DEPARTMENT OF HEALTH

DISEASE CONTROL NEWSLETTER

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# Annual Summary of Communicable Diseases Reported to the Minnesota Department of Health, 2019

## Introduction

Assessment of the population's health is a core public health function. Surveillance for communicable diseases is one type of assessment. Epidemiologic surveillance is the systematic collection, analysis, and dissemination of health data for the planning, implementation, and evaluation of health programs. The Minnesota Department of Health (MDH) collects information on infectious diseases for the purposes of determining disease impact, assessing trends in disease occurrence, characterizing affected populations, prioritizing control efforts, and evaluating prevention strategies. Prompt reporting allows outbreaks to be recognized in a timely fashion when control measures are most likely to be effective in preventing additional cases.

In Minnesota, communicable disease reporting is centralized, whereby reporting sources submit standardized reports to MDH. Cases of disease are reported pursuant to Minnesota Rules Governing Communicable Diseases (Minnesota Rules 4605.7000 -4605.7800). The diseases listed in Table 1 must be reported to MDH. As stated in the rules, physicians, health care facilities, laboratories, veterinarians, and others are required to report these diseases. Reporting sources may designate an individual within an institution to perform routine reporting duties (e.g., an infection preventionist for a hospital). Data maintained by MDH are private and protected under the Minnesota Government Data Practices Act (Section 13.3805).

Since April 1995, MDH has participated as an Emerging Infections Program (EIP) site funded by the U.S. Centers for Disease Control and Prevention (CDC) and, through this program, has implemented active hospital- and laboratory-based surveillance for several conditions, including selected bacterial diseases, foodborne diseases, tickborne diseases, and hospitalized influenza cases.

Isolates of pathogens from certain diseases are required to be submitted to MDH (Table 1: Minnesota Rules Governing Communicable Diseases (Minnesota Rules 4605.7000-4605.7800). The MDH Public Health Laboratory (PHL) performs microbiologic and molecular evaluation of isolates, such as pulsed-field gel electrophoresis (PFGE) and whole genome sequencing (WGS), to determine whether isolates (e.g., enteric pathogens such as *Salmonella* and *Escherichia coli* O157:H7, and invasive pathogens such as Group A streptococcus) are related and potentially associated with a common source. Testing of submitted isolates also allows detection and monitoring of antimicrobial resistance.

Table 2 summarizes cases of selected communicable diseases reported during 2019 by district of the patient's residence. Pertinent observations for some of these diseases are presented below. Incidence rates in this report were calculated using disease-specific numerator data collected by MDH and a standardized set of denominator data derived from U.S. Census data. Disease incidence is categorized as occurring within the seven-county Twin Cities metropolitan area (metropolitan area) or outside of it in Greater Minnesota (unless otherwise indicated).

## Anaplasmosis

Anaplasmosis is a rickettsial disease caused by the disease agent *Anaplasma phagocytophilum*, which is transmitted by bites from *Ixodes scapularis*, the blacklegged tick. Although the organism that causes anaplasmosis was previously known by other names and thought to be a part of the genus Ehrlichia, anaplasmosis and ehrlichiosis (due to *E. chaffeensis*) are distinct diseases caused by different rickettsial species. The same tick vector also transmits the etiologic agents of Lyme disease, babesiosis, ehrlichiosis (due to *E. muris*), and Powassan virus. In rare circumstances, *A. phagocytophilum* may be transmitted by blood transfusion.

In 2019, 407 confirmed or probable cases of anaplasmosis (7.2 cases per 100,000) were reported, down from the 496 cases reported in 2018. Despite some annual fluctuations, including a decrease in cases the past 2 years, yearly case totals over time continue to trend upward, with a median of 620 cases reported per year since 2010 (Figure 1). In 2019, 245 (60%) confirmed or probable cases reported were male. The median age was 62 years (range, 0 to 92), 14 years older than the median age of confirmed Lyme disease cases, but close to the median age of confirmed or probable babesiosis cases (67). As is typical, most cases had illness onsets during the summer months, with 69% of cases reporting illness onsets in June, July, or August. In 2019, 133 (33%) cases were hospitalized for their anaplasmosis infection, with a median duration of 4 admission days (range, 2 to 374 days). Thirty-three (8%) cases reported complications (e.g., organ failure) due to anaplasmosis infection.

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# Table 1. Diseases Reportable to the Minnesota Department of Health

*Reportable Diseases, MN Rules 4605.7000 to 4605.7900*

## Diseases Reportable to the Minnesota Department of Health

651-201-5414 or 1-877-676-5414 — 24 hours a day, 7 days a week

## REPORT IMMEDIATELY BY TELEPHONE

- Anthrax (*Bacillus anthracis*)
- Botulism (*Clostridium botulinum*)
- Brucellosis (*Brucella* spp.)
- Cholera (*Vibrio cholerae*)
- Diphtheria (*Corynebacterium diphtheriae*)
- Free-living amebic infection (including at least: *Acanthamoeba* spp., *Naegleria fowleri*, *Balamuthia* spp., *Sappinia* spp.)
- Glanders (*Burkholderia mallei*)
- Hemolytic uremic syndrome
- Measles (rubeola)
- Melioidosis (*Burkholderia pseudomallei*)
- Meningococcal disease (*Neisseria meningitidis*) (invasive)
- Middle East Respiratory Syndrome (MERS)
- Orthopox virus
- Plague (*Yersinia pestis*)
- Poliomyelitis
- Q fever (*Coxiella burnetii*)
- Rabies (animal and human cases and suspected cases)
- Rubella and congenital rubella syndrome
- Severe Acute Respiratory Syndrome (SARS)
- Smallpox (variola)
- Tularemia (*Francisella tularensis*)
- Unusual or increased case incidence of any suspect infectious illness
- Viral hemorrhagic fever (including but not limited to Ebola virus disease and Lassa fever)

## REPORT WITHIN ONE WORKING DAY

- Amebiasis (*Entamoeba histolytica/dispar*)
- Anaplasmosis (*Anaplasma phagocytophilum*)
- Arboviral disease (including, but not limited to, La Crosse encephalitis, eastern equine encephalitis, western equine encephalitis, St. Louis encephalitis, West Nile virus disease, Powassan virus disease, and Jamestown Canyon virus disease)
- Babesiosis (*Babesia* spp.)
- Blastomycosis (*Blastomyces dermatitidis*)
- Campylobacteriosis (*Campylobacter* spp.)
- *Candida auris*
- Carbapenem-resistant Enterobacteriaceae (CRE)
- Cat scratch disease (infection caused by *Bartonella* species)
- Chancroid (*Haemophilus ducreyi*)
- Chikungunya virus disease
- *Chlamydia trachomatis* infections
- Coccidioidomycosis
- *Cronobacter sakazakii* in infants under one year of age
- Cryptosporidiosis (*Cryptosporidium* spp.)
- Cyclosporiasis (*Cyclospora* spp.)
- Dengue virus infection
- *Diphyllobothrium latum* infection
- Ehrlichiosis (*Ehrlichia* spp.)
- Encephalitis (caused by viral agents)
- Enteric *Escherichia coli* infection (*E. coli* O157:H7, other Shiga toxin-producing *E. coli*, enterohemorrhagic *E. coli*, enteropathogenic *E. coli*, enteroinvasive *E. coli*, enteroaggregative *E. coli*, enterotoxigenic *E. coli*, or other pathogenic *E. coli*)
- Giardiasis (*Giardia intestinalis*)
- Gonorrhea (*Neisseria gonorrhoeae* infections)
- *Haemophilus influenzae* disease (all invasive disease)
- Hantavirus infection
- Hepatitis (all primary viral types including A, B, C, D, and E)
- Histoplasmosis (*Histoplasma capsulatum*)
- Human immunodeficiency virus (HIV) infection, including Acquired Immunodeficiency Syndrome (AIDS)
- Influenza (unusual case incidence, critical illness, or laboratory-confirmed cases)
- Kawasaki disease
- *Kingella* spp. (invasive only)
- Legionellosis (*Legionella* spp.)
- Leprosy (Hansen's disease) (*Mycobacterium leprae*)
- Leptospirosis (*Leptospira interrogans*)
- Listeriosis (*Listeria monocytogenes*)
- Lyme disease (*Borrelia burgdorferi*, and other *Borrelia* spp.)
- Malaria (*Plasmodium* spp.)
- Meningitis (caused by viral agents)
- Mumps
- Neonatal sepsis (bacteria isolated from a sterile site, excluding coagulase-negative *Staphylococcus*) less than seven days after birth
- Pertussis (*Bordetella pertussis*)
- Psittacosis (*Chlamydophila psittaci*)
- Retrovirus infections
- Salmonellosis, including typhoid (*Salmonella* spp.)
- Shigellosis (*Shigella* spp.)
- Spotted fever rickettsiosis (*Rickettsia* spp. infections, including Rocky Mountain spotted fever)
- *Staphylococcus aureus* (only vancomycin-intermediate *Staphylococcus aureus* [VISA], vancomycin-resistant *Staphylococcus aureus* [VRSA], and death or critical illness due to community-associated *Staphylococcus aureus* in a previously healthy individual)
- Streptococcal disease - invasive disease caused by Groups A and B streptococci and *S. pneumoniae*
- Streptococcal disease - non-invasive *S. pneumoniae* (urine antigen laboratory-confirmed pneumonia)
- Syphilis (*Treponema pallidum*)
- Tetanus (*Clostridium tetani*)
- Toxic shock syndrome
- Toxoplasmosis (*Toxoplasma gondii*)
- Transmissible spongiform encephalopathy
- Trichinosis (*Trichinella spiralis*)
- Tuberculosis (*Mycobacterium tuberculosis* complex) (pulmonary or extrapulmonary sites of disease, including clinically diagnosed disease). Latent tuberculosis infection is not reportable.
- Typhus (*Rickettsia* spp.)
- Unexplained deaths and unexplained critical illness (possibly due to infectious cause)
- Varicella (chickenpox)
- *Vibrio* spp.
- Yellow fever
- Yersiniosis (enteric Yersinia spp. regardless of specimen source)
- Zika virus disease
- Zoster (shingles) (all cases <18 years old; unusual case incidence/complications regardless of age)

## SENTINEL SURVEILLANCE

Diseases reportable through sentinel surveillance are reportable based on the residence of the patient or the specific health care facility. Sentinel surveillance is not statewide reporting.

