Madeline Burke
Kansas State University

Analysis of Communicable Disease Reports and Public Education through COVID-19 Contact Tracing

Hello!

- DVM/MPH Student
- Starting clinical rotations
- Interests in public health, primates, and comparative medicine
- Plan to enter into a lab animal residency following DVM graduation in 2022

Outline

1. Overview of Cincinnati and the CHD
2. Project Areas
3. Results
4. Discussion
5. Competencies

1.
Overview of Cincinnati and the CHD

Cincinnati

- Located in Southwest Ohio along the Ohio River
- Third highest population in Ohio
- 300,357 residents
  - Race
    - 53.3% White
    - 45.5% Black
    - 2.6% Asian
    - 0.9% American Indian/Alaskan Native
  - Ethnicity
    - 3.7% Hispanic and/or Latino

Sean Pavone | Retrieved from https://www.istockphoto.com/photo/cincinnati-ohio-usa-skyline-gm927599916-254456557

Cincinnati Health Department

- Led by Health Commissioner Melba R. Moore and overseen by the Cincinnati Board of Health
- Allowed me to learn about public health practice from epidemiologists working in the field
- June 2020 to March 2021

2.
Project Areas

Common Theme: Disease Surveillance

Influenza Report

- Annual report on the 2019-2020 influenza season
- Supervised by epidemiologist Kimberly Wright

Monthly Reports

- Monthly reports on reportable disease cases in the Cincinnati area
- Supervised by epidemiologist Kimberly Wright

Contact Tracing

- Contact tracing to support the COVID-19 public health response
- Supervised by contact tracing leads Umar Durrani and Katie Brehm

Timeline

Influenza Report

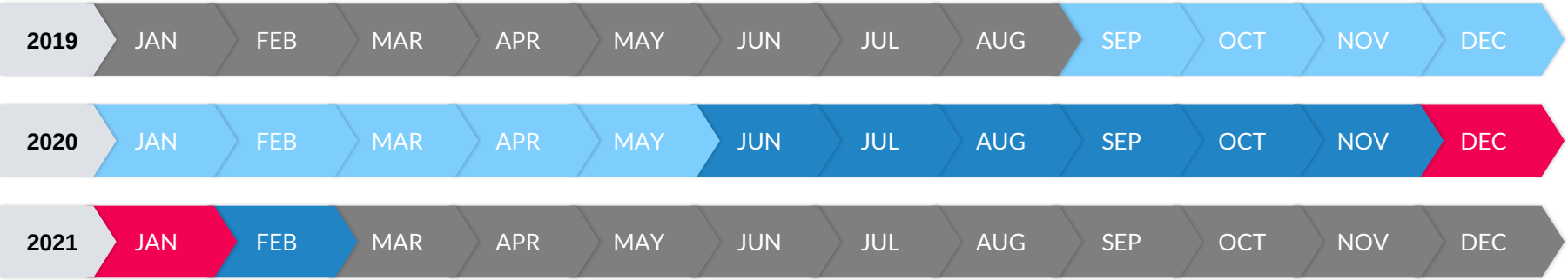
Seasonal retrospective
(Sep. 2019 – May 2020)

Monthly Reports

Completed at end of month
(Jun. 2020 – Feb. 2021)

Contact Tracing

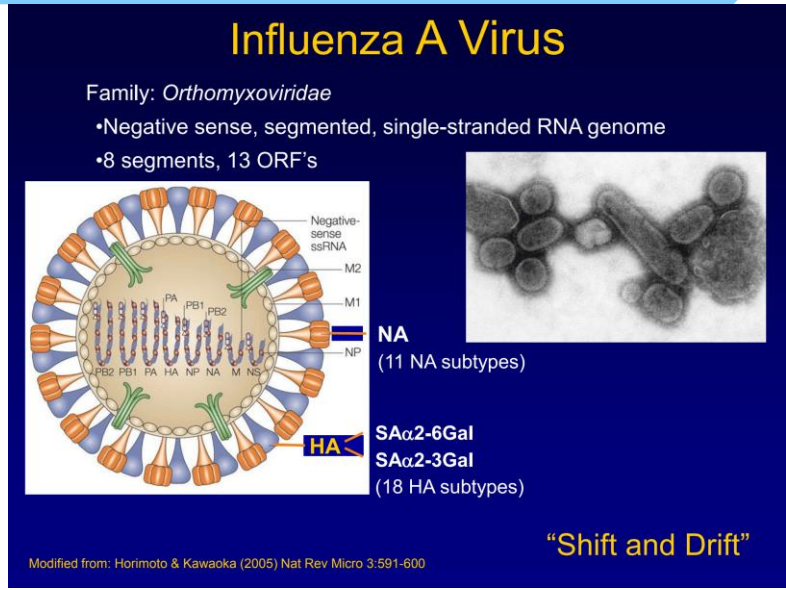
Ongoing data collection
(Dec. 2020 – Jan. 2021)



