important that the Cincinnati Health Department is aware of these differences to look for ways to integrate influenza education into current health initiatives.

Contact Tracing as part of the COVID-19 Public Health Response

While working as a contact tracer, I learned about the importance of contact tracing and extant knowledge discrepancies regarding COVID-19 disease transmission and encountered firsthand compassion fatigue among public health professionals. First, I directly experienced how contact tracing fits into healthcare. Most of the PUIs with whom I spoke had already been contacted by a laboratory and knew that they had tested positive and should be isolating. Some had already had follow-up conversations with their doctors and been prescribed supportive medications. However, many PUIs expressed frustration about how they may have contracted the disease, confusion about how long to wait before leaving their house, concern about how long symptoms would last, doubt about how to best take care of their family for the time being, and many other understandable emotions. These individuals simply wanted someone to talk to who could answer their questions, and I was glad to be that person for them. I quickly realized that contact tracers were tasked with being the source of health information for people who may have otherwise been lost to the system due to high volumes of positive tests across the city. In addition, the contact tracing leads at the Cincinnati Health Department had created a document of local organizations providing relief for those affected by the COVID-19 pandemic, and I was able to share this document with individuals who expressed concern about being able to support their families while isolating or quarantining.

Time and time again, I was pleasantly surprised by how willing PUIs were to share their stories and personal information in order to identify possible locations and risk factors of COVID-19 disease transmission. I found that active listening was very useful in learning more about each PUI's specific situation. Most PUIs expressed desire to do their part to help reduce disease transmission to others in the area. As I asked questions pertaining to the PUIs' current isolation practices and accounts of recent activities, I discovered knowledge discrepancies in at-risk groups. For example, I spoke with a PUI currently staying in a homeless shelter who was genuinely curious as to how they may have contracted COVID-19 and wondered if it could be blamed on prior needle use. The PUI was surprised to learn that COVID-19 is a respiratory disease and had not made the connection with widespread mask use. I spoke with another PUI who worked in healthcare and had recently received their first vaccine dose before—the immediate next day—spending time with a friend with COVID-19. The PUI expressed frustration about how it could be possible that they had tested positive for COVID-19 despite their recent vaccination. I spoke with a third PUI who told me that they had not had any contact with anyone since testing positive for COVID and later noted that their significant other had visited and given them a hug since the PUI had a fever and was not feeling well. The PUI was genuinely

surprised when I pointed out that the encounter may have been a chance for disease exposure for the significant other. Each of these conversations gave me the chance to educate in a way that reserved judgment or shame of any sort. They also provided me the ability to look critically at how disease information was distributed on national, statewide, and local scales and how these individuals may have been missed. I have a new perspective on communication deficits and vulnerable populations in the COVID-19 pandemic.

Finally, my short time working as a contact tracer introduced me to compassion fatigue in relation to the COVID-19 pandemic. I really enjoyed contributing to the contact tracing effort and was proud about the number of people whose lives I had the chance to impact. Much of my work was during the holiday season while I was physically in Cincinnati, and it felt good to do good for my community during this time. However, it became exhausting to see the impact of the pandemic on people's lives with no clear end in sight. It was difficult to have the same conversations over and over, hoping that people would learn from their mistakes and take my recommendations and wondering if we were doing enough. I had conversations where people told me heartbreaking stories of their loved ones who had passed away from COVID-19, and I had conversations with hospitalized patients where I wondered if I might be among their final phone calls. I only worked as a contact tracer for about 100 hours, so my experience is highly limited compared to full-time contact tracers, who have been working hard for several months on end with few, if any, days off. Contact tracing leads at the Cincinnati Health Department shared mental health resources for contact tracers after requests to do so, so I know I was not alone in these perceptions. The increasing availability of the COVID-19 vaccine right as I transitioned away from contact tracing was a source of increased morale for the contact tracing team.

Conclusion

Overall, my Applied Practical Experience at the Cincinnati Health Department was incredibly insightful, and I am grateful to all the individuals who provided me the chance to learn about public health practice in my home city. I faced personal challenges associated with completing my field experience during a pandemic, but these obstacles were put in perspective by the importance of my work.

At this point in my career, I am interested in pursuing laboratory animal medicine and working as a clinical veterinarian for research animals, particularly nonhuman primates. I also have interests in other population health-related areas of veterinary medicine, including the CDC's Epidemic Intelligence Service, the U.S. Public Health Service, veterinary public health

work at the state or federal level, and shelter medicine. My increased familiarity with disease surveillance, disease reporting, contact tracing, computer-based software, public health vocabulary, independent remote work, and problem solving prepare me to be successful in any of these career paths.

Chapter 5 - Competencies

Table 5.1 Summary of MPH Foundational Competencies

Number and Competency		Description
1	Apply epidemiological methods to the breadth of settings and situations in public health practice	I applied epidemiological methods while contributing to the COVID-19 contact tracing response and while analyzing data for the annual influenza report.
3	Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate	I analyzed quantitative and qualitative data pertaining to reportable diseases, influenza-associated hospitalizations, and COVID-19 contact tracing. I used Microsoft Excel and exported reports from the Ohio Disease Reporting System (ODRS) to create the monthly and annual reports and the Research Electronic Data Capture (REDCap) tool for contact tracing.
4	Interpret results of data analysis for public health research, policy or practice	I interpreted the results of data analysis with my given task of interpreting the annual flu season through various lenses.
18	Select communication strategies for different audiences and sectors	I selected communication strategies for different audiences through the creation of my reports and my communication with community members regarding COVID-19. I was selective in my language and terminology for both of these projects.
21	Perform effectively on interprofessional teams	I performed effectively by working remotely with various members of the Cincinnati Health Department including epidemiologists, contact tracing team leads, and contact tracers.

(1) I applied epidemiological methods while contributing to the COVID-19 contact tracing response and while analyzing data for the annual influenza report. While contact tracing, I was tasked with interviewing a person under investigation (PUI) whose positive COVID-19 test results had been reported to the Cincinnati Health Department via the laboratory. I conducted phone interviews with PUIs to follow up regarding initial and current symptoms, time of symptom onset, potential sources of transmission, potential close contacts during and after the infectious period, quarantine recommendations, and answer any remaining questions from the PUI. While analyzing data for the annual influenza report, I used patient and vaccination data to create a heat map showing density of patients per zip code in the Cincinnati area. This allowed me to overlay the locations of the six health centers run by the Cincinnati Health Departments and see where resources may be needed to further provide access to influenza vaccines.

(3) I analyzed quantitative and qualitative data in each of my three areas: reportable disease reports, the annual influenza report, and contact tracing. I used Microsoft Excel and exported reports from the Ohio Disease Reporting System (ODRS) to create the monthly and annual reports and was trained on the Research Electronic Data Capture (REDCap) tool for contact tracing. I became especially proficient with using Microsoft Excel to analyze large data sets and create informative figures.

(4) I interpreted the results of data analysis for public health practice with my given task of interpreting the annual influenza season through various lenses. The Cincinnati Health Department had not created an annual influenza report for the previous year (2018-2019), so I was tasked with selecting what to include in the report. My intention was to create a report that would provide helpful information to public health professionals in Cincinnati, who may be looking for opportunities for interventions. For this reason, I included rates of influenza-associated hospitalizations by demographic and a heat map of patient home zip codes as well as city vaccine clinic locations.

(18) I selected communication strategies for different audiences through the creation of my reports and my communication with community members regarding COVID-19. I was selective in my language and terminology for each of these projects. My reports were written with public health professionals—including the Cincinnati Health Department epidemiologists and members of the Cincinnati Board of Health—in mind, while my contact tracing efforts were directed towards members of the public with little to no science or health background. For example, I avoided terms like “incubation period” and “close contact” when asking PUIs about their activity in the time before and since they tested positive for COVID-19 and used series of interview questions to get answers.

(21) I performed effectively by working remotely with various members of the Cincinnati Health Department including epidemiologists, contact tracing team leads, and contact tracers. I set the plan of my Applied Practical Experience with my preceptor and supervising epidemiologist Dr. Maryse Amin. I worked extensively with epidemiologist Kimberly Wright to create monthly communicable disease reports and gather data for the annual influenza report. I trained with contact tracer Kristen Knight to learn how to interview PUIs, trace contacts, and log data for daily follow-up calls and ODRS. I worked with contact tracing leads Umar Durrani and Katie Brehm for advice about complex PUI cases. Technology was of utmost importance due to the COVID-19 pandemic preventing us from working together in-person, and I used Microsoft Teams, Google Voice, SharePoint, and GoToMeeting to stay in touch with my team members.

Below is a list of the 22 Public Health Foundational Competencies, the competency number, the courses they are taught in to facilitate completing the table above.