- *Staphylococcus aureus*
- Candidemia (*Candida* spp.) (blood isolates only)
- Carbapenem-resistant *Acinetobacter* spp. (CRA), and *Pseudomonas aeruginosa* (CR-PA)
- *Clostridium difficile*
- Respiratory syncytial virus (RSV)
- Nontuberculous Mycobacteria (NTM), pulmonary and extrapulmonary

## FOOTNOTES

- Submission of clinical materials required. Submit isolates or, if an isolate is not available, submit material containing the infectious agent in the following order of preference: a patient specimen; nucleic acid; or other laboratory material. Call the MDH Public Health Laboratory at 651-201-4953 for instructions.
- Invasive disease only: isolated from a normally sterile site, e.g.: blood, CSF, joint fluid, etc.
- In the event of SARS or another severe respiratory outbreak, also report cases of health care workers hospitalized for pneumonia or acute respiratory distress syndrome.
- Also report a pregnancy in a person with Zika; or a person chronically infected with hepatitis B, HIV, or syphilis.

## TO REPORT

DEPARTMENT OF HEALTH

- For immediate reporting call: 651-201-5414 or 1-877-676-5414.
- Report forms can be downloaded at www.health.state.mn.us/diseasereport

1/2021

# Table 2. Cases of Selected Communicable Diseases Reported to the Minnesota Department of Health by District of Residence, 2019

| | District (population per U.S. Census 2018 estimates) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Disease** | Metropolitan (3,094,901) | Northwestern (158,963) | Northeastern (324,911) | Central (765,928) | West Central (243,383) | South Central (292,438) | Southeastern (509,346) | Southwestern (216,379) | Unknown Residence | Total (5,606,249) |
| Anaplasmosis | 79 | 85 | 72 | 105 | 28 | 1 | 28 | 8 | 0 | 406 |
| Babesiosis | 13 | 6 | 6 | 12 | 6 | 3 | 8 | 1 | 0 | 55 |
| Blastomycosis | 28 | 6 | 20 | 15 | 0 | 4 | 6 | 0 | 0 | 79 |
| Campylobacteriosis | 506 | 30 | 28 | 171 | 57 | 69 | 158 | 122 | 0 | 1,141 |
| Cryptosporidiosis | 132 | 26 | 22 | 58 | 32 | 50 | 119 | 51 | 0 | 490 |
| *Escherichia coli* O157 infection | 59 | 3 | 7 | 15 | 6 | 9 | 5 | 7 | 0 | 111 |
| Hemolytic uremic syndrome | 6 | 0 | 0 | 3 | 1 | 0 | 1 | 0 | 0 | 11 |
| Giardiasis | 306 | 14 | 38 | 71 | 18 | 25 | 51 | 54 | 0 | 577 |
| *Haemophilus influenzae* disease | 58 | 1 | 8 | 16 | 8 | 6 | 14 | 9 | 0 | 120 |
| HIV (non-AIDS) | 173 | 3 | 3 | 18 | 6 | 5 | 8 | 2 | 1 | 219 |
| AIDS (diagnosed in 2018) | 94 | 1 | 2 | 4 | 2 | 5 | 3 | 0 | 0 | 111 |
| Legionnaires' disease | 75 | 4 | 6 | 6 | 5 | 8 | 10 | 4 | 0 | 118 |
| Listeriosis | 4 | 0 | 1 | 7 | 0 | 1 | 2 | 1 | 0 | 16 |
| Lyme disease | 399 | 57 | 114 | 213 | 34 | 7 | 81 | 10 | 0 | 915 |
| Mumps | 2 | 0 | 0 | 0 | 7 | 0 | 1 | 1 | 0 | 11 |
| Pertussis | 235 | 8 | 23 | 81 | 15 | 17 | 44 | 38 | 8 | 469 |
| Q Fever (acute) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| Q Fever (chronic) | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 2 |
| Salmonellosis | 440 | 17 | 41 | 112 | 34 | 37 | 77 | 47 | 0 | 805 |
| Sexually transmitted diseases | 23,018 | 789 | 1,539 | 2,947 | 917 | 1,340 | 2,096 | 757 | 322 | 33,725 |
| *Chlamydia trachomatis* - genital infections | 16,170 | 502 | 1,153 | 2,314 | 700 | 1,123 | 1,692 | 634 | 247 | 24,535 |
| Gonorrhea | 6,055 | 169 | 364 | 544 | 188 | 187 | 372 | 109 | 75 | 8,063 |
| Syphilis, total | 793 | 118 | 22 | 89 | 29 | 30 | 32 | 14 | 0 | 1127 |
| Primary/secondary | 264 | 48 | 8 | 30 | 13 | 10 | 9 | 3 | 0 | 385 |
| Early Non-Primary Non-Secondary* | 263 | 43 | 9 | 28 | 10 | 8 | 6 | 0 | 0 | 367 |
| Unknown Duration or LATE** | 257 | 19 | 5 | 31 | 5 | 10 | 16 | 11 | 0 | 354 |
| Congenital | 9 | 8 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 21 |
| Other*** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Shigellosis | 139 | 0 | 0 | 9 | 2 | 3 | 9 | 3 | 0 | 165 |
| Streptococcal invasive disease - Group A | 149 | 18 | 37 | 59 | 20 | 10 | 23 | 10 | 0 | 326 |
| Streptococcal invasive disease - Group B | 304 | 23 | 48 | 87 | 28 | 41 | 56 | 19 | 0 | 606 |
| Streptococcus pneumoniae disease | 246 | 26 | 44 | 78 | 27 | 40 | 41 | 29 | 0 | 531 |
| Tuberculosis | 108 | 1 | 2 | 6 | 0 | 14 | 14 | 3 | 0 | 148 |
| Tularemia | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Varicella | 210 | 3 | 13 | 77 | 5 | 12 | 40 | 6 | 0 | 366 |
| Viral hepatitis, type A | 51 | 0 | 4 | 17 | 0 | 1 | 1 | 1 | 1 | 76 |
| Viral hepatitis, type B (acute infections only, not perinatal) | 12 | 0 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 16 |
| Viral hepatitis, type C (acute infections only) | 44 | 1 | 7 | 6 | 3 | 0 | 0 | 1 | 0 | 62 |
| West Nile virus | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 5 |
| Zika virus | 3 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 4 |

* Duration ≤1 year
** Duration >1 year
*** Includes unstaged neurosyphilis, latent syphilis of unknown duration, and latent syphilis with clinical manifestations

**County Distribution within Districts**

Metropolitan - Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, Washington
Northwestern- Beltrami, Clearwater, Hubbard, Kittson, Lake of the Woods, Marshall, Pennington, Polk, Red Lake, Roseau
Northeastern - Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, St. Louis
Central - Benton, Cass, Chisago, Crow Wing, Isanti, Kanabec, Mille Lacs, Morrison, Pine, Sherburne, Stearns, Todd, Wadena, Wright
West Central - Becker, Clay, Douglas, Grant, Mahnomen, Norman, Otter Tail, Pope, Stevens, Traverse, Wilkin
South Central- Blue Earth, Brown, Faribault, LeSueur, McLeod, Martin, Meeker, Nicollet, Sibley, Waseca, Watonwan
Southeastern - Dodge, Fillmore, Freeborn, Goodhue, Houston, Mower, Olmsted, Rice, Steele, Wabasha, Winona
Southwestern- Big Stone, Chippewa, Cottonwood, Jackson, Kandiyohi, Lac Qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Redwood, Renville, Rock, Swift, Yellow Medicine

## Arboviral Diseases

### Endemic Mosquitoborne Arboviral Diseases

Historically, the primary arboviral encephalitides found in Minnesota have been La Crosse encephalitis, Western equine encephalitis (WEE), and West Nile virus (WNV) encephalitis, but in recent years other viruses like Jamestown Canyon have emerged as significant causes of disease. While WNV and WEE are maintained in mosquito-to-bird transmission cycles involving several different species of each, La Crosse and Jamestown Canyon viruses use mammals instead of birds as part of their transmission cycles. WNV is established throughout Minnesota, and will probably be present in the state to some extent every year, whereas human cases of other diseases may occur more sporadically. Interpreting the effect of weather on arboviral transmission is complex, making it difficult to predict the number of people who will become infected in any given year.