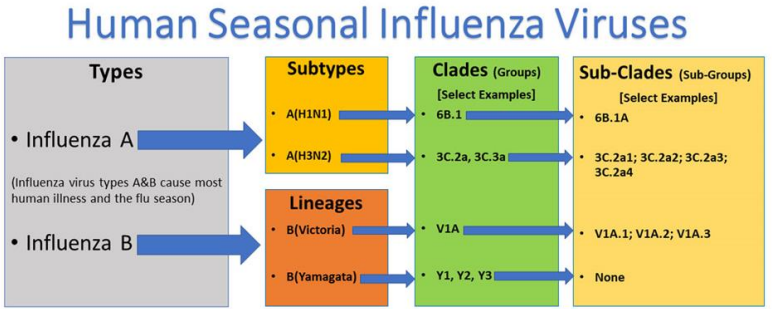
Annual Influenza Report

Influenza Virus

- Influenza A and B are responsible for seasonal epidemics in people
- CDC uses FluView and FluSurv-NET to monitor cases
- 2019-2020 season spanned Sep. 29 (week 19-40) to May 16 (week 20-20)
- In Ohio, influenza-associated hospitalizations are reportable



Obtained from Dr. Sally Davis



Annual Influenza Report

- Worked with data sets from the Ohio Disease Reporting System (ODRS) to define the 2019-2020 influenza season in Cincinnati
- No record of prior reports
- Intended for public health professionals

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*

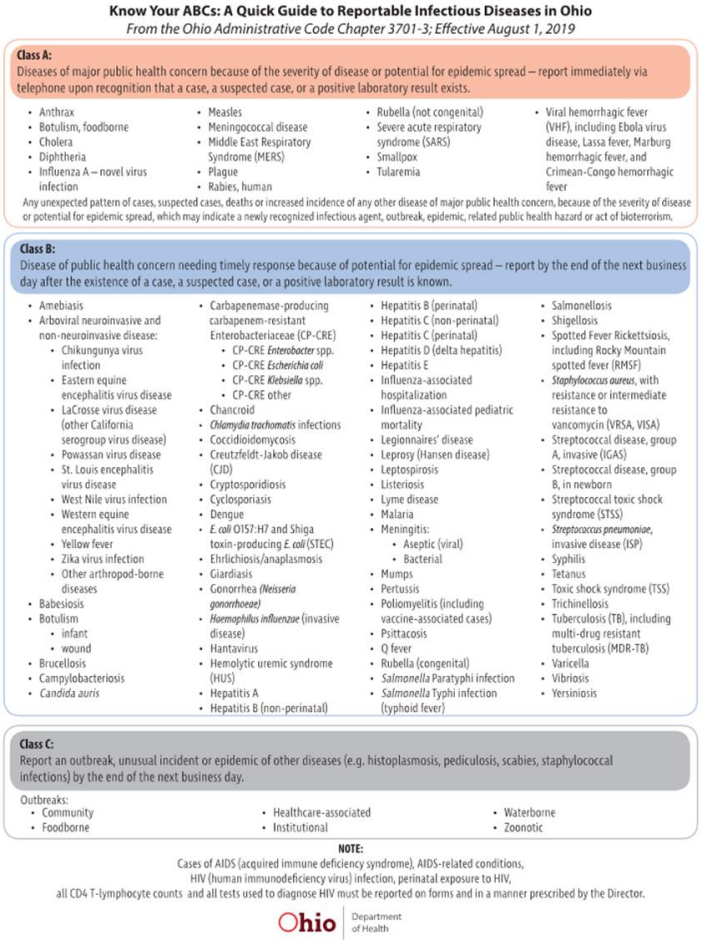
Hospital Admissions
From 09/29/2019 through 05/16/2020, 404 Cincinnatians were hospitalized for influenza (Table 1, below). This total is greater than the last influenza season. Previous infectious diseases surveillance summaries for Cincinnati indicate that 264 Cincinnati residents were hospitalized 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-

Monthly Disease Reporting

Reportable Diseases

- In Ohio, the Ohio Department of Health determines which diseases must be reported by healthcare providers
- Diseases with severity, potential for epidemic spread, or need for timely response
- Class A reportable diseases must be reported immediately by phone call



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

Monthly Disease Reporting

- Worked on eight monthly data reports compiling the reportable disease incidences for each month
- Categorized data according to previous monthly reports
- Reports were included in agenda materials for the Cincinnati Board of Health and posted to the Cincinnati Health Department website