Table 5.2 MPH Foundational Competencies and Course Taught In

22 Public Health Foundational Competencies Course Mapping	MPH 701	MPH 720	MPH 754	MPH 802	MPH 818
Evidence-based Approaches to Public Health					
1. Apply epidemiological methods to the breadth of settings and situations in public health practice	x		x		
2. Select quantitative and qualitative data collection methods appropriate for a given public health context	x	x	x		
3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate	x	x	x		
4. Interpret results of data analysis for public health research, policy or practice	x		x		
Public Health and Health Care Systems					
5. Compare the organization, structure and function of health care, public health and regulatory systems across national and international settings		x			
6. Discuss the means by which structural bias, social inequities and racism undermine health and create challenges to achieving health equity at organizational, community and societal levels					x
Planning and Management to Promote Health					
7. Assess population needs, assets and capacities that affect communities' health		x		x	
8. Apply awareness of cultural values and practices to the design or implementation of public health policies or programs					x
9. Design a population-based policy, program, project or intervention			x		
10. Explain basic principles and tools of budget and resource management		x	x		
11. Select methods to evaluate public health programs	x	x	x		
Policy in Public Health					
12. Discuss multiple dimensions of the policy-making process, including the roles of ethics and evidence		x	x	x	
13. Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes		x		x	
14. Advocate for political, social or economic policies and programs that will improve health in diverse populations		x			x
15. Evaluate policies for their impact on public health and health equity		x		x	
Leadership					
16. Apply principles of leadership, governance and management, which include creating a vision, empowering others, fostering collaboration and guiding decision making		x			x
17. Apply negotiation and mediation skills to address organizational or community challenges		x			

22 Public Health Foundational Competencies Course Mapping	MPH 701	MPH 720	MPH 754	MPH 802	MPH 818
Communication					
18. Select communication strategies for different audiences and sectors	DMP 815, FNDH 880 or KIN 796				
19. Communicate audience-appropriate public health content, both in writing and through oral presentation	DMP 815, FNDH 880 or KIN 796				
20. Describe the importance of cultural competence in communicating public health content		x			x
Interprofessional Practice					
21. Perform effectively on interprofessional teams		x			x
Systems Thinking					
22. Apply systems thinking tools to a public health issue			x	x	

Table 5.3 Summary of MPH Emphasis Area Competencies

MPH Emphasis Area:		
Number and Competency		**Description**
1	Pathogens/pathogenic mechanisms	Evaluate modes of disease causation of infectious agents.
2	Host response to pathogens/immunology	Investigate the host immune response to infection.
3	Environmental/ecological influences	Examine the influence of environmental and ecological forces on infectious diseases.
4	Disease surveillance	Analyze disease risk factors and select appropriate surveillance.
5	Disease vectors	Investigate the role of vectors, toxic plants and other toxins in infectious diseases.

(1) I evaluated modes of disease causation of infectious agents while working on the monthly communicable disease surveillance summaries.

(2) I investigated the host immune response to infection in my Principles of Veterinary Immunology course for my concurrent Doctor of Veterinary Medicine degree.

(3) I examined the influence of environmental and ecological forces on infectious diseases in my Environmental Health course.

(4) I analyzed disease risk factors and selected appropriate surveillance while conducting interviews with COVID-19 persons under investigation and close contacts. I also learned about disease surveillance while researching for my communicable disease and annual influenza reports.

(5) I investigated the role of vectors, toxic plants, and other toxins in infectious diseases in my parasitology and toxicology coursework for my concurrent Doctor of Veterinary Medicine degree.

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Appendix 1

Today's Date
Confirmed or Probable?

CHD UPDATED 9.11.20

Patient first name _____ Patient last name _____ Date of birth (MM/DD/YYYY): ____/____ /_____

Patient Address_____ Patient Phone_____ Cell ☐ Landline ☐

Guardian Name _____ Guardian Phone _____

Human Infection with 2019 Novel Coronavirus
Person Under Investigation (PUI) and Case Report Form

Interviewer information

Name of interviewer: Last _____ First _____

Affiliation/Organization: _____ Telephone _____ Email _____

Basic information

What is the current status of this person?
☐ Patient under investigation (PUI)
☐ Laboratory-confirmed case

Report date of PUI to CDC (MM/DD/YYYY):
____/_____/_____

Report date of case to CDC (MM/DD/YYYY):
____/_____/_____

County of residence: _____
State of residence: _____

Ethnicity:
☐ Hispanic/Latino
☐ Non-Hispanic/ Latino
☐ Not specified

Sex:
☐ Male ☐ Female
☐ Unknown ☐ Other

Pregnant?:
☐ Yes ☐ No
☐ Unknown

Race (check all that apply):
☐ Asian
☐ Black
☐ White
☐ American Indian/Alaska Native
☐ Native Hawaiian/Other Pacific Islander
☐ Unknown
Other, specify: _____

Date of birth (MM/DD/YYYY): ____/_____/_____
Age: _____
Age units(yr/mo/day): _____

Date of first positive specimen collection (MM/DD/YYYY):
____/_____/_____
☐ Unknown ☐ N/A

Did the patient develop pneumonia?
☐ Yes ☐ Unknown
☐ No

Did the patient have acute respiratory distress syndrome?
☐ Yes ☐ Unknown
☐ No

Did the patient have another diagnosis/ etiology for their illness?
☐ Yes ☐ Unknown
☐ No

Did the patient have an abnormal chest X-ray?
☐ Yes ☐ Unknown
☐ No

Was the patient hospitalized?
☐ Yes ☐ No ☐ Unknown
Reason:
If yes, admission date 1
___/___/___ (MM/DD/YYYY)
If yes, discharge date 1
___/___/___ (MM/DD/YYYY)

Was the patient admitted to an intensive care unit (ICU)?
☐ Yes ☐ No ☐ Unknown

Did the patient receive mechanical ventilation (MV)/intubation?
☐ Yes ☐ No ☐ Unknown

If yes, total days with MV (days)
_____

Did the patient receive ECMO?
☐ Yes ☐ No ☐ Unknown

Did the patient require transport?
☐ Yes ☐ No ☐ Unknown

Did the patient die as a result of this illness?
☐ Yes ☐ No ☐ Unknown

Date of death (MM/DD/YYYY):
____/_____/_____
☐ Unknown date of death

Symptoms present during course of illness:
☐ Symptomatic
☐ Asymptomatic
☐ Unknown

If symptomatic, onset date (MM/DD/YYYY):
____/_____/_____
☐ Unknown

If symptomatic, date of symptom resolution (MM/DD/YYYY):
____/_____/____
☐ Still symptomatic ☐ Unknown symptom status
☐ Symptoms resolved, unknown date

Do you have drug allergies?
If yes, please list:

Is the patient a health care worker in the United States? ☐ Yes ☐ No ☐ Unknown

Does the patient have a history of being in a healthcare facility (as a patient, worker or visitor) in China? ☐ Yes ☐ No ☐ Unknown

In the 14 days prior to illness onset, did the patient have any of the following exposures (check all that apply):

☐ Travel to Wuhan
☐ Travel to Hubei
☐ Travel to mainland China
☐ Travel to other non-US country specify:_____
☐ Household contact with another lab confirmed COVID-19 case-patient
☐ Community contact with another lab-confirmed COVID-19 case-patient
☐ Any healthcare contact with another lab-confirmed COVID-19 case-patient
☐ Patient ☐ Visitor ☐ HCW
☐ Animal exposure
☐ Exposure to a cluster of patients with severe acute lower respiratory distress of unknown etiology
☐ Other, specify:_____
☐ Unknown

If the patient had contact with another COVID-19 case, was this person a U.S. case? ☐ Yes, ODRS ID, or First and Last name of source case: _____ ☐ No ☐ Unknown ☐ N/A

Under what process was the PUI or case first identified? (check all that apply): ☐ Clinical evaluation leading to PUI determination
☐ Contact tracing of case patient ☐ Routine surveillance ☐ EpiX notification of travelers; if checked, DGMQID_____
☐ Unknown Other, specify:_____

Symptoms, clinical course, past medical history and social history

Collected from (check all that apply): ☐ Patient interview ☐ Medical record review

Human Infection with 2019 Novel Coronavirus
Person Under Investigation (PUI) and Case Report Form

During this illness, did the patient experience any of the following symptoms?	Symptom Present?
Fever >100.4F (38C)[c]	☐ Yes No Unk
Subjective fever (felt feverish)	☐ Yes ☐ No ☐ Unk
Chills	☐ Yes ☐ No ☐ Unk
Muscle aches (myalgia)	☐ Yes ☐ No ☐ Unk
Runny nose (rhinorrhea)	☐ Yes ☐ No ☐ Unk
Sore throat	☐ Yes ☐ No ☐ Unk
Cough (new onset or worsening of chronic cough)	☐ Yes ☐ No ☐ Unk
Shortness of breath (dyspnea)	☐ Yes ☐ No ☐ Unk
Nausea or vomiting	☐ Yes ☐ No ☐ Unk
Headache	☐ Yes ☐ No ☐ Unk
Abdominal pain	☐ Yes ☐ No ☐ Unk
Diarrhea (≥3 loose/looser than normal stools/24hr period)	☐ Yes ☐ No ☐ Unk
Other, specify:_____	