In Minnesota, 5 WNV disease cases were reported in 2019, a total that is much lower than the median number of cases per year from the previous 5 years (30 from 2013 to 2018). Two had neuroinvasive presentations including encephalitis or meningitis. The other cases had West Nile fever. None of the cases died. Four cases were male, and the median age was 51 years (range, 16 to 70). Two cases were hospitalized. Four cases reported symptom onset in July, August, or September. One asymptomatic WNV-positive blood donor was also identified in 2019. Risks for human WNV infection continue to be higher in central and western Minnesota where the primary mosquito vector, *Culex tarsalis*, is most abundant.

In 2019, 1 case of La Crosse encephalitis was reported in a Minnesota resident. The case was a 7-year-old male with an unknown exposure. The disease, which primarily affects children, is transmitted through the bite of infected *Aedes triseriatus* (Eastern Tree Hole) mosquitoes and is maintained in a cycle that includes mosquitoes and small mammals. Exposure to infected mosquitoes typically occurs in wooded or shaded areas inhabited by this species, especially in areas where water-holding containers (e.g., waste tires, buckets, or cans) that provide breeding habitats are abundant. Since 1985, 145 cases have been reported from 22 Minnesota counties, primarily in the southeastern part of the state. Many people who are infected have no apparent symptoms, but severe disease is more common in children. Most people report an illness onset during the typical arboviral season from mid-July through mid- September.

In 2019, 21 cases of Jamestown Canyon virus disease, a California group virus related to La Crosse, were reported. The virus is transmitted by *Aedes* mosquitoes, and the maintenance cycle in nature is thought to include deer and other large mammals. Much remains unknown about the clinical spectrum of Jamestown Canyon virus, but the typical presentation includes fever, and in more severe cases, meningitis or encephalitis. The virus is likely widespread in Minnesota. Cases were aged 1 month to 86 years, with a median of 66 years, and 66% were male. Eleven (52%) presented with neuroinvasive disease, including meningitis, encephalitis and acute flaccid paralysis, and most were residents of counties in north central and northeastern Minnesota. Due to the mosquito vectors involved in the transmission cycle for this virus, disease onsets can occur from late spring through the early part of the fall.

### Imported Mosquitoborne Arboviral Diseases

#### Dengue

Dengue fever is one of the most frequently occurring mosquitoborne diseases worldwide, with an estimated 390 million infections, with nearly 100 million people experiencing symptomatic disease each year. Four serotypes of dengue virus are transmitted to humans through the bite of *Aedes aegypti* and *Ae. albopictus* mosquitoes. Dengue is considered endemic in more than 100 countries in tropical or subtropical regions around the world, and risk is widespread, especially where water-holding containers (e.g., waste tires, buckets, or cans) provide abundant mosquito breeding habitat.

In 2019, 20 cases were reported in Minnesota residents. The median case age was 40 years (range, 7 to 69 years) and onset of symptoms occurred throughout the year from February through November. Seventeen resided in the metropolitan area, and all infections were acquired abroad. Cases reported travel to many areas of the world, including to India (8), Ethiopia (3), Mexico (2), the Caribbean (2), South America (2), Southeast Asia (2), and Central America (1).

#### Chikungunya

Chikungunya virus is a mosquitoborne alphavirus found in Africa, Asia, and Europe. In late 2013, locally acquired cases appeared for the first time in the Americas on the Caribbean island of St. Martin, and the virus subsequently has spread throughout Central and South America. The virus is transmitted by the same *Aedes* spp. mosquitoes (*Ae. aegypti* and *Ae. albopictus*) that also transmit dengue and Zika viruses.

Unlike many other mosquitoborne viruses, most people who are infected with chikungunya develop symptoms. The most common symptoms are fever and joint pain, but patients may also experience headache, muscle aches, or rash. Symptoms usually begin 3-7 days after a person is bitten by an infected mosquito, and most recover within a week. Joint pain may persist for weeks to years after the initial illness.

In 2019, 18 cases were reported in Minnesota residents. The median case age was 41 (range, 2 to 71 years). Fifteen resided in the metropolitan area and symptom onsets occurred all year, from January through December. All represented imported infections acquired abroad, and travel occurred to many areas of the world. Ten traveled to Asia, six went to Africa, and one each visited the Caribbean and South America.

### Zika Virus

Zika virus is a mosquitoborne flavivirus that was initially discovered in 1947 in Uganda, and the first human cases were identified in 1952. Historically this virus occurred only sporadically in Africa and Asia, but it gained attention after it resulted in outbreaks in Micronesia in 2007 and French Polynesia in 2013-2014. In spring 2015, cases were reported from Brazil, representing the first time the virus had been found in the Americas. Since then, the virus has spread to most countries and territories in the Western Hemisphere, and infections during pregnancy have been associated with adverse fetal outcomes, including microcephaly. Zika has been shown to be transmitted perinatally as well as through sexual contact, a route of transmission that has never before been associated with a mosquitoborne virus. The mosquito vectors for humans are the same *Aedes* spp. mosquitoes (*Ae. aegypti* and *Ae. albopictus*) that transmit dengue virus and Chikungunya virus.

Although the outbreak in the Americas peaked in 2016, cases are still reported from around the region. The risk for infection persists throughout many areas of the world, but the ability to detect a new outbreak varies by country, and reporting of new outbreaks may be delayed several weeks to months. Since most people (up to 80%) that are infected with Zika do not develop symptoms, it is possible that many infections, and even small outbreaks, may go undetected.

In 2019, 4 cases of Zika virus disease was reported; 3 cases exhibited febrile illness and one was asymptomatic. Three of the 4 cases were female and 2 of these were pregnant women. One case each was linked to Belize, Guyana, the Philippines and Cuba.

### Endemic Tickborne Arboviral Disease

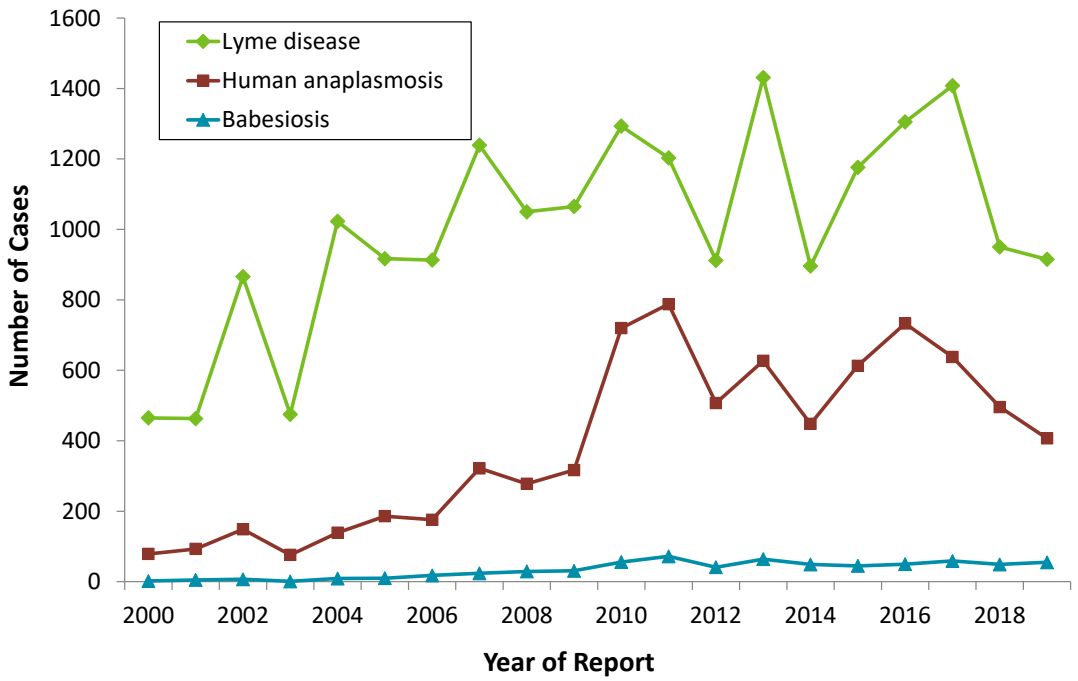
Powassan virus (POW) is a tickborne flavivirus that includes a strain (lineage II or "deer tick virus") that is transmitted by *Ixodes scapularis*. The virus can cause encephalitis or meningitis, and long-term sequelae occur in approximately half of those patients. Approximately 10-15% of cases are fatal. Since the first case in 2008, there have been cases every year except for 2014 and 2015, with a peak of 11 cases in 2011 (range, 1 to 11). Seven cases of POW were reported in 2019. Six cases were male, and ages ranged from 58 to 76 years. All but 1 case in 2019 presented with meningitis or encephalitis, and 2 cases died. Similar to other tickborne diseases, the majority of patients report being exposed to ticks in north central Minnesota. Most illness onset fell in June or July but one case had an onset date at the beginning of November. Based on findings from routine tick surveillance activities, the virus appears to be widely distributed in the same wooded parts of the state that are endemic to other pathogens transmitted by *I. scapularis*.

### Babesiosis

Babesiosis is a malaria-like illness caused by a protozoan parasite, typically *Babesia microti*, which infects red blood cells. *B. microti* is transmitted to humans by bites from *Ixodes scapularis* (the blacklegged tick), the same vector that transmits the agents of Lyme disease, human anaplasmosis, one form of human ehrlichiosis, and a strain of Powassan virus. *Babesia* parasites can also be transmitted by blood transfusion. Although most people infected with Babesia have asymptomatic infections, people with weak immune systems, other co-morbidities, and the elderly can become seriously ill.