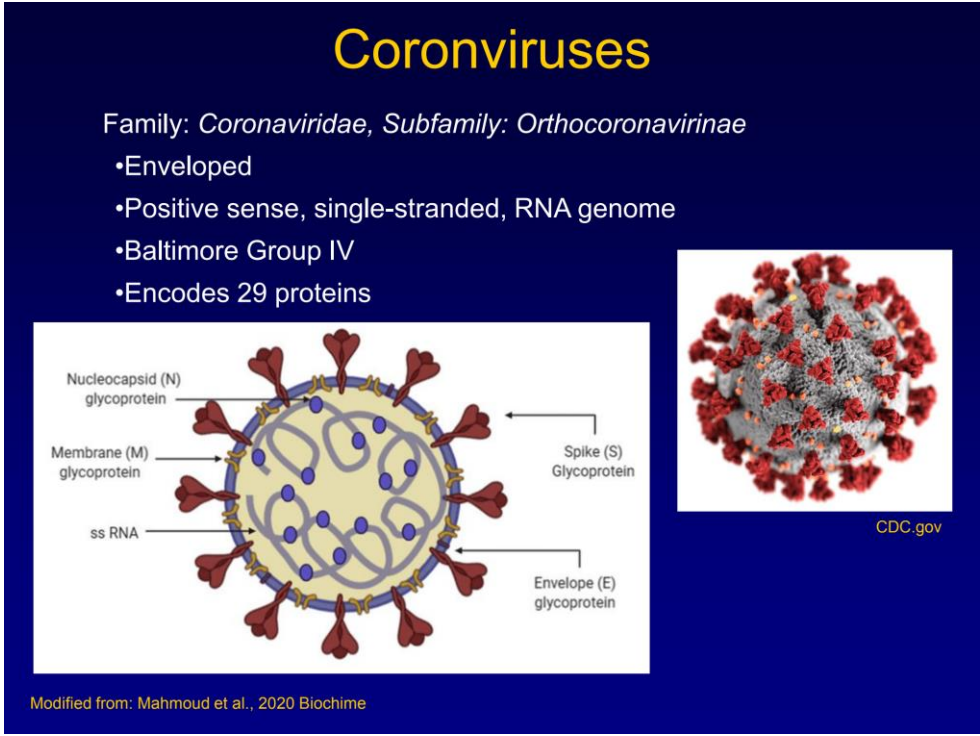
Monthly Infectious Disease Surveillance Summary,[1 2] February 2021

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

Coronavirus Disease 2019

- Characterized as a pandemic by the World Health Organization on March 11, 2020
- CDC collects case data through the National Notifiable Diseases Surveillance System
- Reportable disease in Ohio



Obtained from Dr. Sally Davis

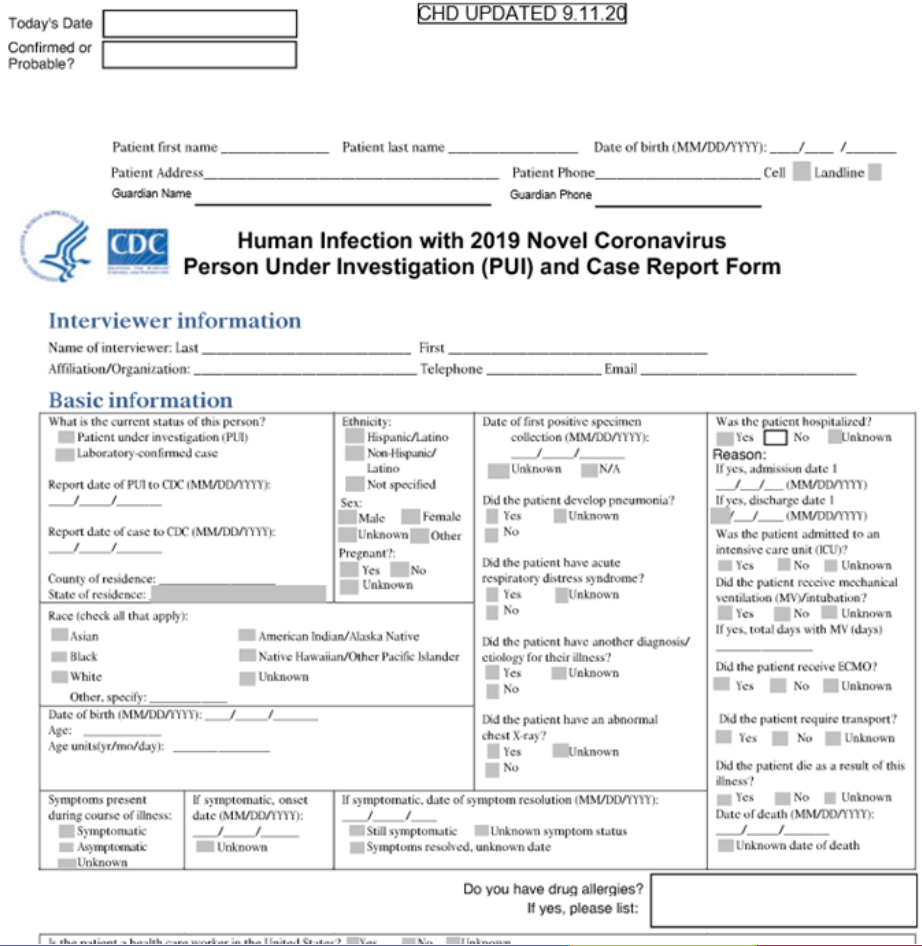
Contact Tracing

- Training
  - Johns Hopkins COVID-19 Contact Tracing Coursera course
  - HIPAA modules
  - Shadowing
- Definitions:
  - PUI: person under investigation (confirmed or probable)
  - Close contact: been within 6 feet for 15 minutes or more over 24 hours