Pre-existing medical conditions? ☐ Yes ☐ No ☐ Unknown

Chronic Lung Disease (asthma/emphysema/COPD)	☐ Yes	☐ No	☐ Unknown	
Diabetes Mellitus	☐ Yes	☐ No	☐ Unknown	
Cardiovascular disease	☐ Yes	☐ No	☐ Unknown	
Chronic Renal disease	☐ Yes	☐ No	☐ Unknown	
Chronic Liver disease	☐ Yes	☐ No	☐ Unknown	
Immunocompromised Condition	☐ Yes	☐ No	☐ Unknown	
Neurologic/neurodevelopmental	☐ Yes	☐ No	☐ Unknown	(If YES, specify) _____
Other chronic diseases	☐ Yes	☐ No	☐ Unknown	(If YES, specify) _____
If female, currently pregnant	☐ Yes	☐ No	☐ Unknown	
Current smoker	☐ Yes	☐ No	☐ Unknown	
Former smoker	☐ Yes	☐ No	☐ Unknown	

Respiratory Diagnostic Testing

Test	Pos	Neg	Pend.	Not done
Influenza rapid Ag☐A☐B	☐	☐	☐	☐
Influenza PCR ☐A☐B	☐	☐	☐	☐
RSV	☐	☐	☐	☐
H. metapneumovirus	☐			
Parainfluenza (1-4)	☐	☐	☐	☐
Adenovirus	☐	☐	☐	☐
Rhinovirus/enterovirus	☐	☐	☐	☐
Coronavirus (OC43, 229E, HKU1, NL63)	☐	☐	☐	☐
M. pneumoniae	☐			
C. pneumoniae	☐			
Other, Specify:_____				

Specimens for COVID-19 Testing

Specimen Type	Specimen ID	Date Collected	Sent to CDC	State Lab Tested
NP Swab				
OP Swab				
Sputum				
Other, Specify: _____				

Additional State/local Specimen IDs: _____ _____ _____ _____ _____

ODRS ID

Employer Name

Employer Address

Occupation

Employer: Health Care Worker First Responder Long Term Care Facility Jail EMS
Group Home School Other

Resident of Long Term Care Facility, Jail or Group Home Yes No

Attends School, Daycare or Childcare? Yes No If yes, name:

If yes, does the individual participate in extracurricular activities? Yes No

If yes, please list:

Are you currently in home Isolation/Quarantine? Yes No Completed Isolation

If yes, date of isolation? If no, date isolation will start?

Have you participated in protests in the last two weeks? Yes No Refuse to Answer

If yes, list when/where/size of gathering:

If yes, were you wearing a face mask: Yes No

If yes, what type of mask:

Have you participated in any other large gatherings in the last two weeks? Yes No

If yes, list when/where/size of gathering:

If yes, were you wearing a face mask: Yes No

If yes, what type of mask:

Have you attended or participated in any of the following?			If YES, specify:
Restaurants	Yes	No	
Bars/Nightclubs	Yes	No	
Parks/Recreation Areas	Yes	No	
Sports/Sports Facilities/Gyms	Yes	No	
Retail Stores	Yes	No	
Amusement Parks/Casinos	Yes	No	
Church/ Religious Services	Yes	No	
Family/Friend Parties	Yes	No	
Weddings/Funerals/Occasions	Yes	No	
Work Events/Conferences/Trainings	Yes	No	
Museum/Library	Yes	No	
Other:	Yes	No	

Appendix 2

Monthly Infectious Disease Surveillance Summary,[1,2] June 2020

city of CINCINNATI HEALTH DEPARTMENT

Reportable Condition[2] by Category (For a description of listed conditions, see https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infectious-disease-control-manual/section3/idcm-section-3.)	2020 June	2020 YTD	2019 June	2019 YTD	2019 TOTAL
Food- or Waterborne	***3***	***34***	***21***	***143***	***251***
Brucellosis					
Campylobacteriosis		12	5	21	43
Cryptosporidiosis		1		3	14
Cyclosporiasis					10
E. coli, enterohemorrhagic	1	2	1	7	13
Giardiasis		4	1	10	19
Hepatitis A *(also vaccine-preventable)*		3	2	34	39
Legionellosis - Legionnaires' Disease	1	3	4	11	18
Listeriosis				2	2
Salmonellosis	1	7	2	18	41
Shigellosis		2	4	35	48
Vibriosis (not cholera)			1	1	2
Yersiniosis			1	1	2
Vectorborne	***0***	***1***	***1***	***5***	***12***
Chikungunya Virus Disease*				1	2
Lyme disease		1	1	3	6
Malaria*				1	4
Vaccine-Preventable	***0***	***361***	***10***	***316***	***454***
Haemophilus influenzae, invasive disease		6	2	4	11
Influenza-associated hospitalization		328	2	255	336
Mumps				1	1
Pertussis		4	1	13	37
S. pneumoniae, invasive (abx susceptible/unknown)		10	3	21	37
S. pneumoniae, invasive (abx resistant)		13		9	14
Varicella (chickenpox)			2	13	18
Viral Hepatitis	***55***	***246***	***62***	***435***	***771***
Hepatitis B, acute *(also vaccine-preventable)*			2	9	14
Hepatitis B, chronic, newly identified *(also vaccine-preventable)*	8	31	5	48	102
Hepatitis C, acute	1	7		2	8

	Hepatitis C, perinatal		1		3	3
	Hepatitis C, chronic, newly identified	46	207	55	373	644
Other Conditions*		***1,458***	***2,669***	***5***	***33***	***75***
	Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae (CP-CRE)^		1		3	7
	Candida auris		2			
	COVID-19	1,456	2,638			
	Coccidioidomycosis		1		1	1
	Hemolytic uremic syndrome (HUS)					
	Meningitis, aseptic		4	1	12	32
	Meningitis, bacterial (not *N. meningitidis*)		1	2	6	12
	Staphylococcal aureus - intermediate resistance to vancomycin (VISA)					
	Streptococcal, Group A, invasive	2	22	2	9	20
	Streptococcal, Group B, newborn				1	1
	Toxic Shock Syndrome (TSS)				1	2
TOTAL CONFIRMED AND PROBABLE CASES		***1,516***	***3,311***	***99***	***932***	***1,563***
Outbreaks (Investigation started or continuing)		***7***	***21***	***22***	***26***	***30***
	Dermatologic					1
	Gastrointestinal			5	6	8
	Vaccine-Preventable			16	16	17
	Other	7	21	1	1	4

1) Confirmed and probable cases reported by health care providers and laboratories among residents of the City of Cincinnati by date of event (most frequently, the date of event is the date of illness onset).

2) List includes only reportable conditions for which at least one case was reported in either year; the full list of reportable conditions in Ohio can be found at *https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infectious-disease-control-manual.*

*Acquired through international travel

^CP-CRE (Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae) is a multi-drug resistant condition newly reportable as of March 2018.

*Note that sexually-transmitted infections, Human Immunodeficiency Virus (HIV) infections (including AIDS) and Tuberculosis are investigated and reported by Hamilton County Public Health and are not included here.

Monthly Infectious Disease Surveillance Summary,[1,2] July 2020

city of CINCINNATI HEALTH DEPARTMENT

Reportable Condition[2] by Category (For a description of listed conditions, see https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infectious-disease-control-manual/section3/idcm-section-3.)	2020 July	2020 YTD	2019 July	2019 YTD	2019 TOTAL
Food- or Waterborne	***13***	***54***	***13***	***170***	***251***
Brucellosis					
Campylobacteriosis	6	19	4	26	43
Cryptosporidiosis	1	4		3	14
Cyclosporiasis			2	10	10
E. coli, enterohemorrhagic		2	1	7	13
Giardiasis		4	2	13	19
Hepatitis A *(also vaccine-preventable)*		3		36	39
Legionellosis - Legionnaires' Disease		3	2	15	18
Listeriosis				2	2
Salmonellosis	5	15		19	41
Shigellosis		3	2	37	48
Vibriosis (not cholera)				1	2
Yersiniosis	1	1		1	2
Vectorborne	***0***	***1***	***0***	***5***	***12***
Chikungunya Virus Disease*				1	2
Lyme disease		1		3	6
Malaria*				1	4
Vaccine-Preventable	***2***	***364***	***9***	***329***	***454***
Haemophilus influenzae, invasive disease		6		4	11
Influenza-associated hospitalization		328	1	256	336
Mumps				1	1
Pertussis		4	5	21	37
S. pneumoniae, invasive (abx susceptible/unknown)	2	13	1	22	37
S. pneumoniae, invasive (abx resistant)		13		9	14
Varicella (chickenpox)			2	16	18
Viral Hepatitis	***45***	***307***	***61***	***501***	***771***
Hepatitis B, acute *(also vaccine-preventable)*				10	14
Hepatitis B, chronic, newly identified *(also vaccine-preventable)*	1	34	8	56	102
Hepatitis C, acute		8		3	8

	Hepatitis C, perinatal		1		3	3
	Hepatitis C, chronic, newly identified	44	264	53	429	644
Other Conditions*		***1,481***	***4,489***	***5***	***39***	***75***
	Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae (CP-CRE)^		1	1	4	7
	Candida auris		2			
	COVID-19	1,478	4,454			
	Coccidioidomycosis		1		1	1
	Creutzfeldt-Jakob Disease	1	1			
	Hemolytic uremic syndrome (HUS)					
	Meningitis, aseptic		4	2	15	32
	Meningitis, bacterial (not *N. meningitidis*)	2	4		6	12
	Staphylococcal aureus - intermediate resistance to vancomycin (VISA)					
	Streptococcal, Group A, invasive		22	2	11	20
	Streptococcal, Group B, newborn				1	1
	Toxic Shock Syndrome (TSS)				1	2
TOTAL CONFIRMED AND PROBABLE CASES		***1,541***	***5,215***	***88***	***1,044***	***1,563***
Outbreaks (Investigation started or continuing)		***4***	***25***	***22***	***23***	***30***
	Dermatologic					1
	Gastrointestinal			5	6	8
	Vaccine-Preventable			16	16	17
	Other	4	25	1	1	4

1) Confirmed and probable cases reported by health care providers and laboratories among residents of the City of Cincinnati by date of event (most frequently, the date of event is the date of illness onset).