In 2019, there were 55 confirmed and probable cases reported (0.97 cases per 100,000), a slight increase from the 49 cases in 2018. Over the past decade, slight annual fluctuations in reported cases have been observed, however, reported case numbers continue to trend upward (range, 41 to 72) and are consistently higher than annual cases reported in the previous decade, 2000-2009 (range, 1 to 31) (Figure 1). In recent years, case demographics were similar. In 2019, 40 (73%) of the cases occurred in males. The median case age was 67 years (range, 4 to 97), up from 64 in 2018, and older than the median ages for both anaplasmosis (62 years) and Lyme disease (48 years). Illness onset dates peaked in the summer months: 40 (77%) of 52 cases with known onset date reported first experiencing symptoms in June, July, or August. Twenty- four (44%) cases were hospitalized due to their infection in 2018 with a median admission duration of 4 days (range, 2 to 10). Seven patients reported severe complications (e.g. organ failure), but there were no deaths attributed to babesiosis infection.

**Figure 1. Reported *I. scapularis*-borne Disease Cases, 2000-2019**





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## Blastomycosis

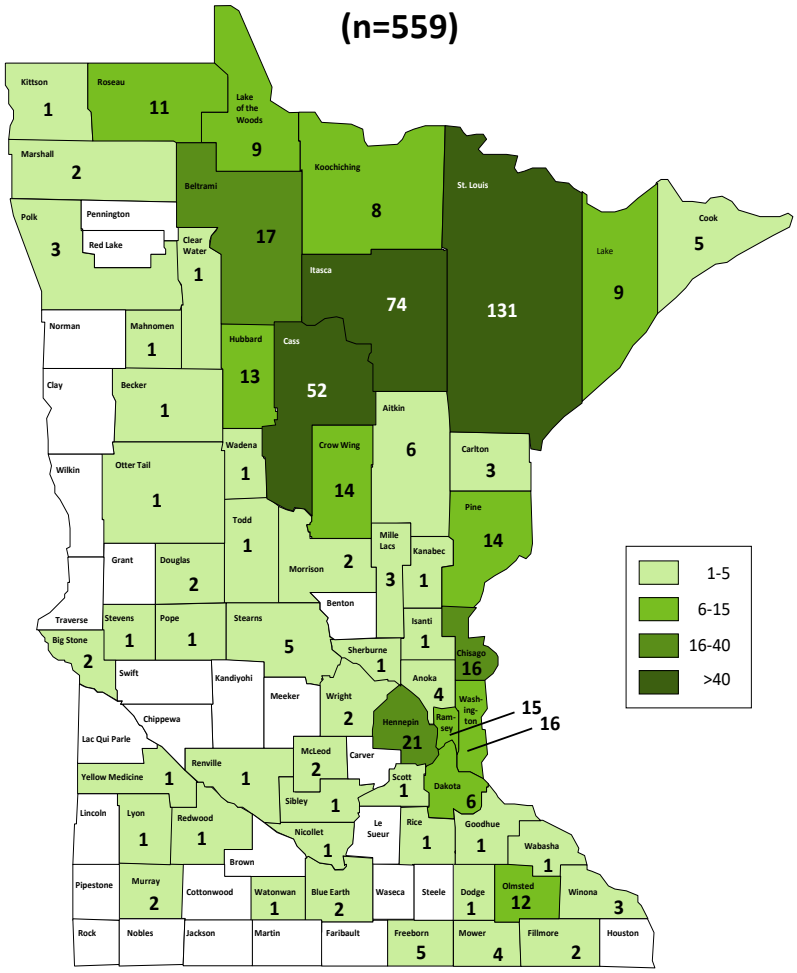
In 2019, 79 blastomycosis cases were reported, the highest number since enhanced surveillance began in 1999, and 21 higher than last year's previous record. This continues the increase in cases seen in the past few years. The median age of cases was 41.5 years (range, 4 to 76), and 56 (71%) were male. Fifty-six (74%) cases were white, 8 (11%) were Asian/Pacific Islander, 7 (9%) were black, 5 (7%) were American Indian/Alaskan Native, and 3 were of unknown race. Fifty-one (65%) cases were hospitalized for a median of 8 days (range, 1 to 78). Five (6%) cases died, which is a lower fatality rate than the normally observed 9-10%, and improved over 2017-2018 when the case fatality rate was 15%. Blastomycosis was the cause of death for all five. Twenty-two cases (28%) had immunocompromising health conditions or medication use, including 9 (11%) with diabetes, and 1 (1%) on medications for rheumatoid arthritis. Sixty (76%) cases had pulmonary infection, 11 (14%) had disseminated infection, and 8 (10%) had extra-pulmonary infection.

One large outbreak occurred in Minnesota residents in 2019; however, the exposure occurred in Wisconsin. Twelve cases all reported tubing, primarily in early August, on a popular Wisconsin river. Eleven cases were part of three different groups. The twelfth case was also part of a group, but no other members developed illness. Half of these outbreak cases were male and half were female, a much different ratio than in sporadic cases. Five (42%) cases were white, 4 (33%) were black, 2 (17%) were Asian/Pacific Islander and 1 (8%) was unknown. The median age was 28 years (range, 21 to 41 years). Eight cases (67%) were hospitalized.

From 1999 to 2019, 750 cases were reported; the annual median is 34 cases (range, 22 to 79), but the median for the most recent 5 years is 44 cases/year. In 2019, the incidence statewide was 1.4 cases/100,000 population, compared to the 1999-2019 median annual incidence of 0.63 cases/100,000. Exposure information is available for 605 cases. The largest number, 131 (22%), were likely exposed in St. Louis County. Seventy-four (12%) cases were likely exposed in Itasca County, 52 (9%) in Cass County, 21 (3%) in Hennepin County, and 17 (3%) in Beltrami County. (Figure 2).

**Figure 2. Human Blastomycosis Cases by Probable County of Exposure*, 1999-2019,**

**(n=559)**




* 66 cases were exposed in Wisconsin, 8 in other states, 10 in Canada, and 1 in South America. Exposure location is unknown for 145 cases.

## Botulism

Botulinum toxin, a neurotoxin, is produced by the spore-forming bacteria *Clostridium botulinum* and other related species. There are 8 distinct toxin types: A, B, C, D, E, F, G, and H. Toxin types A, B, E, F, and H can cause human intoxication. Botulism is characterized by a descending, bilateral paralysis that can be fatal without treatment. Botulism spores are ubiquitous in the environment and cause three main forms of intoxication: foodborne, wound, and intestinal-toxemia which includes infant botulism and adult intestinal toxemia. Infant botulism, which is the most common form in the United States, results from the ingestion of *C. botulinum* spores that germinate into vegetative bacteria that colonize the intestinal tract, producing toxin that is absorbed into the circulation.

In 2019, no infant, foodborne, or wound botulism cases were reported. From 2001-2019, 14 cases of infant botulism and 2 cases of foodborne botulism were reported. The median age of infants was 19 weeks (range, 5 to 41 weeks), and 8 (57%) were male. Eleven (79%) cases were caused by botulinum toxin type B and 3 (21%) by toxin type A; since 2006 all infant cases in Minnesota have been caused by toxin type B. Eleven infants were known to be hospitalized, for a median of 15 days (range 8 to 30 days); one infant did not require hospitalization. The 2 foodborne cases were of toxin type A, and occurred in 2009 in two men consuming home-canned asparagus. Both were hospitalized for 6 and 16 days. No deaths occurred among the infant or foodborne botulism cases.

## Brucellosis

Brucellosis is an acute or chronic illness caused by bacteria of the *Brucella* genus. There are 5 important species of *Brucella*: *B. abortus, B. melitensis, B. suis, B. canis,* and *B. ovis*, of which cattle, goats, pigs, dogs, and sheep are the respective reservoir animals. Transmission can occur through ingestion of unpasteurized dairy products, contact with infected animal tissue, or inhalation of aerosolized bacteria in a laboratory setting. Minnesota's livestock have been brucellosis free since 1985; most infections are acquired in *Brucella*-endemic countries.

In 2019, 4 confirmed cases were reported; all were infected with *B. melitensis.* Case ages ranged from 23 to 44 years; 2 were male; all were hospitalized and survived. The exposure for 3 cases was likely ingesting unpasteurized camel milk in Africa, and the exposure for the fourth case was unknown. One case's isolate resulted in exposure of one clinical laboratory staff person.

From 2007 to 2019, 26 cases were reported. Nineteen likely acquired their infection outside the United States, and 7 were domestically acquired.

The median number of cases reported annually was 2 (range, 0 to 4). Nineteen were infected with *B. melitensis*, 5 with *B. suis,* 1 with *B. abortus*, and 1 with an unidentified *Brucella* species diagnosed by serology only. The median age of cases was 49 years (range, 3 to 86). Sixteen of the 26 cases for which race was known were black, 8 were white (of which 2 identified as Hispanic), and 2 were Asian/Pacific Islander.