COVID-19 Contact Tracing

Process:

- Assign myself to PUIs
- Phone call interview
- Intro to contact tracing
- Immediate symptoms check-in
- Questions about symptom onset
- Demographics
- Risk factors and recent activity
- Identification of close contacts
- Recommendations



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 _____

CDC

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 ?
___/___/___ (MM/DD/YYYY)
If yes, discharge date ?
___/___/___ (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

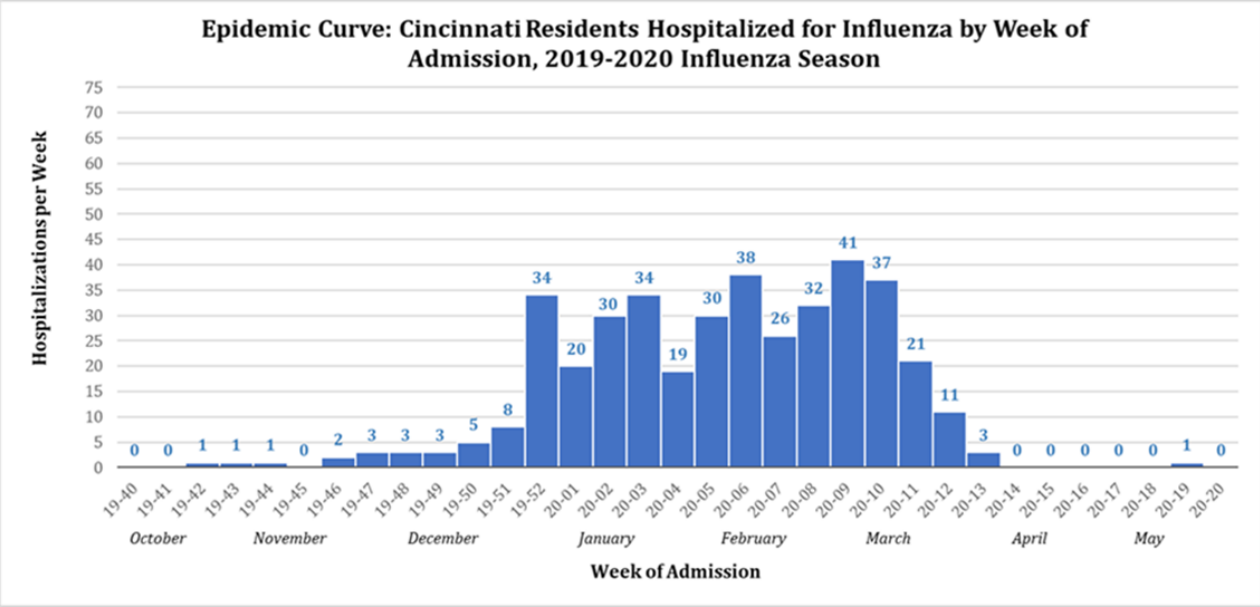
If symptomatic, onset date (MM/DD/YYYY):
___/___/_____
Unknown

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:

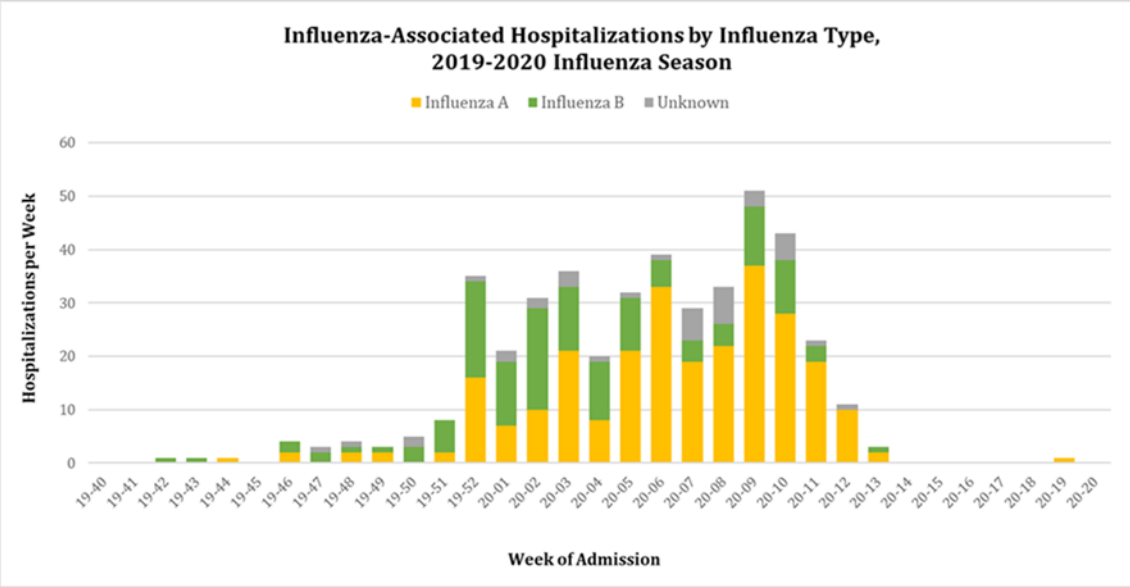
3.
Results

Annual Influenza Report



- 404 total influenza-associated hospitalizations
- On par with national and state data showing peaks ranging from 19-52 to 20-12 (end of Dec. to end of Mar.)