2) List includes only reportable conditions for which at least one case was reported in either year; the full list of reportable conditions in Ohio can be found at *https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infectious-disease-control-manual.*

*Acquired through international travel

^CP-CRE (Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae) is a multi-drug resistant condition newly reportable as of March 2018.

*Note that sexually-transmitted infections, Human Immunodeficiency Virus (HIV) infections (including AIDS) and Tuberculosis are investigated and reported by Hamilton County Public Health and are not included here.

Monthly Infectious Disease Surveillance Summary,[1,2] September 2020

city of CINCINNATI HEALTH DEPARTMENT

Reportable Condition[2] by Category (For a description of listed conditions, see https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infectious-disease-control-manual/section3/idcm-section-3.)	2020 September	2020 YTD	2019 September	2019 YTD	2019 TOTAL
Food- or Waterborne	***17***	***80***	***9***	***203***	***251***
Brucellosis					
Campylobacteriosis	5	25		34	43
Cryptosporidiosis		6	3	6	14
Cyclosporiasis				10	10
E. coli, enterohemorrhagic	1	4	2	12	13
Giardiasis	2	8		16	19
Hepatitis A *(also vaccine-preventable)*		3		36	39
Legionellosis - Legionnaires' Disease		3		15	18
Listeriosis				2	2
Salmonellosis	8	25	4	27	41
Shigellosis	1	5		44	48
Vibriosis (not cholera)					2
Yersiniosis		1		1	2
Vectorborne	***0***	***1***	***0***	***7***	***12***
Chikungunya Virus Disease*				1	2
Lyme disease		1		3	6
Malaria*				3	4
Vaccine-Preventable	***1***	***366***	***12***	***349***	***454***
Haemophilus influenzae, invasive disease		6	2	6	11
Influenza-associated hospitalization		328	2	258	336
Mumps				1	1
Pertussis		4	2	29	37
S. pneumoniae, invasive (abx susceptible/unknown)		14	5	28	37
S. pneumoniae, invasive (abx resistant)	1	14		10	14
Varicella (chickenpox)			1	17	18
Viral Hepatitis	***69***	***436***	***51***	***621***	***771***
Hepatitis B, acute *(also vaccine-preventable)*			1	13	14
Hepatitis B, chronic, newly identified *(also vaccine-preventable)*	6	49	7	78	102

	Hepatitis C, acute		9		6	8
	Hepatitis C, perinatal	2	3		3	3
	Hepatitis C, chronic, newly identified	61	375	43	521	644
Other Conditions*		***929***	***6,217***	***6***	***55***	***75***
	Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae (CP-CRE)^		1		7	7
	Candida auris		2			
	COVID-19	928	6,173			
	Coccidioidomycosis		1		1	1
	Creutzfeldt-Jakob Disease		1			
	Hemolytic uremic syndrome (HUS)					
	Meningitis, aseptic		5	2	23	32
	Meningitis, bacterial (not *N. meningitidis*)	1	8	3	10	12
	Staphylococcal aureus - intermediate resistance to vancomycin (VISA)					
	Streptococcal, Group A, invasive		26	1	12	20
	Streptococcal, Group B, newborn				1	1
	Toxic Shock Syndrome (TSS)				1	2
TOTAL CONFIRMED AND PROBABLE CASES		***1,016***	***7,100***	***78***	***1,235***	***1,563***
Outbreaks (Investigation started or continuing)		***4***	***31***	***5***	***28***	***30***
	Dermatologic				1	1
	Gastrointestinal			2	7	8
	Vaccine-Preventable			2	16	17
	Other	4	31	1	4	4

1) Confirmed and probable cases reported by health care providers and laboratories among residents of the City of Cincinnati by date of event (most frequently, the date of event is the date of illness onset).

2) List includes only reportable conditions for which at least one case was reported in either year; the full list of reportable conditions in Ohio can be found at *https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infectious-disease-control-manual*.

*Acquired through international travel

^CP-CRE (Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae) is a multi-drug resistant condition newly reportable as of March 2018.

#Note that sexually-transmitted infections, Human Immunodeficiency Virus (HIV) infections (including AIDS) and Tuberculosis are investigated and reported by Hamilton County Public Health and are not included here.

Monthly Infectious Disease Surveillance Summary,[1,2] October 2020

city of CINCINNATI HEALTH DEPARTMENT

Reportable Condition[2] by Category (For a description of listed conditions, see https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infectious-disease-control-manual/section3/idcm-section-3.)	2020 October	2020 YTD	2019 October	2019 YTD	2019 TOTAL
Food- or Waterborne	***7***	***86***	***16***	***218***	***251***
Amebiasis		1			
Brucellosis					
Campylobacteriosis	2	26	3	38	43
Cryptosporidiosis		4	1	7	14
Cyclosporiasis		1		10	10
E. coli, enterohemorrhagic		3		12	13
Giardiasis	1	10		18	19
Hepatitis A (also vaccine-preventable)		3	2	39	39
Legionellosis - Legionnaires' Disease		3	2	17	18
Listeriosis				2	2
Salmonellosis	3	28	6	27	41
Shigellosis	1	5	1	46	48
Vibriosis (not cholera)					2
Yersiniosis		2	1	2	2
Vectorborne	***0***	***2***	***0***	***9***	***12***
Chikungunya Virus Disease*				1	2
Lyme disease		1		5	6
Malaria*				3	4
Spotted Fever Rickettsiosis		1			
Vaccine-Preventable	***0***	***367***	***10***	***360***	***454***
Haemophilus influenzae, invasive disease		6		6	11
Influenza-associated hospitalization		329	3	261	336
Mumps				1	1
Pertussis		4	3	33	37
S. pneumoniae, invasive (abx susceptible/unknown)		14	3	31	37
S. pneumoniae, invasive (abx resistant)		14	1	11	14
Varicella (chickenpox)				17	18

Viral Hepatitis		***77***	***498***	***42***	***658***	***771***
	Hepatitis B, acute *(also vaccine-preventable)*				13	14
	Hepatitis B, chronic, newly identified *(also vaccine-preventable)*	2	50	8	85	102
	Hepatitis C, acute		8		7	8
	Hepatitis C, perinatal		3		3	3
	Hepatitis C, chronic, newly identified	75	437	34	550	644
Other Conditions#		***1,883***	***8,034***	***1***	***55***	***75***
	Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae (CP-CRE)^		2		6	7
	Candida auris		2			
	COVID-19	1,879	7,980			
	Coccidioidomycosis		1		1	1
	Creutzfeldt-Jakob Disease		1			
	Hemolytic uremic syndrome (HUS)					
	Meningitis, aseptic	2	7		23	32
	Meningitis, bacterial (not *N. meningitidis*)		8	1	11	12
	Multisystem Inflammatory Syndrome in Children (MIS-C) associated with COVID-19		2			
	Staphylococcal aureus - intermediate resistance to vancomycin (VISA)					
	Streptococcal, Group A, invasive	1	29		12	20
	Streptococcal, Group B, newborn	1	2		1	1
	Toxic Shock Syndrome (TSS)				1	2
TOTAL CONFIRMED AND PROBABLE CASES		***1,967***	***8,987***	***69***	***1,300***	***1,563***
Outbreaks (Investigation started or continuing)		***3***	***39***	***1***	***28***	***30***
	Dermatologic				1	1
	Gastrointestinal		2		7	8
	Respiratory	3	37			
	Vaccine-Preventable			1	16	17
	Other				4	4

1) Confirmed and probable cases reported by health care providers and laboratories among residents of the City of Cincinnati by date of event (most frequently, the date of event is the date of illness onset).

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*Acquired through international travel

^CP-CRE [Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae] is a multi-drug resistant condition newly reportable as of March 2018.

#Note that sexually-transmitted infections, Human Immunodeficiency Virus (HIV) infections (including AIDS) and Tuberculosis are investigated and reported by Hamilton County Public Health and are not included here.