## Campylobacteriosis

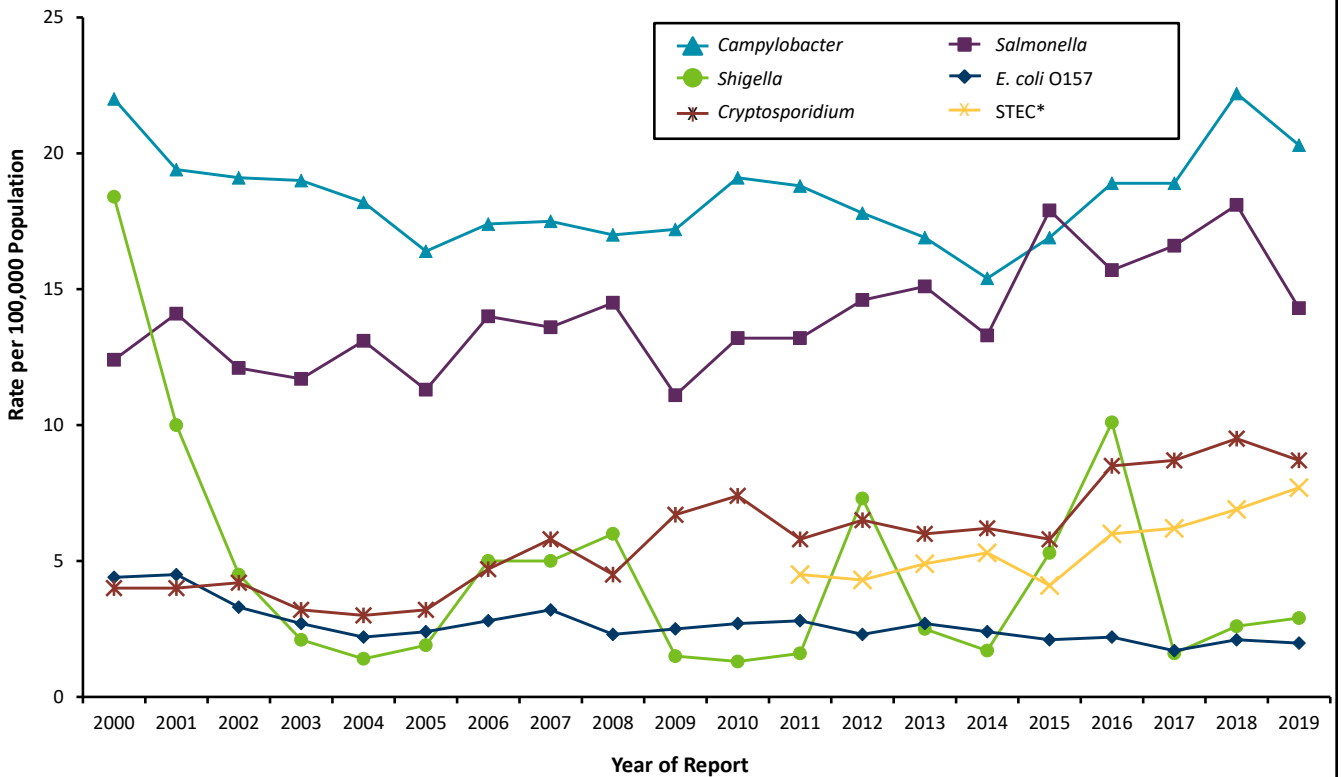
There were 1,141 culture-confirmed *Campylobacter* cases reported in 2019 (20.3 per 100,000 population). This is an 8% decrease from the 1,238 cases reported in 2018, but a 27% increase from the annual median of 975 cases reported from 2009 to 2018 (range, 834 to 1,238). In 2019, 44% of cases occurred in people who resided in the metropolitan area. Of the 1,138 *Campylobacter* isolates confirmed and identified to species by MDH, 79% were *C. jejuni* and 11% were *C. coli*.

The median age of cases was 30 years (range, 2 months to 96 years). Forty-two percent were between 20 and 49 years of age, and 9% were ≤5 years of age. Fifty-seven percent were male. Fourteen percent were hospitalized; the median length of hospitalization was 3 days. Forty-seven percent of infections occurred during June through September. Of the 1,028 cases for whom data were available, 195 (19%) reported travel outside the United States during the week prior to illness onset. The most common travel destinations were Europe (n=48), Central or South America or the Caribbean (n=46), Mexico (n=37), Asia (n=35), Africa (n=12), and the Middle East (n=11).

Three outbreaks of *Campylobacter* infections were identified in 2019. One was due to foodborne transmission at a restaurant. One was due to contact with puppies; and one was associated with a festival, but the route of transmission was not determined.

A primary feature of public health importance among *Campylobacter* cases was the continued presence of *Campylobacter* isolates resistant to fluoroquinolone antibiotics (e.g., ciprofloxacin), which are commonly used to treat campylobacteriosis. In 2019, the overall proportion of ciprofloxacin resistance among *Campylobacter* isolates tested was 36%. However, historically, 80-90% of *Campylobacter* isolates from

**Figure 3. Incidence of Selected Enteric Pathogens, 2000-2019**




*STEC (Shiga toxin producing *E. coli*) includes O157 and non-O157 STEC case counts.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patients with a history of foreign travel during the week prior to illness onset, regardless of destination, were resistant to fluoroquinolones as compared to approximately 20% of *Campylobacter* isolates from patients who acquired their infection domestically.

In 2009, a culture-independent test (CIDT) became commercially available for the qualitative detection of *Campylobacter* antigens in stool. In 2019, 36 patients were positive for *Campylobacter* by an antigen detection CIDT conducted in a clinical laboratory. However, only 12 (33%) of the specimens were subsequently culture-confirmed. Beginning In 2015, some clinical laboratories in Minnesota began testing stool specimens with PCR-based gastrointestinal pathogen panels, another type of CIDT. In 2019, 1,247 patients were positive for *Campylobacter* by a PCR gastrointestinal panel; 923 (74%) of these specimens were culture-confirmed. Only culture-confirmed cases met the surveillance case definition for inclusion in MDH case count totals.

## Candidemia

In 2017, surveillance began for candidemia among residents of the metropolitan area. Candidemia is a bloodstream infection with *Candida* fungal species, and is one of the most common types of healthcare-associated bloodstream infections in the United States. Risk factors include prolonged hospitalization in an intensive care unit, having a central venous catheter, a weakened immune system, recent surgery (especially abdominal surgery), recently, receipt of antibiotics, total parenteral nutrition, kidney failure, hemodialysis, and diabetes.

In 2019, 161 cases were reported among residents of the metropolitan area. The overall incidence rate was 5.2 per 100,000, and the highest county-level incidence was in Ramsey County (6.8 per 100,000). The median age was 54 years (range, newborn to 92 years). Eighty-two cases (52%) were male; 112 (71%) were white, 23 (15%) were black, 16 (10%) were Asian/Pacific Islander, and race was unknown for 10 cases.

Of the 161 cases, 98% were hospitalized at time of diagnosis, and 42 (28%) died while hospitalized. Underlying conditions included malignancy (30%), chronic lung condition (16%), diabetes (31%), renal disease (27%), neurologic condition (11%), skin condition (8%), and chronic liver disease (12%). Healthcare risk factors included receiving systemic antibiotics in the 14 days prior to diagnosis (80%); presence of a central venous catheter in the 2 days prior to diagnosis (66%); being admitted to the ICU in 14 days prior to, or 14 days after diagnosis (32%); and having surgery in the 90 days before diagnosis (29%).

More than 17 different *Candida* species are known to be agents of human infection; however, the two most common species comprised over 50% of candidemia infections. Of the 161 cases, 41% were *C. albicans*, 34% *C. glabrata*, 14% *C. parapsilosis*, 3% *C. tropicalis*, 6% *C. dubliniensis*, 1% *C. guilliermondii*, 4% *C. krusei,* and 4% with other species including *C. nivariensis, C. pelliculosa*, and *C. lusitaniae*. Nine cases (6%) were co-infected with multiple species of *Candida* at the time of incident specimen collection.

As primarily a healthcare-associated infection, injection drug use (IDU) has not been considered a common risk factor for candidemia. However, with the increasing opioid epidemic, IDU has been reported as an increasingly common condition associated with candidemia. In 2017, only 2/143 (1.4%) cases had IDU documented in their medical chart. However, in 2018, 15 (10.8%) cases, and in 2019, 16 (9.9%) cases had IDU documented in their medical chart.

## Carbapenem-resistant *Enterobacteriaceae* (CRE), *Acinetobacter baumannii* (CRA), and *Pseudomonas aeruginosa* (CRPA), 2019

Carbapenem-resistant *Enterobacteriaceae* (CRE), *Acinetobacter baumannii* (CRA), and *Pseudomonas aeruginosa* (CRPA) are Gram-negative bacilli that most commonly occur among patients with significant healthcare exposures, co-morbid conditions, invasive devices, and those who have received long courses of antibiotics. Invasive infections caused by CRE, such as carbapenem-resistant *Klebsiella pneumoniae*, are associated with higher morbidity and mortality than those caused by carbapenem-susceptible *Enterobacteriaceae*. Carbapenem-resistant *A. baumannii* (CRA) is increasingly recognized as one of the leading causes of healthcare-associated infections worldwide, and is associated with high mortality rates and unfavorable clinical outcomes. Invasive infections caused by CRPA are associated with higher morbidity and mortality than those caused by carbapenem-susceptible *P. aeruginosa*. Carbapenem resistance can be acquired through a variety of mechanisms including transmissible genetic elements. Some CRE, CRA, and CRPA carry resistance genes that produce enzymes called carbapenemases. Certain carbapenemases (e.g., *K. pneumoniae* carbapenemase [KPC]) can easily spread between bacteria of similar species. KPC is the predominant carbapenemase in the United States. Other carbapenemases (e.g., New Delhi metallo-β-lactamase [NDM], Verona integron-encoded metallo-β- lactamase [VIM], and oxacillinase-48 [OXA-48]) are more frequently identified in other countries. Resistance can also be acquired through the production of a β-lactamase effective against third generation cephalosporins (e.g., AmpC β-lactamases or extended-spectrum β-lactamases [ESBLs]) when combined with porin mutations that prevent carbapenem antibiotics from entering the cell.