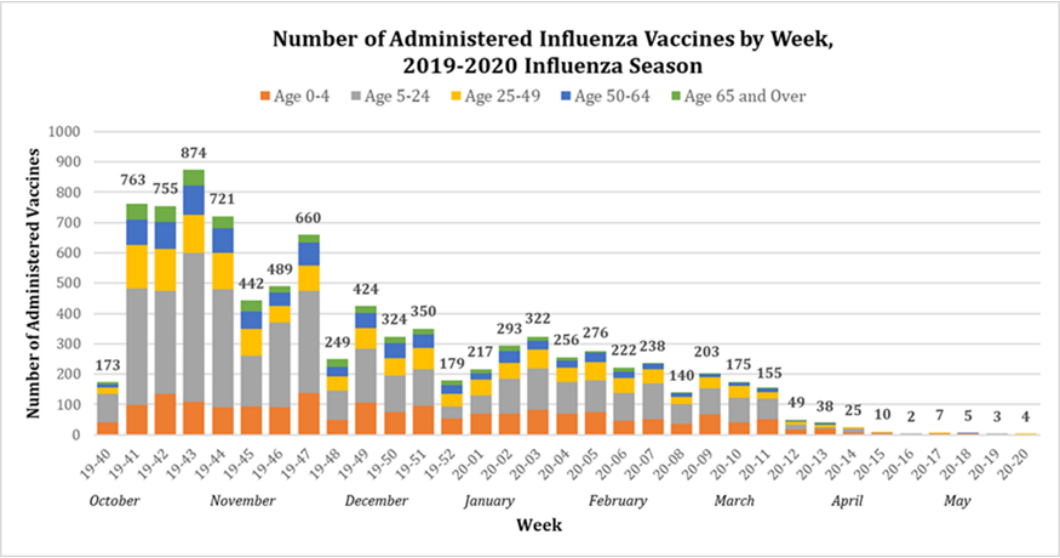
Annual Influenza Report



- Peak in influenza B early in the season
- Unusual as influenza B viruses tend to circulate later in the season nationwide

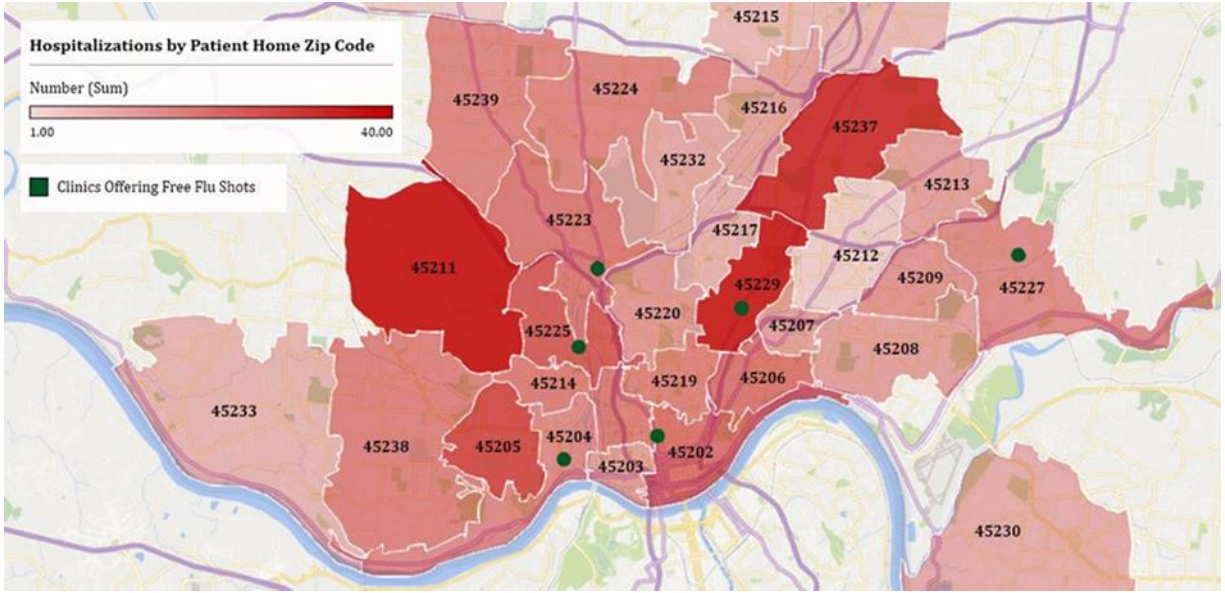
Annual Influenza Report

- 9,049 total influenza vaccines administered in CCPC health centers
- Rates
  - 0-4: 8,730.1
  - 5-24: 4,883.6
  - 50-64: 1,901.7
  - 25-49: 1,485.9
  - 65-plus: 1,325.6