Monthly Infectious Disease Surveillance Summary,[1,2] November 2020

city of CINCINNATI HEALTH DEPARTMENT

Reportable Condition[2] by Category (For a description of listed conditions, see https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infectious-disease-control-manual/section3/idcm-section-3.)	2020 November	2020 YTD	2019 November	2019 YTD	2019 TOTAL
Food- or Waterborne	***2***	***88***	***19***	***247***	***251***
Amebiasis		1			
Brucellosis					
Campylobacteriosis		26	3	42	43
Cryptosporidiosis	1	5	5	13	14
Cyclosporiasis		1		10	10
E. coli, enterohemorrhagic		3	1	13	13
Giardiasis		10	1	19	19
Hepatitis A (also vaccine-preventable)		3		39	39
Legionellosis - Legionnaires' Disease		3		17	18
Listeriosis	1	1		2	2
Salmonellosis		28	8	41	41
Shigellosis		5	1	47	48
Vibriosis (not cholera)				2	2
Yersiniosis		2		2	2
Vectorborne	***0***	***2***	***1***	***12***	***12***
Chikungunya Virus Disease*				2	2
Lyme disease		1		6	6
Malaria*			1	4	4
Spotted Fever Rickettsiosis		1			
Vaccine-Preventable	***0***	***367***	***21***	***381***	***454***
Haemophilus influenzae, invasive disease		6	2	8	11
Influenza-associated hospitalization		329	9	270	336
Mumps				1	1
Pertussis		4	4	37	37
S. pneumoniae, invasive (abx susceptible/unknown)		14	2	33	37
S. pneumoniae, invasive (abx resistant)		14	3	14	14
Varicella (chickenpox)			1	18	18

Viral Hepatitis		***50***	***548***	***66***	***723***	***771***
	Hepatitis B, acute *(also vaccine-preventable)*				13	14
	Hepatitis B, chronic, newly identified *(also vaccine-preventable)*	6	56	8	93	102
	Hepatitis C, acute	1	9		7	8
	Hepatitis C, perinatal	1	4		3	3
	Hepatitis C, chronic, newly identified	42	479	58	607	644
Other Conditions#		***4,026***	***12,060***	***3***	***59***	***75***
	Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae (CP-CRE)^		2		7	7
	Candida auris		2			
	COVID-19	4,026	12,006			
	Coccidioidomycosis		1		1	1
	Creutzfeldt-Jakob Disease		1			
	Hemolytic uremic syndrome (HUS)					
	Meningitis, aseptic		7	1	24	32
	Meningitis, bacterial (not *N. meningitidis*)		8		11	12
	Multisystem Inflammatory Syndrome in Children (MIS-C) associated with COVID-19		2			
	Staphylococcal aureus - intermediate resistance to vancomycin (VISA)					
	Streptococcal, Group A, invasive		29		13	20
	Streptococcal, Group B, newborn		2	1	1	1
	Toxic Shock Syndrome (TSS)			1	2	2
TOTAL CONFIRMED AND PROBABLE CASES		***4,078***	***13,065***	***110***	***1,422***	***1,563***
Outbreaks (Investigation started or continuing)		***5***	***44***	***1***	***29***	***30***
	Dermatologic				1	1
	Gastrointestinal		2		7	8
	Respiratory	5	42			
	Vaccine-Preventable			1	17	17
	Other				4	4

1) Confirmed and probable cases reported by health care providers and laboratories among residents of the City of Cincinnati by date of event (most frequently, the date of event is the date of illness onset).

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*Acquired through international travel

^CP-CRE (Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae) is a multi-drug resistant condition newly reportable as of March 2018.

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Monthly Infectious Disease Surveillance Summary,[1,2] December 2020

city of CINCINNATI HEALTH DEPARTMENT

Reportable Condition[2] by Category (For a description of listed conditions, see https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infectious-disease-control-manual/section3/idcm-section-3.)	2020 December	2020 YTD	2019 December	2019 YTD	2019 TOTAL
Food- or Waterborne	***11***	***99***	***4***	***251***	***251***
Amebiasis		1			
Brucellosis					
Campylobacteriosis	5	31	1	43	43
Cryptosporidiosis		5	1	14	14
Cyclosporiasis		1		10	10
E. coli, enterohemorrhagic		3		13	13
Giardiasis		10		19	19
Hepatitis A (also vaccine-preventable)		3		39	39
Legionellosis - Legionnaires' Disease	1	4	1	18	18
Listeriosis		1		2	2
Salmonellosis	3	31		41	41
Shigellosis	2	7	1	48	48
Vibriosis (not cholera)				2	2
Yersiniosis		2		2	2
Vectorborne	***0***	***2***	***0***	***12***	***12***
Chikungunya Virus Disease*				2	2
Lyme disease		1		6	6
Malaria*				4	4
Spotted Fever Rickettsiosis		1			
Vaccine-Preventable	***2***	***369***	***73***	***454***	***454***
Haemophilus influenzae, invasive disease	1	7	3	11	11
Influenza-associated hospitalization		329	66	336	336
Mumps				1	1
Pertussis		4		37	37
S. pneumoniae, invasive (abx susceptible/unknown)	1	15	4	37	37
S. pneumoniae, invasive (abx resistant)		14		14	14
Varicella (chickenpox)				18	18

Viral Hepatitis		***56***	***604***	***48***	***771***	***771***
	Hepatitis B, acute *(also vaccine-preventable)*			1	14	14
	Hepatitis B, chronic, newly identified *(also vaccine-preventable)*	7	63	9	102	102
	Hepatitis C, acute		9	1	8	8
	Hepatitis C, perinatal		4		3	3
	Hepatitis C, chronic, newly identified	49	528	37	644	644
Other Conditions#		***5,355***	***17,415***	***16***	***75***	***75***
	Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae (CP-CRE)^	1	3		7	7
	Candida auris		2			
	COVID-19	5,352	17,358			
	Coccidioidomycosis		1		1	1
	Creutzfeldt-Jakob Disease		1			
	Hemolytic uremic syndrome (HUS)					
	Meningitis, aseptic		7	8	32	32
	Meningitis, bacterial (not *N. meningitidis*)		8	1	12	12
	Multisystem Inflammatory Syndrome in Children (MIS-C) associated with COVID-19		2			
	Staphylococcal aureus - intermediate resistance to vancomycin (VISA)					
	Streptococcal, Group A, invasive	1	30	7	20	20
	Streptococcal, Group B, newborn	1	3		1	1
	Toxic Shock Syndrome (TSS)				2	2
TOTAL CONFIRMED AND PROBABLE CASES		***5,424***	***18,489***	***141***	***1,563***	***1,563***
Outbreaks (Investigation started or continuing)		***5***	***51***	***1***	***30***	***30***
	Dermatologic				1	1
	Gastrointestinal		2		8	8
	Respiratory	5	49			
	Vaccine-Preventable			1	17	17
	Other				4	4

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*Acquired through international travel

^CP-CRE (Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae) is a multi-drug resistant condition newly reportable as of March 2018.

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Monthly Infectious Disease Surveillance Summary,[1,2] January 2021

city of CINCINNATI HEALTH DEPARTMENT

Reportable Condition[2] by Category (For a description of listed conditions, see https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infectious-disease-control-manual/section3/idcm-section-3.)	2021 January	2021 YTD	2020 January	2020 YTD	2020 TOTAL
Food- or Waterborne	***1***	***1***	***7***	***7***	***99***
Amebiasis					1
Brucellosis					
Campylobacteriosis			2	2	31
Cryptosporidiosis					5
Cyclosporiasis					1
E. coli, enterohemorrhagic	1	1	1	1	3
Giardiasis			1	1	10
Hepatitis A (also vaccine-preventable)					3
Legionellosis - Legionnaires' Disease			1	1	4
Listeriosis					1
Salmonellosis			2	2	31
Shigellosis					7
Vibriosis (not cholera)					
Yersiniosis					2
Vectorborne	***1***	***1***	***0***	***0***	***2***
Chikungunya Virus Disease*					
Lyme disease					1
Malaria*	1	1			
Spotted Fever Rickettsiosis					1
Vaccine-Preventable	***2***	***2***	***123***	***123***	***369***
Haemophilus influenzae, invasive disease			3	3	7
Influenza-associated hospitalization			110	110	329
Mumps					
Pertussis					4
S. pneumoniae, invasive (abx susceptible/unknown)	2	2	6	6	15
S. pneumoniae, invasive (abx resistant)			4	4	14
Varicella (chickenpox)					

Viral Hepatitis		***30***	***30***	***41***	***41***	***604***
	Hepatitis B, acute *(also vaccine-preventable)*	1	1			
	Hepatitis B, chronic, newly identified *(also vaccine-preventable)*	4	4	5	5	63
	Hepatitis C, acute	3	3	2	2	9
	Hepatitis C, perinatal					4
	Hepatitis C, chronic, newly identified	22	22	34	34	528
Other Conditions*		***4,291***	***4,291***	***6***	***6***	***17,415***
	Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae (CP-CRE)^					3
	Candida auris					2
	COVID-19	4,286	4,286			17,358
	Coccidioidomycosis					1
	Creutzfeldt-Jakob Disease					1
	Hemolytic uremic syndrome (HUS)					
	Meningitis, aseptic	1	1	1	1	7
	Meningitis, bacterial (not *N. meningitidis*)	1	1	1	1	8
	Multisystem Inflammatory Syndrome in Children (MIS-C) associated with COVID-19					2
	Staphylococcal aureus - intermediate resistance to vancomycin (VISA)					
	Streptococcal, Group A, invasive	3	3	4	4	30
	Streptococcal, Group B, newborn					3
	Toxic Shock Syndrome (TSS)					
TOTAL CONFIRMED AND PROBABLE CASES		***4,325***	***4,325***	***177***	***177***	***18,489***
Outbreaks (Investigation started or continuing)		***0***	***0***	***2***	***2***	***51***
	Dermatologic					
	Gastrointestinal			2	2	2
	Respiratory					49
	Vaccine-Preventable					
	Other					

1) Confirmed and probable cases reported by health care providers and laboratories among residents of the City of Cincinnati by date of event (most frequently, the date of event is the date of illness onset).