We first identified a KPC-producing CRE in February 2009, and voluntary reporting, including isolate submission for all *Enterobacteriaceae* and *A. baumannii* resistant to imipenem, meropenem, doripenem, or ertapenem using current Clinical and Laboratory Standards Institute (CLSI) breakpoints (ertapenem excluded for Acinetobacter isolates) began. In 2012, we used standardized CRE and CRA definitions developed by the EIP Multi-site Gram-negative Surveillance Initiative (MuGSI), and initiated active laboratory- and population-based surveillance in Hennepin and Ramsey Counties. As a subset of statewide reporting, MuGSI surveillance includes all isolates from normally sterile sites or urine of *the three most common types of CRE* (*Escherichia coli*, *Enterobacter* spp., or *Klebsiella* spp.) and *A. baumannii* that are resistant to imipenem, meropenem, doripenem, or ertapenem using current CLSI breakpoints (ertapenem excluded for *Acinetobacter* isolates). A MuGSI incident case is defined as the first eligible isolate of each species collected from a Hennepin or Ramsey

County resident in 30 days. In 2016, we initiated statewide CRE surveillance for *E. coli, Enterobacter* spp., *Klebsiella* spp., and *Citrobacter* spp.; MDH also tracks other *Enterobacteriaceae* including, but not limited to, *Morganella* spp., *Proteus* spp., and *Providencia* spp. PHL tests all CRE isolates for carbapenemase production using a phenotypic assay (modified carbapenem inactivation method [mCIM] or CarbaNP), and conducts PCR on isolates with a positive phenotypic test for KPC, NDM, OXA-48-like, VIM, and IMP genes. All CRA isolates are tested by PCR for KPC, NDM, OXA-48, VIM, and IMP genes, along with *Acinetobacter*-specific OXA genes (OXA-23, OXA-24, and OXA-58).

In 2019, 558 CRE incident cases representing 515 patients were identified from clinical cultures among Minnesota residents. The most common cases were *Enterobacter* spp. (219) and *Klebsiella* spp. (138), followed by *E. coli* (87), *Citrobacter* spp. (40), *Serratia* spp. (31), *Providencia* spp. (17), *Proteus* spp. (12), *Raoultella* spp. (6), *Morganella* spp. (3), and other *Enterobacteriaceae* (5). Among the 558 incident cases, there were 157 CRE MuGSI incident cases (representing 145 patients) reported among residents of Hennepin and Ramsey Counties. For MuGSI cases, 66 (42%) cases were *Enterobacter* spp., 57 (36%) were *Klebsiella* spp., and 34 (22%) were *E. coli*. MuGSI isolates harbored carbapenemases KPC (5), NDM (4), and OXA-48 (2). CRE MuGSI incident cases were most frequently isolated from urine (143) followed by blood (8), other sterile sites (5), and pleural fluid (1).

We identified 29 additional CRE surveillance cases (from 23 patients) through colonization screening including 11 residents identified during an outbreak of NDM-producing *K. pneumoniae* at a long-term care facility. Among surveillance cases with known organism, there were *K. pneumoniae* (19), *E. coli* (5), *C. freundii* (1), *E. cloacae* (1), and *Pluralibacter* spp. (1) isolates harboring carbapenemases NDM (21), KPC (5), and OXA-48 (3).

Among the 558 CRE incident cases, 51 (9%) were carbapenemase-producing organisms. Nineteen cases (from 14 patients) were KPC positive (*K. pneumoniae* [10], *C. freundii* [2], *E. cloacae* [2], *E. coli* [2], *K. oxytoca* [2], and *P. mirabilis* [1]). Seventeen cases (from 11 patients) were NDM positive (*K. pneumoniae* [9], *E. coli* [6], *E. cloacae* [1], and *P. rettgeri* [1]. Twelve cases (from 11 patients) were IMP positive (*P. rettgeri* [9], *P. mirabilis* [2], and *M. morgannii* [1] and 3 cases were OXA-48 positive (*E. coli* [2] and *R. ornithinolytica* [1]. For colonization screening among non-outbreak cases, 5 cases (42%) had healthcare exposure outside of the United States or from an area in the United States where carbapenemases are more common.

Among 39 Minnesota residents with carbapenemase-producing isolates, the median age was 66 years (range, 10 to 97); 21 (54%) were female. There were cases in 19 counties; 10 (26%) were residents of Hennepin or Ramsey County, 4 were residents of Dakota County (10%), 3 were residents of Anoka County (8%), and 3 were residents of Waseca County (8%). Twenty (51%) were inpatient at the time of specimen collection, 16 (41%) were in outpatient settings, 2 (5%) were in long-term acute care hospitals, and 1 (3%) was in a long-term care facility. Urine (25) was the most common isolate source followed by blood (4), wound (4), sputum (2), and other sites (4).

Detection of NDM and OXA-48 serve as a reminder to clinicians that assessing travel history to identify receipt of healthcare outside the United States is a critical component of early detection of CRE isolates with carbapenemases that are less common in the United States. In April 2019, MDH released recommendations for admission colonization screening to detect carbapenemase-producing organisms (CPO). In line with CDC recommendations, MDH strongly recommends that Minnesota hospitals screen on admission patients who received healthcare abroad in the last 12 months; healthcare abroad includes ambulatory surgery, hemodialysis, or an overnight stay at a healthcare facility outside of the United States. Furthermore, MDH recommends Minnesota hospitals consider screening patients on admission who received healthcare in U.S. regions where CPO are more common.

In 2018, CDC released the Containment Strategy which provides guidance to state and local public health departments when responding to cases of novel or rare multidrug resistant organisms (MDRO) including CPOs. Novel or rare MDROs are epidemiologically important because these organisms cause severe, difficult-to-treat infections and have the potential to spread within healthcare settings. MDH utilizes the Containment Strategy in response to all single cases of carbapenemase-producing CRE, CRA, and CRPA in Minnesota. This rapid and aggressive action includes prompt identification of the organism, notification and investigation with healthcare facilities, and response or "containing the spread" in an effort to slow the spread of novel or rare MDROs in Minnesota.

In 2019, 21 CRA incident cases representing 18 patients were identified from clinical cultures among Minnesota residents. Wound (6) was the most common isolate source followed by urine (5), sputum (5), lower respiratory tract (2), blood (1), bone (1), and other sterile site (1). Fifteen (71%) cases were hospitalized at the time of culture collection. Other CRA isolates were collected from patients in outpatient settings (3), long-term care facilities (2), and long-term acute care hospitals (1). Eight CRA isolates possessed genes for carbapenemase production (6 with OXA-23 and 2 with OXA-24). Of 21 CRA incident cases, 4 incident cases were reported for MuGSI and all were isolated from urine; 2 cases were found to harbor a carbapenemase, both of which were OXA-23.

Active laboratory- and population-based surveillance for carbapenem-resistant *P. aeruginosa* (CRPA) was initiated on August 1, 2016 in Hennepin and Ramsey Counties as part of MuGSI and ended on July 31, 2018. This surveillance included all CRPA isolates collected from normally sterile sites, wounds, urine, sputum, throat cultures from cystic fibrosis (CF) patients, or other lower respiratory sites that are resistant to imipenem, meropenem, or doripenem using current CLSI breakpoints. An incident case was defined as the first report of CRPA, or a subsequent report of CRPA ≥ 30 days after the last incident report. Despite surveillance discontinuation in 2018, PHL continued to test any submitted CRPA isolates for carbapenemase production. In 2019, 2 CRPA isolates demonstrated carbapenemase-production (VIM and NDM).


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## *Clostridioides difficile*

*Clostridioides difficile* is an anaerobic, spore-forming, Gram-positive bacillus that produces two pathogenic toxins: A and B. *C. difficile* infections (CDI) range in severity from mild diarrhea to fulminant colitis and death. Transmission of *C. difficile* occurs primarily in healthcare facilities, where environmental contamination by *C. difficile* spores and exposure to antimicrobial drugs are common. The primary risk factor for development of CDI in healthcare settings is recent use of antimicrobials, particularly clindamycin, cephalosporins, and fluoroquinolones. Other risk factors for CDI acquisition in these settings are age >65 years, severe underlying illness, intensive care unit admission, nasogastric intubation, and longer duration of hospital stay.

In the early 2000s, a marked increase in the number of CDI cases and mortality due to CDI was noted across the United States, Canada, and England. Most notable was a series of large-scale outbreaks in Quebec first reported in March 2003. During this period, Quebec hospitals reported a 5-fold increase in healthcare-acquired CDI. These and other healthcare facility (e.g., long-term care facilities) outbreaks have been associated with the emergence of a more virulent strain of *C. difficile*, designated North American PFGE type 1 (NAP1), toxinotype III.

In 2009, as part of EIP, we initiated population-based, sentinel surveillance for CDI at clinical laboratories serving Stearns, Benton, Morrison, and Todd Counties; in 2012 Olmsted County was added.