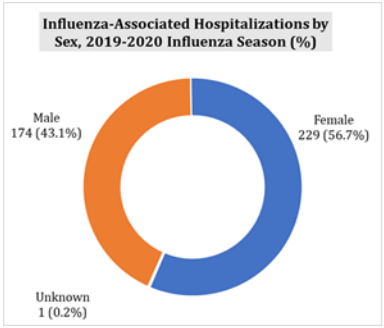
(Rates per 100,000 persons)

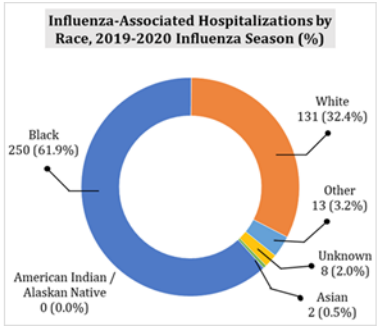
Annual Influenza Report

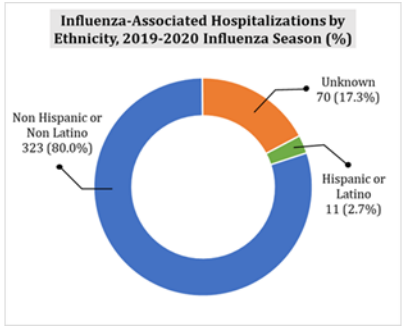


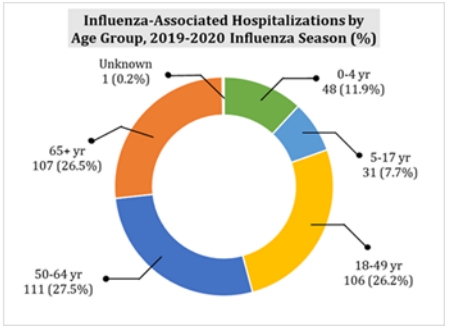
- Green dots indicate CCPC health centers that offered free influenza vaccines
- Zip codes 45211, 45229, and 45237 had highest numbers