2) List includes only reportable conditions for which at least one case was reported in either year; the full list of reportable conditions in Ohio can be found at *https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infectious-disease-control-manual.*

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Monthly Infectious Disease Surveillance Summary,[1,2] February 2021

city of CINCINNATI HEALTH DEPARTMENT

Reportable Condition[2] by Category (For a description of listed conditions, see https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infectious-disease-control-manual/section3/idcm-section-3.)	2021 February	2021 YTD	2020 February	2020 YTD	2020 TOTAL
Food- or Waterborne	***6***	***7***	***7***	***14***	***99***
Amebiasis					1
Brucellosis					
Campylobacteriosis	3	3	3	5	31
Cryptosporidiosis	1	1	1	1	5
Cyclosporiasis					1
E. coli, enterohemorrhagic		1		1	3
Giardiasis	1	1		2	10
Hepatitis A (also vaccine-preventable)			3	3	3
Legionellosis - Legionnaires' Disease					4
Listeriosis					1
Salmonellosis				2	31
Shigellosis	1	1			7
Vibriosis (not cholera)					
Yersiniosis					2
Vectorborne	***1***	***2***	***0***	***1***	***2***
Chikungunya Virus Disease*					
Lyme disease				1	1
Malaria*	1	2			
Spotted Fever Rickettsiosis					1
Vaccine-Preventable	***5***	***7***	***141***	***280***	***369***
Haemophilus influenzae, invasive disease	1	1	1	4	7
Influenza-associated hospitalization	1	1	136	261	329
Mumps					
Pertussis			1	2	4
S. pneumoniae, invasive (abx susceptible/unknown)	2	4	1	6	15
S. pneumoniae, invasive (abx resistant)	1	1	2	7	14
Varicella (chickenpox)					

Viral Hepatitis		***46***	***76***	***42***	***90***	***604***
	Hepatitis B, acute *(also vaccine-preventable)*		1			
	Hepatitis B, chronic, newly identified *(also vaccine-preventable)*	4	8	5	9	63
	Hepatitis C, acute		3	2	4	9
	Hepatitis C, perinatal			1	1	4
	Hepatitis C, chronic, newly identified	42	64	34	76	528
Other Conditions*		***1,856***	***6,147***	***0***	***12***	***17,415***
	Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae (CP-CRE)^	1	1		1	3
	Candida auris					2
	COVID-19	1,850	6,136			17,358
	Coccidioidomycosis				1	1
	Creutzfeldt-Jakob Disease					1
	Hemolytic uremic syndrome (HUS)					
	Meningitis, aseptic		1		1	7
	Meningitis, bacterial (not *N. meningitidis*)	1	2		1	8
	Multisystem Inflammatory Syndrome in Children (MIS-C) associated with COVID-19					2
	Staphylococcal aureus - intermediate resistance to vancomycin (VISA)					
	Streptococcal, Group A, invasive	4	7		8	30
	Streptococcal, Group B, newborn					3
	Toxic Shock Syndrome (TSS)					
TOTAL CONFIRMED AND PROBABLE CASES		***1,914***	***6,239***	***190***	***397***	***18,489***
Outbreaks (Investigation started or continuing)		***1***	***1***	***5***	***7***	***51***
	Dermatologic					
	Gastrointestinal				2	2
	Respiratory	1	1	5	5	49
	Vaccine-Preventable					
	Other					

1) Confirmed and probable cases reported by health care providers and laboratories among residents of the City of Cincinnati by date of event (most frequently, the date of event is the date of illness onset).

2) List includes only reportable conditions for which at least one case was reported in either year; the full list of reportable conditions in Ohio can be found at *https://odh.ohio.gov/wps/portal/gov/odh/know-our-programs/infectious-disease-control-manual.*

*Acquired through international travel

^CP-CRE (Carbapenemase-Producing Carbapenem-Resistant Enterobacteriaceae) is a multi-drug resistant condition newly reportable as of March 2018.

*Note that sexually-transmitted infections, Human Immunodeficiency Virus (HIV) infections (including AIDS) and Tuberculosis are investigated and reported by Hamilton County Public Health and are not included here.

Appendix 3

Cincinnati Annual Influenza Report: 2019-2020 Season

(09/29/19 to 05/16/20)

Background

The U.S. influenza surveillance season runs from the 40th week of the year (using the Centers for Disease Control and Prevention (CDC)'s *Morbidity and Mortality Weekly Report* calendar) through the 20th week of the next year. For the 2019-2020 season, week 40 (denoted 19-40) began on 09/29/2019 and week 20 (denoted 20-20) ended on 05/16/2020.

Influenza, by itself, is not a reportable disease, meaning that it is not one of the diseases that Ohio law mandates be reported to public health authorities. This means that public health authorities do not have a single simple data source to measure the incidence (occurrence) and impact of influenza. For this reason, influenza surveillance is conducted by looking at different factors and data sources. In Ohio, influenza-associated hospitalizations of persons of any age and influenza-associated pediatric deaths are reportable.

Pediatric Deaths (2019-2020 season)

- Cincinnati: 0
- Ohio*: 5
- United States*: 189

**As of week 20-20, end of 2019-2020 season*

Hospital Admissions

From 09/29/2019 through 05/16/2020, 404 Cincinnatians were hospitalized for influenza (Table 1, below). This total is greater than the last influenza season. Previous infectious diseases surveillance summaries for Cincinnati indicate that 264 Cincinnati residents were hospitalized for influenza during the 2018-2019 season. Statewide, the total number of influenza-associated hospitalizations is 11,005 (through 05/16/2020). In the last week of the 2019-2020 season, influenza-associated hospitalizations for Ohio were below the seasonal threshold.

Table 1. Number of influenza-associated hospitalizations among Cincinnati residents by month during the 2019-2020 season, which spans from 09/29/2019 to 05/16/2020.

Month	Number of hospitalizations
October	2
November	9
December	60
January	120
February	140
March	72
April	0
May	1
Total	**404**

Figure 1 (below) shows the epidemic curve of the number of influenza-associated hospitalizations among Cincinnati residents reported to the Cincinnati Health Department by their week of admission.

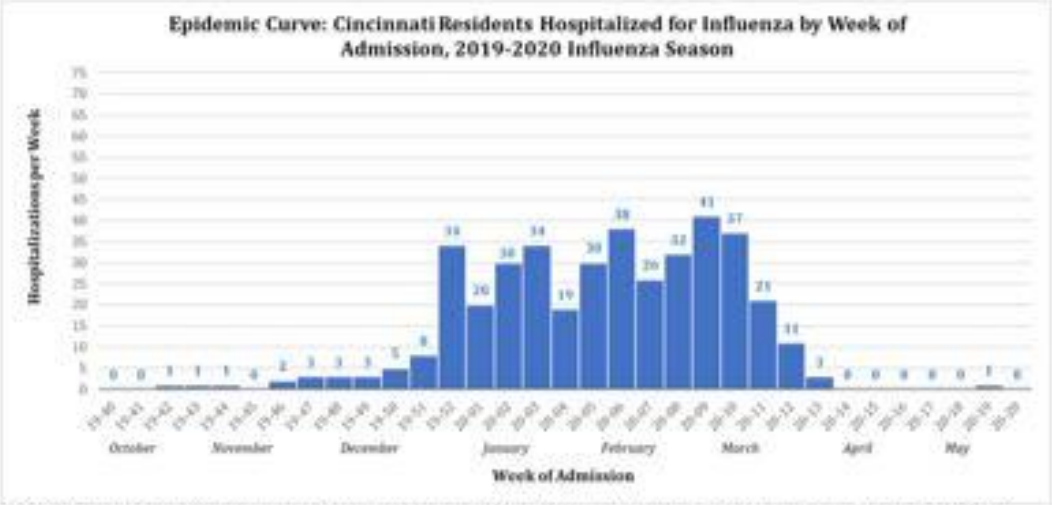

Figure 1. Number of Cincinnati residents hospitalized for influenza by week of admission during the 2019-2020 influenza season (n=404).

Demographics of Hospital Admissions:

Figure 2 (below) shows the distribution of influenza-associated hospitalizations by sex during the 2019-2020 influenza season. The rate of hospitalizations among males in Cincinnati was 120.1 per 100,000 persons, while the rate among females in Cincinnati was 147.2 per 100,000 persons (Table 2, below).