CDIs that occur outside the traditional healthcare settings (i.e., community-associated) have also been receiving increased attention. Community-associated (CA) CDI data from 2009-2011 across 10 EIP sites showed that 64% of CA CDI patients received prior antibiotics, and 82% had some outpatient healthcare exposure.

A CDI case is defined as a positive *C. difficile* toxin assay on an incident stool specimen from a resident (≥ 1 year of age) of one of the five counties. A CDI case is classified as healthcare facility-onset (HCFO) if the initial specimen was collected >3 days after admission to a healthcare facility. Community-onset (CO) cases who had an overnight stay at a healthcare facility in the 12 weeks prior to the initial specimen are classified as CO-HCFA, whereas CO cases without documented overnight stay in a healthcare facility in the 12 weeks prior to the initial specimen result are classified as CA. A more detailed set of case definitions is available upon request.

In 2019, 858 incident cases of CDI were reported in the five sentinel counties (207 per 100,000 population), a decrease from 210 per 100,000 population in 2018. Sixty percent of these cases were classified as CA, 21% as CO-HCFA, and 20% as HCFO. The median ages for CA, CO-HCFA, and HCFO cases were 57 years, 59 years, and 73 years, respectively. Forty-nine percent of CA cases were prescribed antibiotics in the 12 weeks prior to stool specimen collection compared to 85% of HCFO cases and 80% of CO-HCFA cases. Of the 513 putative CA cases eligible for interview, 362 were interviewed and confirmed as CA cases. Forty-eight percent of CA cases reported antibiotic use in the 12 weeks prior to illness onset date. Most common uses of antibiotics included treatment of ear, sinus, or upper respiratory infections (29%); dental procedures (17%); urinary tract infections (16%); and skin infections (11%).

## Cryptosporidiosis

In 2019, 490 cases of cryptosporidiosis (8.73 per 100,000 population) were reported. This is markedly higher than the median number of cases reported annually from 2009 to 2018 (median, 348 cases; range, 307 to 532). The median age was 28 years (range, 5 months to 96 years). Children 10 years of age or younger accounted for 22% of cases. Fifty-six percent of cases occurred during July through October. The incidence of cryptosporidiosis in the Southwestern, Southeastern, South Central, Northwestern, and West Central districts (23.5, 23.5, 17.2, 16.4 and 13.2 cases per 100,000, respectively) was significantly higher than the statewide incidence. Only 132 (27%) cases occurred among residents of the metropolitan area (4.3 per 100,000). Thirty-eight (8%) cases required hospitalization, for a median of 4 days (range, 2 to 190 days). No deaths were reported.

Five confirmed outbreaks of cryptosporidiosis were identified in Minnesota in 2019, accounting for 22 laboratory-confirmed cases. One recreational water outbreak of cryptosporidiosis occurred, accounting for 124 cases (16 laboratory-confirmed). The outbreak was associated with multiple locations of the same swim school (Hennepin and Ramsey counties) Two outbreaks associated with animal contact accounted for 13 cases (3 laboratory-confirmed); these outbreaks occurred in Olmsted and Mower counties. Two outbreaks of cryptosporidiosis due to person-to-person transmission in child care settings accounted for 12 cases (3 laboratory-confirmed); these outbreaks occurred in Douglas and Renville counties.

## Cyclosporiasis

There were 136 *Cyclospora* cases reported in 2019 (2.42 per 100,000 population). This is markedly higher than the median number of cases reported from 2009 to 2018 (median, 2; range, 0 to 156 per year). In 2019, 38% of cases occurred in people who resided in the metropolitan area.

The median age of cases was 44.5 years (range, 16 to 83 years). Seventy-two percent were female. Five percent were hospitalized; the median length of hospitalization was 5 days (range, 2 to 38 days). Eighty-five percent of infections occurred during May through July. Of the 92 non-outbreak cases for whom data were available, 13 (14%) reported travel outside the United States during the 2 weeks prior to illness onset.

One foodborne outbreak of cyclosporiasis was identified, a multi-state outbreak associated with fresh basil. The outbreak accounted for 37 laboratory-confirmed Minnesota cases, with sub-clusters at an Olmsted County restaurant (26 cases), a St. Louis County catered conference (4 cases), a St. Louis County restaurant (3 cases), and a Hennepin County restaurant (2 cases); 2 Minnesota cases were exposed at a restaurant in another state.

## *Escherichia coli* O157 and Other Shiga Toxin-producing *E. coli,* and Hemolytic Uremic Syndrome

In 2019, 111 culture-confirmed cases of *Escherichia coli* O157 infection (1.98 per 100,000 population) were reported. The number of reported cases represents a 12% decrease from

the median number of cases reported annually from 2009 to 2018 (median, 126.5 cases; range, 96 to 146). During 2019, 59 (53%) cases occurred in the metropolitan area. Sixty-eight (61%) cases occurred during May through October. The median age of the cases was 28 years (range, 1 to 91 years). Eleven percent of the cases were 4 years of age or younger. Forty-five (41%) cases were hospitalized; the median hospital stay was 3 days (range, 1 to 25 days). No cases died.

In addition to the 111 culture-confirmed *E. coli* O157 cases, 322 cases of Shiga toxin-producing *E. coli* (STEC) infection were identified in 2019. Among the 322 cases with STEC other than O157, *E. coli* O103 was the serogroup for 52 (16%) cases, *E. coli* O26 for 52 (16%), *E. coli* O111 for 51 (16%), *E. coli* O145 for 12 (4%), *E. coli* O121 for 7 (2%), and *E. coli* O45 for 5 (2%). The median age of the non-O157 STEC cases was 23.5 years (range, 5 months to 95 years). Forty-one (13%) cases were hospitalized; the median hospital stay was 3 days (range, 1 to 56 days). No cases died.

Culture-independent tests (CIDTs) have become increasingly adopted by clinical laboratories for the detection of Shiga toxin in stool. Two hundred fifty-one patient specimens that were positive by a CIDT conducted at a clinical laboratory were not subsequently culture-confirmed, and therefore did not meet the surveillance case definition for inclusion in MDH case count totals.

Five *E. coli* O157 outbreaks were identified during 2019. Four outbreaks were due to foodborne transmission, and one was due to animal contact. All four foodborne outbreaks were part of national investigations. The five outbreaks resulted in 46 laboratory-confirmed Minnesota cases with a median of 7 cases (range, 5 to 18 cases per outbreak). One outbreak was associated with animal contact at the Minnesota State Fair. Eleven laboratory-confirmed cases were identified. No cases developed hemolytic uremic syndrome (HUS) or died. A national outbreak was likely associated with frozen pizza. Eighteen cases were identified in Minnesota. No cases developed HUS or died. In November, a national outbreak of infections was associated with romaine lettuce from Salinas, California. Seven laboratory-confirmed cases were identified in Minnesota. Two cases developed HUS and neither died. In November, a national outbreak was associated with pre-packaged salad kits. Five laboratory-confirmed cases were identified in Minnesota. No cases developed HUS or died. In December, a national outbreak was associated with iceberg lettuce. Five laboratory-confirmed cases were identified in Minnesota. No cases developed HUS or died.

Seven non-O157 STEC outbreaks were identified during 2019. Four outbreaks were due to person-to-person transmission in child care settings, two were due to foodborne transmission, and one was due to waterborne transmission. A national outbreak of *E. coli* O103 infections was associated with consuming ground beef. One laboratory-confirmed case was identified in Minnesota. The case did not develop HUS or die.

An outbreak of *E. coli* O26:H11 infections associated with person-to-person transmission occurred at a childcare facility in Hennepin County. Six cases, all laboratory-confirmed, were identified. No cases developed HUS or died. A second outbreak of *E. coli* O26:H11 infections associated with person-to-person transmission occurred at a childcare facility in Hennepin County. Four cases, all laboratory-confirmed, were identified. No cases developed HUS or died. Another outbreak of *E. coli* O26:H11 infections associated with person-to-person transmission occurred at a child care facility in Olmsted County. Two cases, both laboratory-confirmed, were identified. Neither case developed HUS or died. Another outbreak of *E. coli* O26:H11 infections associated with person-to-person transmission occurred at a childcare facility in Wright County. Thirty-six cases, including 20 laboratory-confirmed, were identified. No cases developed HUS or died.

In August, an outbreak of *E. coli* O145:H28 infections was associated with a waterborne transmission at a lake in Hennepin County. Sixty-nine cases, including 4 laboratory-confirmed, were identified. No cases developed HUS or died.

An outbreak of *E. coli* O69:H11 infections was associated with a restaurant in Anoka County. Three cases, all laboratory-confirmed, were identified. No cases developed HUS or died.

### Hemolytic Uremic Syndrome (HUS)

In 2019, 11 HUS cases were reported. The number of reported cases is similar to the median number of cases reported annually from 2009 to 2018 (median, 12.5 cases; range, 9 to 17). In 2019, the median age of HUS cases was 7 years (range, 1 year to 78 years); 6 of the 11 cases occurred in children <7 years of age. All 11 cases were hospitalized, with a median hospital stay of 15 days (range, 3 to 25 days). No cases died. From 1997 through 2019, the overall case fatality rate among HUS cases was 5.0%. Ten of the 11 HUS cases reported in 2019 were post-diarrheal. *E. coli* O157:H7 was cultured from the stool of 7 cases, *E. coli* O111:H8 was cultured from the stool of 1 case, and *E. coli* O55:H7 was isolated from the stool of 1 case. In 2019, there were 2 outbreak-associated HUS cases, both associated with a national outbreak due to romaine lettuce from Salinas, California. Both outbreak-associated HUS cases were hospitalized; the median hospital stay was 9 days (range, 3 to 15 days). Neither case died.