Annual Influenza Report









Female: 147.2

Male: 120.1

Black: 183.0

White: 81.8

Asian: 25.6

Hispanic/Latino: 99.4

Non-Hispanic/Latino: 111.7

65-plus: 293.0

0-4: 220.0

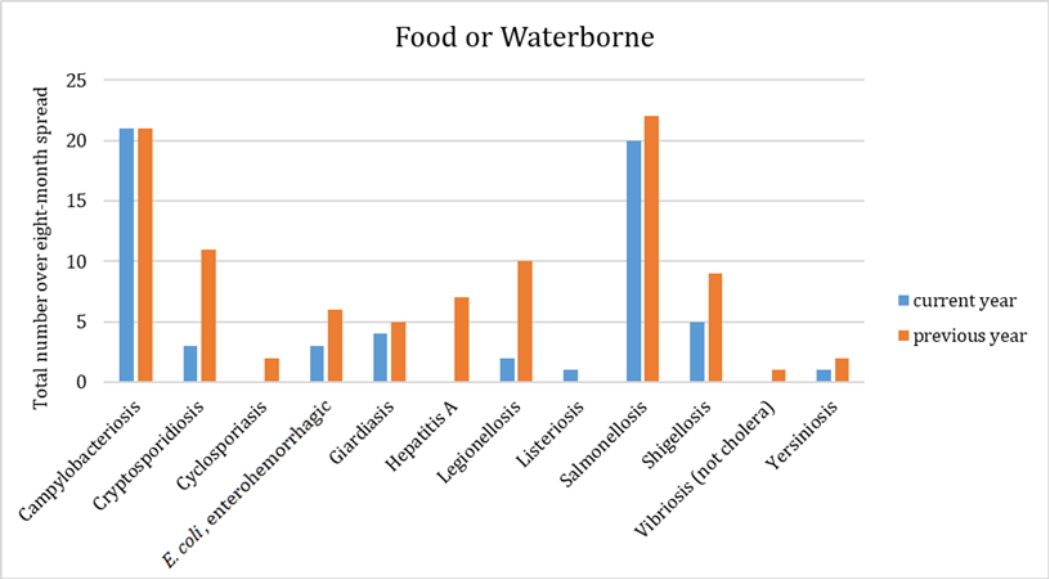
50-64: 215.0

18-49: 72.3

5-17: 70.7

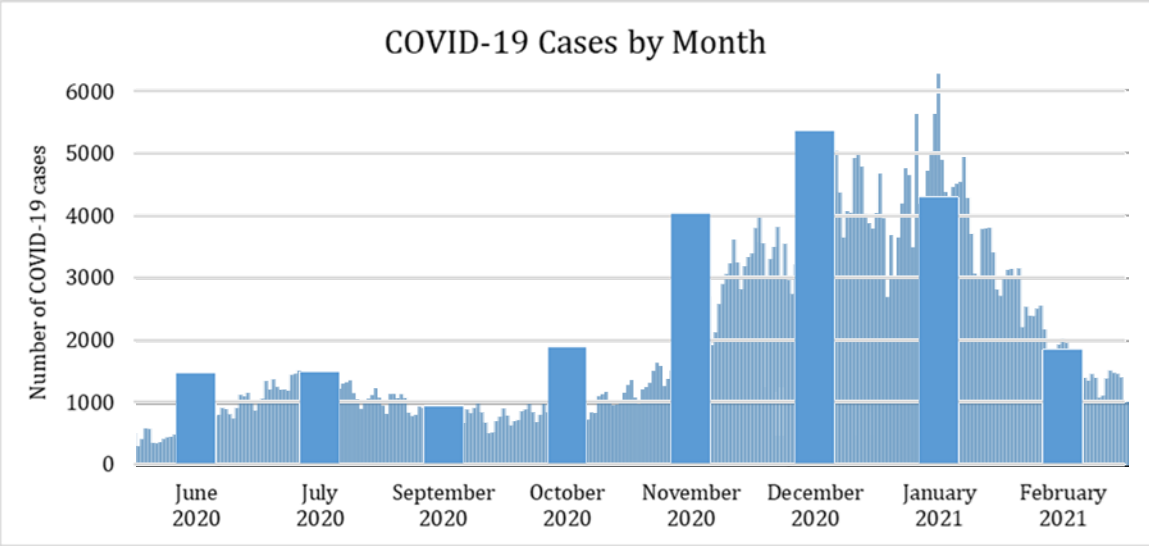
(Rates per 100,000 persons)

Monthly Disease Reporting



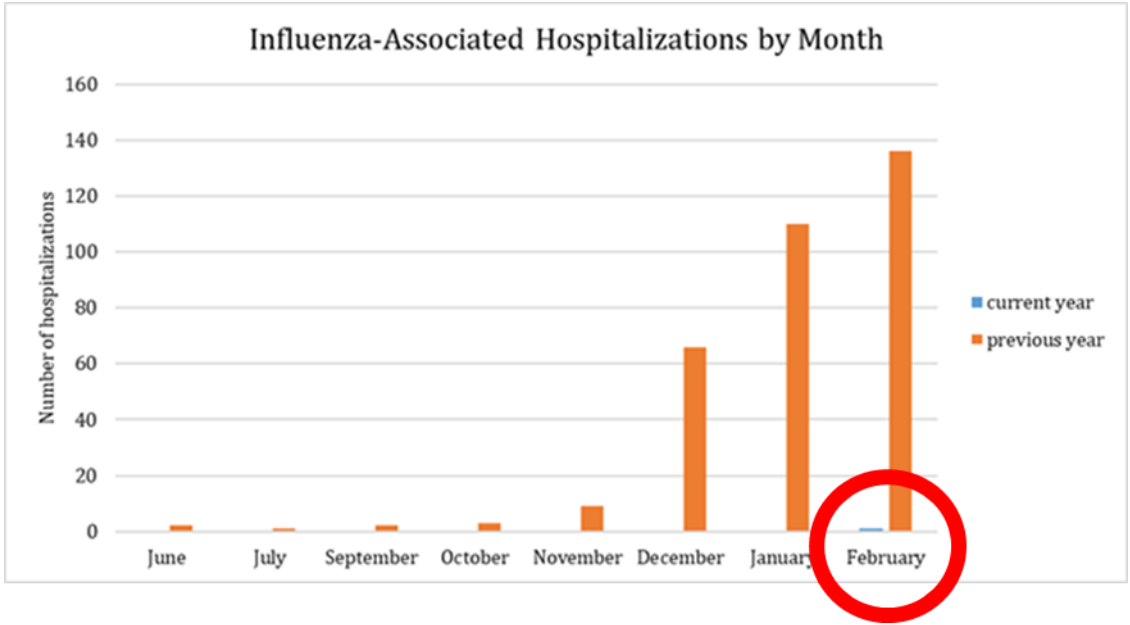
- Created summary figures for “food and waterborne,” “vaccine-preventable,” “vector-borne,” “viral hepatitis,” and “other conditions”

Monthly Disease Reporting



- Zero COVID-19 cases in previous year vs. 21,255 cases in current year
- Curve aligns with national data

Monthly Disease Reporting



- 329 hospitalizations in previous year vs. 1 in current year
- Reflected in national and state data: charting far below baseline this year

COVID-19 Contact Tracing

- I completed 75 contact tracing phone calls on behalf of the Cincinnati Health Department
- 68 to PUIs and 7 to close contacts of PUIs

4.
Discussion

Annual Influenza Report

- Report serves as a source of accessible data for public health interventions
- Black residents exhibited hospitalization rates twice as high as those of White residents
- Heat map may show areas for pop-up or permanent vaccine clinics