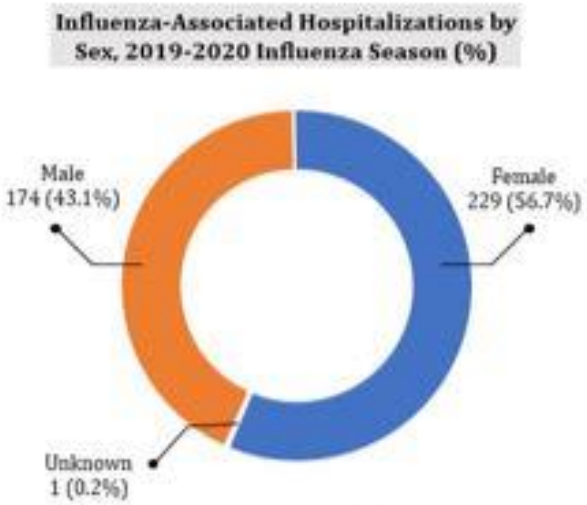

Figure 2. Influenza-associated hospitalizations by sex during the 2019-2020 influenza season (n=404).

Figure 3 (below) shows the distribution of influenza-associated hospitalizations by race during the 2019-2020 influenza season. The rate of hospitalizations among Cincinnati residents identifying as Asian was 25.6 per 100,000 persons, the rate among residents identifying as white was 81.8 per 100,000 persons, the rate among residents identifying as Black was 183.0 per 100,000 persons, and the rate among residents identifying as other was 270.8 per 100,000 persons (Table 2, below).

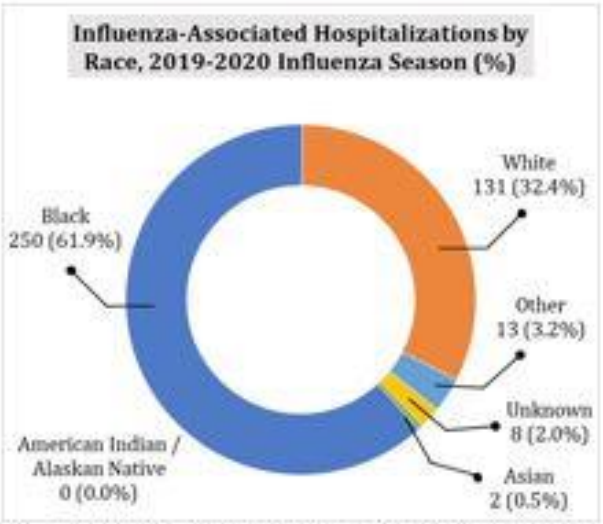

Figure 3. Influenza-associated hospitalizations by race during the 2019-2020 influenza season (n=404).

Figure 4 (below) shows the distribution of influenza-associated hospitalizations by ethnicity during the 2019-2020 influenza season. The rate of hospitalizations among Cincinnati residents identifying as non-Hispanic or non-Latino was 111.7 per 100,000 persons, while the rate among Cincinnati residents identifying as Hispanic or Latino was 99.4 per 100,000 persons (Table 2, below).

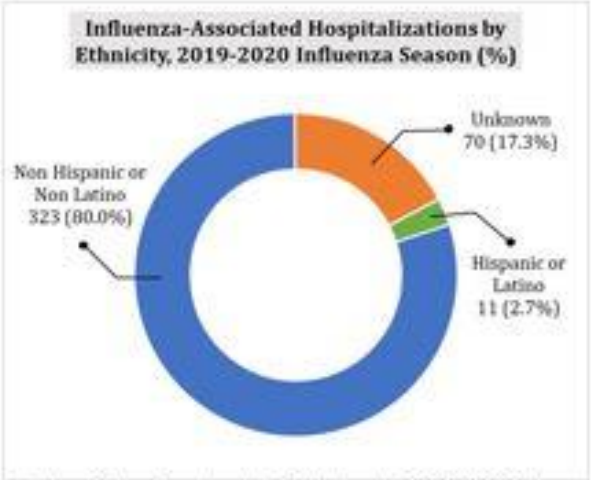

Figure 4. Influenza-associated hospitalizations by ethnicity during the 2019-2020 influenza season (n=404).

Figure 5 (below) shows the distribution of influenza-associated hospitalizations by age group during the 2019-2020 influenza season. The rate of hospitalizations among the youngest age group (0-4 years) and two oldest age groups (50-64 years and 65+ years) were the highest at 220.0 per 100,000 persons, 215.0 per 100,000 persons, and 293.0 per 100,000 persons, respectively. This is compared to the rate of 70.7 per 100,000 persons among residents aged 5-17 years and the rate of 72.3 per 100,000 persons among residents aged 18-49 years (Table 2, below).

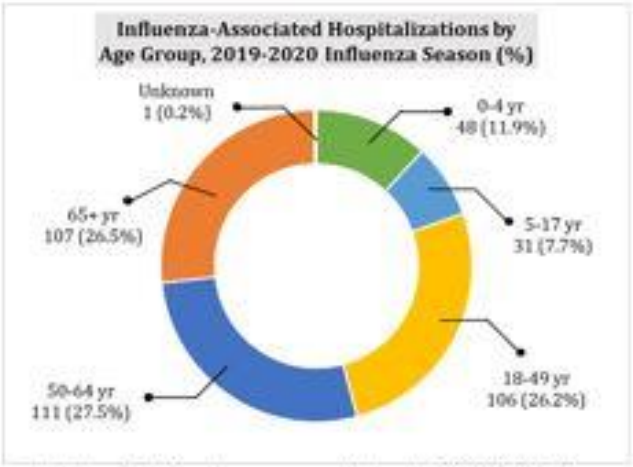

Figure 5. Influenza-associated hospitalizations by age group during the 2019-2020 influenza season (n=404).

Table 2. Breakdown of number of influenza-associated hospitalizations by demographic categories. Rates are per 100,000 persons and calculated from estimated Cincinnati population figures from the 2018 U.S. Census Bureau.

	Category	Number	Percentage	Rate	LL (95% CI)	UL (95% CI)	Std. error
Sex	Male	174	43.1%	120.1	102.3	138.0	9.1026
	Female	229	56.7%	147.2	128.2	166.3	9.7226
	Unknown	1	0.2%	N/A	N/A	N/A	N/A
Race	Asian	2	0.5%	25.6	-9.9	61.0	18.0846
	American Indian / Alaskan Native	0	0.0%	0.0	0.0	0.0	0.0000
	Black	250	61.9%	183.0	160.4	205.7	11.5630
	White	131	32.4%	81.8	67.8	95.8	7.1441
	Other	13	3.2%	270.8	123.8	417.9	75.0139
	Unknown	8	2.0%	N/A	N/A	N/A	N/A
Ethnicity	Hispanic or Latino	11	2.7%	99.4	40.7	158.2	29.9699
	Non-Hispanic or Non-Latino	323	80.0%	111.7	99.5	123.8	6.2089
	Unknown	70	17.3%	N/A	N/A	N/A	N/A
Age	0-4 years	48	11.9%	220.0	157.8	282.1	31.7152
	5-17 years	31	7.7%	70.7	45.8	95.6	12.6945
	18-49 years	106	26.2%	72.3	58.6	86.1	7.0233
	50-64 years	111	27.5%	215.0	175.0	254.9	20.3806
	65+ years	107	26.5%	293.0	237.6	348.5	28.2883
	Unknown	1	0.2%	N/A	N/A	N/A	N/A
	Total	**404**	**100.0%**	**134.5**	**121.4**	**147.6**	**6.6875**

Outpatient Visits: Sentinel Influenza Program

To get a broader picture of the impact of influenza on the community, the Centers for Disease Control and Prevention (CDC) partners with clinics and medical practices in a voluntary program called ILINet through which the number of individuals with certain symptoms similar to influenza ("Influenza-Like Illness", or ILI)[1] are reported weekly along with the total number of patients seen at the clinic or practice. This voluntary ("sentinel") reporting allows for the calculation of the percentage of outpatient visits attributable to ILI. Within Cincinnati, three sites participate in this program as coordinated by the Cincinnati Health Department (CHD). The three sites in Cincinnati are two full-scale primary care health centers and a school-based health center at a high school.

Sentinel data was provided up until 03/09/2020 during the 2019-2020 influenza season. In total, 103 patients meeting the definition of ILI were reported to the CHD from the three local sentinel influenza sites. The percentage of outpatient visits due to ILI did not surpass the regional epidemic threshold of 1.8% and peaked right at 1.8% during week 19-48 (Figure 6, below).

Figure 6. Percentage of outpatient visits due to influenza-like illness by week during the 2019-2020 influenza season. The red dotted line indicates the regional epidemic threshold of 1.8%.

[1] *ILI = Influenza-Like Illness*
-Temperature of >100.40 degrees Fahrenheit; AND
-Cough OR sore throat; AND
-No known cause other than influenza.

Influenza Types

The number of influenza-associated hospitalizations by influenza type is illustrated by Figure 7 (below). The figure shows a peak in Influenza B organisms earlier in the season with a peak in Influenza A organisms later in the season around week 20-09.

Of the samples collected during the 2019-2020 season, 263 were positive for Influenza A with 37 of those further typed A (H1). 137 samples tested positive for Influenza B, and 38 samples were marked as unknown.