Cincinnati Annual Influenza Report:
2019-2020 Season
(09/29/19 to 05/16/20)

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**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-

Monthly Disease Reporting

- Reports serve as comprehensive overviews to track trends
- Decrease in influenza-associated hospitalizations is likely due to COVID-19 preventive measures

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
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Vibriosis (not cholera)					
Yersiniosis					2
Vectorborne	***1***	***2***	***0***	***1***	***2***
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Lyme disease				1	1
Malaria*	1	2			
Spotted Fever Rickettsiosis					1
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Haemophilus influenzae, invasive disease	1	1	1	4	7
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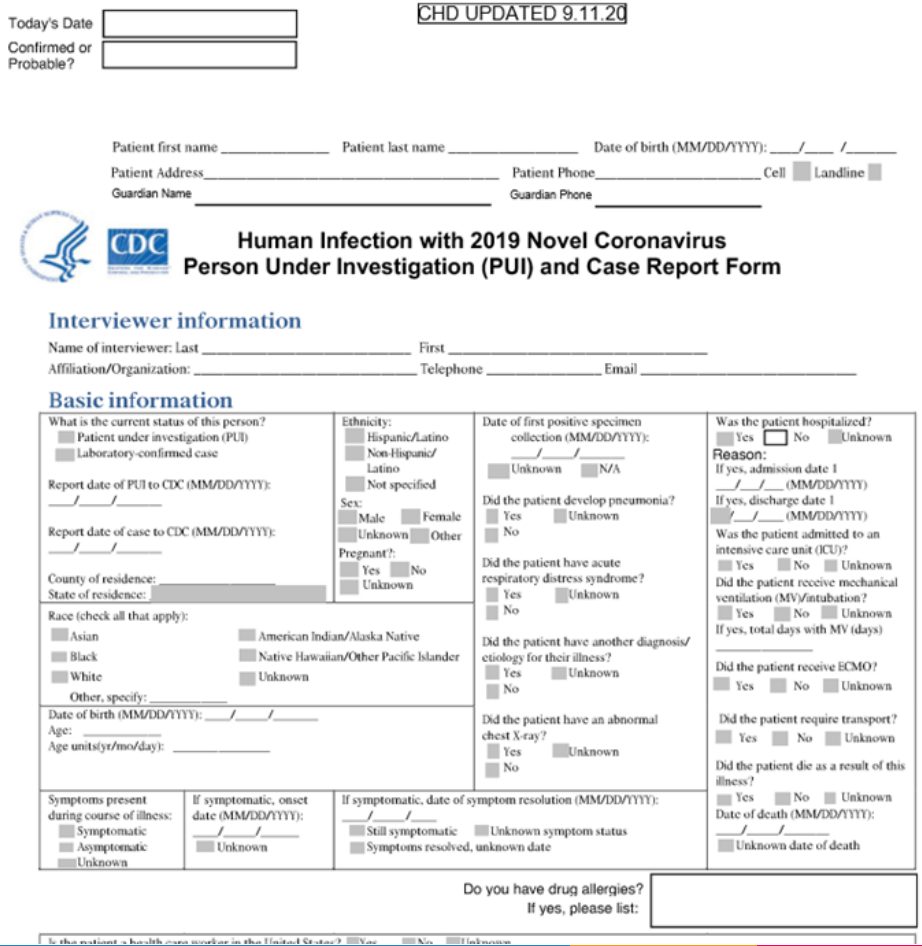
COVID-19 Contact Tracing

- Active listening
- Knowledge discrepancies regarding transmission
- Compassion fatigue



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Laboratory-confirmed case

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___/___/_____

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 ?
___/___/___ (MM/DD/YYYY)
If yes, discharge date ?
___/___/___ (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:

Conclusion

- Change in scope of work, need for flexibility and creativity
- Personal challenges put in perspective by the importance of my work
- Will carry disease surveillance, disease reporting, public health vocabulary, software skills, remote work, and problem solving forward as a veterinarian

5.
Competencies

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.

MPH Foundational Competencies, cont.

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.

MPH Foundational Competencies, cont.

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.

MPH Foundational Competencies, cont.

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.

MPH Foundational Competencies, cont.

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.

MPH Emphasis Area Competencies

Number and Competency		Description
1	Pathogens/pathogenic mechanisms	Evaluate modes of disease causation of infectious agents.

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

MPH Emphasis Area Competencies, cont.

2	Host response to pathogens/immunology	Investigate the host immune response to infection.

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

MPH Emphasis Area Competencies, cont.

3	Environmental/ecological influences	Examine the influence of environmental and ecological forces on infectious diseases.

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

MPH Emphasis Area Competencies, cont.

4	Disease surveillance	Analyze disease risk factors and select appropriate surveillance.

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 reports.

MPH Emphasis Area Competencies, cont.

5	Disease vectors	Investigate the role of vectors, toxic plants and other toxins in infectious diseases.

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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Thanks!

Any questions?

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