These results mirror those seen nationwide and statewide according to summaries from the Centers for Disease Control and Prevention (CDC) and the Ohio Department of Health (ODH). The CDC reported a peak in Influenza B samples at week 19-52 and a peak in Influenza A samples at week 20-05. ODH reported a peak in Influenza B positive tests at week 19-52 as well and a peak in Influenza A positive tests at week 20-06.

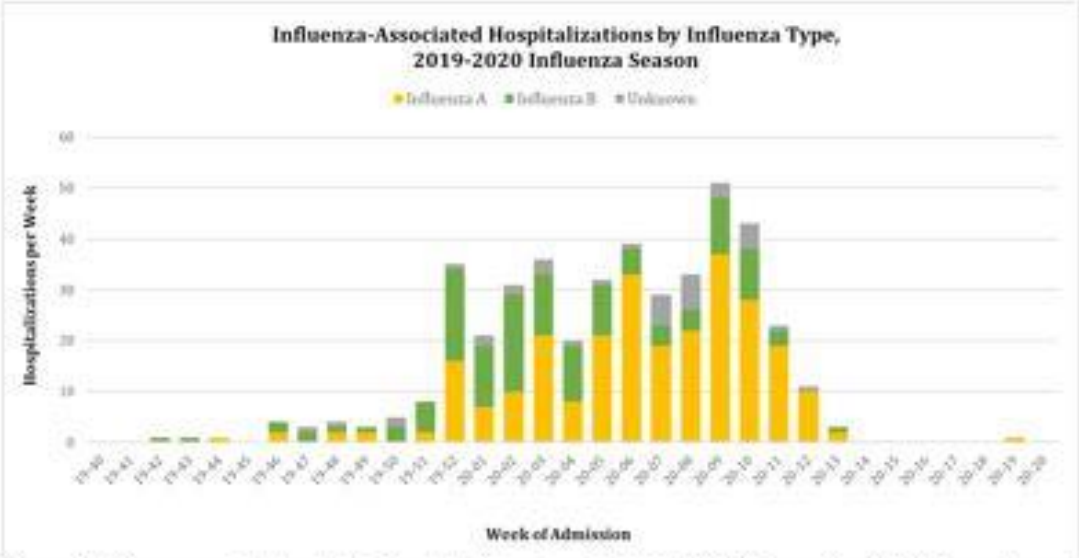

Figure 7. Influenza-associated hospitalizations by influenza type for the 2019-2020 season (n=438). Influenza A organisms made up 60.0% of the total types identified, and Influenza B organisms made up 31.3% of the total types identified.
Note: 34 of the 404 total hospitalizations were reported to have identified both Influenza A and Influenza B organisms; therefore, the total number of hospitalizations in the figure sum to 438.

Influenza Immunizations

The number of administered influenza vaccines by age group per week in the Cincinnati Community Primary Care (CCPC) health centers is illustrated in Figure 8 (below). A total of 9,049 influenza immunizations were administered during the 2019-2020 season, reported as of 5/16/2020. Residents were urged to take advantage of these vaccinations offered at no cost throughout the season. Data shows the highest number of vaccines were administered throughout the month of October in the early weeks of the season. After the initial peak and subsequent decrease over the next couple months, there was another peak of vaccines administered during week 20-03 in mid-January.

The Centers for Disease Control and Prevention (CDC) estimated that the seasonal flu vaccine was 39% effective during the 2019-2020 influenza season as compared to a reported estimate of 29% effectiveness during the 2018-2019 influenza season. Midway through the season in late February, the CDC reported that vaccination remains the best way to protect against the flu and its potential consequences.

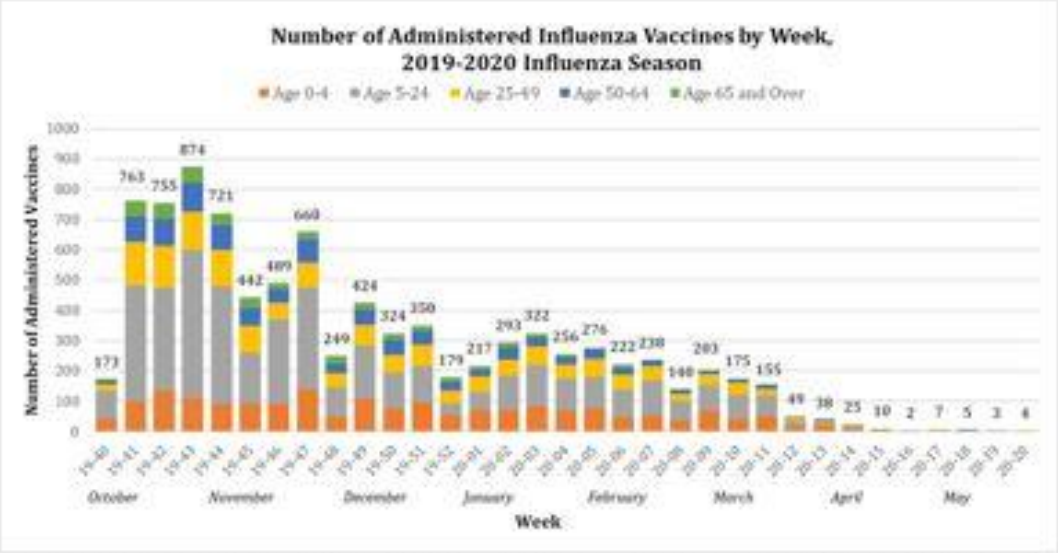

Figure 8. Number of administered influenza vaccines by week during the 2019-2020 influenza season (n=9,049).

A heat map indicating the home zip codes of patients with influenza-associated hospitalizations is shown in Figure 9 (below). The dark green dots indicate the locations of the six CCPC health centers (Ambrose H. Clement Health Center, Elm Street Health Center, Braxton F. Cann Memorial Medical Center, Hopple Street Neighborhood Health Center, Northside Health Center, and Price Hill Health Center) that offered free influenza vaccinations during the 2019-2020 season. This map may be useful in highlighting areas of need in the community where pop-up clinics or further prevention resources could help reduce the number of influenza-associated hospitalizations.

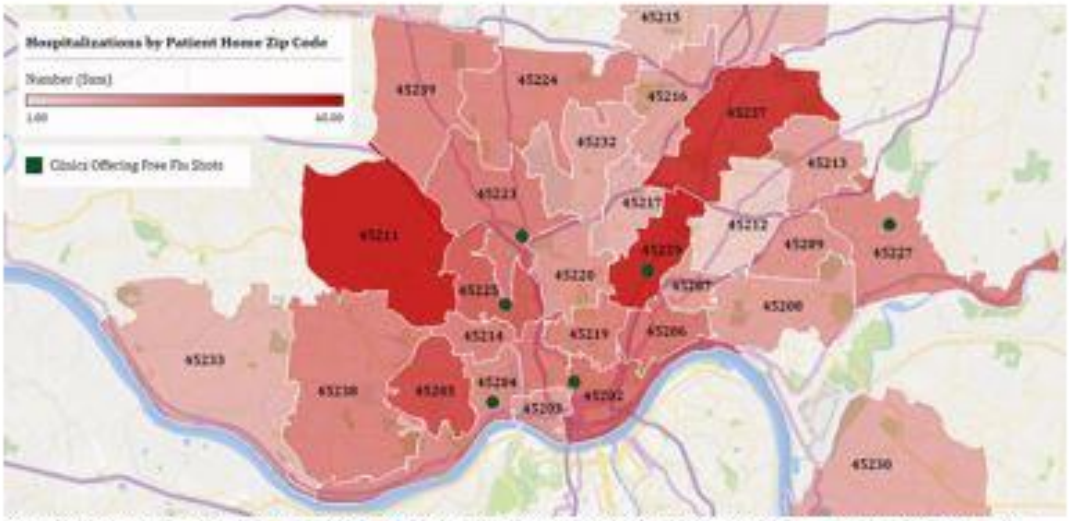

Figure 9. Number of influenza-associated hospitalizations by patient home zip code for the 2019-2020 influenza season (n=404). Green dots indicate the six Cincinnati Community Primary Care (CCPC) health centers (Ambrose H. Clement Health Center, Elm Street Health Center, Braxton F. Cann Memorial Medical Center, Hopple Street Neighborhood Health Center, Northside Health Center, and Price Hill Health Center) where free shots were offered throughout the season.

Summary

Overall, the 2019-2020 influenza season in Cincinnati had similar activity to national and statewide reporting on the season. There was greater activity in Cincinnati during the 2019-2020 season than last year with a greater number of influenza-associated hospitalizations, and a greater percentage of outpatient visits due to ILI. However, the 2019-2020 season did not surpass the regional epidemic threshold at any week.

It is necessary to interpret the 2019-2020 influenza season in the lens of the COVID-19 pandemic. The World Health Organization (WHO) declared COVID-19 a global pandemic on March 11, 2020 in the middle of the season. As respiratory infections, COVID-19 and influenza-like illness have overlapping symptoms. Increases in COVID-19 rule-out diagnostics may have led to a greater detection of influenza cases in the Cincinnati area.