## Giardiasis

In 2019, 577 cases of *Giardia* infection (10.3 per 100,000) were reported. This represents a 12% decrease from the median number of cases reported annually from 2009 through 2018 (median, 648 cases; range, 508 to 846). Recent immigrants and refugees accounted for 10% of cases. An additional 16% of cases reported international travel in the 3 weeks prior to illness onset. Excluding recent immigrants and refugees, the median age of cases was 34 years (range, 2 months to 92 years). Seventeen percent were <10 years of age, and 37% were >50 years of age. Fifty-seven percent of non-immigrant and refugee cases were male. *Giardia* infections had a summer/fall seasonality; 47% of non-immigrant and refugee cases occurred during July through October. Thirty-seven (6%) cases required hospitalization, for a median of 4 days (range, 1 to 39 days).

Two outbreaks were identified that accounted for 10 laboratory-confirmed cases. Both outbreaks were associated with person-to-person transmission in childcare settings.


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## *Haemophilus influenzae*

One hundred twenty invasive *Haemophilus influenzae* disease cases (2.14 per 100,000 population) were reported in 2019. Cases ranged in age from newborn to 99 years (median 66 years). Allowing for more than one syndrome per case, 68 (54%) cases had pneumonia, 31 (25%) bacteremia, 9 (7%) meningitis, 3 (2%) empyema, 2 (2%) septic arthritis, 2 (2%) endophthalmitis 2 (2%) otitis media, and the following each had 1 (1%): cellulitis, conjunctivitis, cholangitis, endometritis, epiglottitis, septic shock, and uveitis. Fourteen (12%) cases died.

Of 116 *H. influenzae* isolates for which typing was performed at PHL, 20 were type a, 3 type b (Hib), 4 type e, 7 type f, and 82 were untypeable. The 3 Hib disease cases compared to 1 case in 2018, 2 cases in 2017, 5 in 2016, 2 in 2015, and 1 in 2014. One case was a child 1 year of age, who had meningitis and died. The child had not received Hib vaccinations. Another was in a child <1 year of age, who had pneumonia, cellulitis, and otitis media, and survived. This child was also unvaccinated. The third case was a 35 year-old who had meningitis and survived.

The 14 deaths occurred in patients ranging in age from newborn to 95 years. Seven cases had pneumonia, 4 had bacteremia without another focus of infection, 2 had meningitis, and 1 was extremely premature. Thirteen had *H. influenzae* isolated from blood and one from placenta. Co-morbidities were reported in all of them. Of the 14 that died, there was 1 case-isolate serotype b, 1 case-isolate serotype a, 1 case-isolate serotype e, 1 case-isolate serotype f, 9 case-isolates were untypeable, and 1 isolate was not available for serotyping.

## Histoplasmosis

In 2019, there were 61 confirmed and 153 probable cases of histoplasmosis, an increase from 2017 and 2018. A new national case definition was implemented 2017; thus, comparisons to earlier years are difficult to make. The median age of cases was 52 years (range, 3 to 86 years); 133 (62%) were male. Of the 174 cases with race reported, 162 (93%) were white, 5 (3%) were black, 5 (3%) were Asian/Pacific Islander, 1 (1%) was American Indian/Alaskan Native, and 1 (1%) reported more than one race. Of the 150 with ethnicity reported, 5 (3%) were Hispanic. One hundred one cases (49%) were hospitalized, for a median of 4 days (range, 1-28 days), and of the 166 whose status was known, 61 (37%) were immunocompromised. Ten (5%) cases died, and histoplasmosis was the primary cause of death in 8 of these cases.

From 2017 to 2019, 581 cases of histoplasmosis have been reported. The average annual incidence of histoplasmosis in Minnesota was 3.3 cases per 100,000 population.

Histoplasmosis is caused by the soil-dwelling dimorphic fungus *Histoplasma capsulatum*. Infection typically results from inhalation of aerosolized spores, and symptomatic infections usually involve pulmonary disease, though disseminated or non-pulmonary infections are possible. The Mississippi River Valley is known to be an endemic area. Additionally, geographic micro-foci exist inside and outside endemic areas, and are usually associated with soil containing bird or bat guano. Common activities associated with exposure include farming, exposure to soil enriched with bird or bat guano, remodeling or demolition of old buildings, and clearing trees or brush in which birds have roosted. A subset of cases from 2018 and 2019 were enrolled in an enhanced surveillance interview, including 50 confirmed cases and 47 probable cases. These cases were asked about possible exposures, including bird or bat droppings, construction, demolition, gardening or other handling of plants or trees. Eighty-two (85%) cases reported at least one of these. The most commonly reported exposure was gardening or other handling of plants or trees (51 cases, 53%), while 32 (33%) cases reported exposure to construction or demolition, and 24 (25%) cases reported exposure to either bird or bat guano.

## HIV Infection and AIDS

HIV/AIDS incidence in Minnesota remains moderately low. In 2018, state-specific HIV infection rates ranged from 2.5 per 100,000 population in Wyoming to 28.6 per 100,000 in Georgia. Minnesota had the 14th lowest rate (6.2 cases per 100,000 population). In 2018, state-specific AIDS diagnosis rates ranged from 0.3 per 100,000 persons in Wyoming to 11.6 per 100,000 population in Georgia. Minnesota had the 15th lowest rate (2.1 cases per 100,000 population).

As of December 31, 2019, 2,112 cases of HIV infection (2,308 AIDS at first diagnosis, and 9,804 HIV [non-AIDS] cases) were reported among Minnesota residents. By the end of 2019, an estimated 9,193 persons with HIV/AIDS were living in Minnesota.

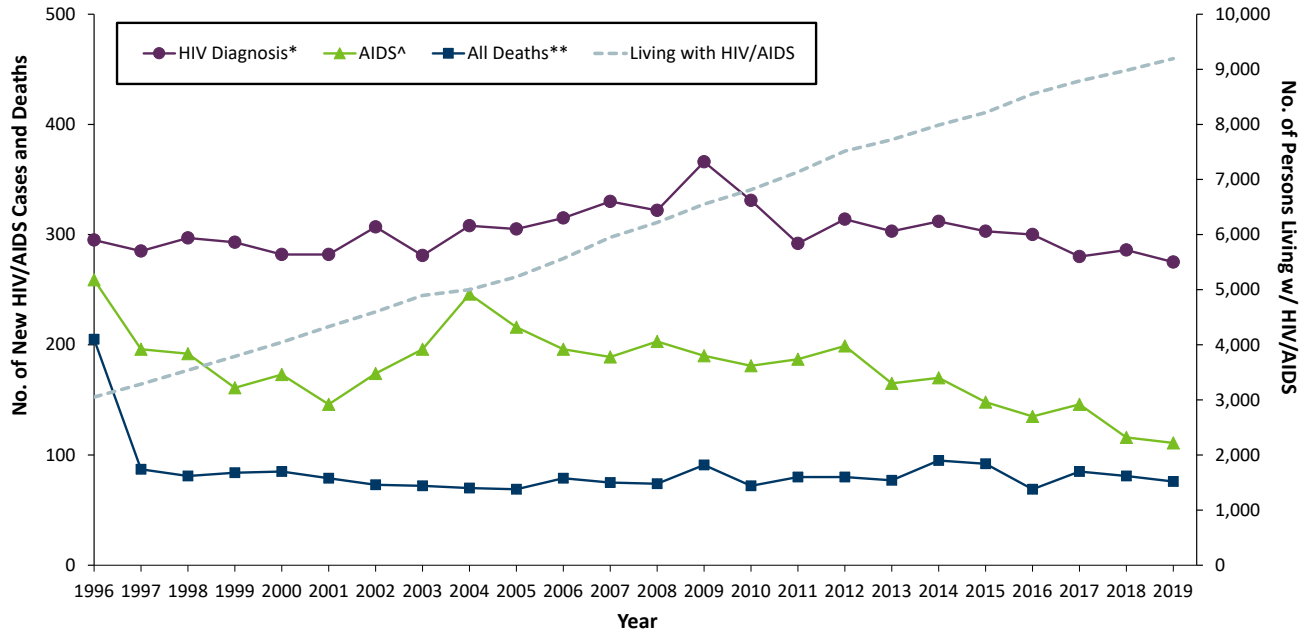
The annual number of AIDS cases reported in Minnesota increased steadily from 1982 through the early 1990s, reaching a peak of 361 cases in 1992. Beginning in 1996, the annual number of new AIDS diagnoses and deaths declined sharply, primarily due to better antiretroviral therapies. In 2019, 111 new AIDS cases (Figure 4) and 76 deaths among persons living with HIV infection in Minnesota were reported.

The number of HIV (non-AIDS) diagnoses has varied over the past decade. There was a peak of 278 newly diagnosed HIV (non-AIDS) cases in 2009, and a low of 215 new HIV (non-AIDS) cases reported in 2017, which is slightly lower than 219 cases reported in 2019.

In 2019, 81% (222/275) of new HIV diagnoses (both HIV [non-AIDS] and AIDS at first diagnosis) occurred in the metropolitan area. In greater Minnesota there were 52 cases in 31 of 78 counties. HIV infection is most common in areas with higher population densities and greater poverty.

The majority of new HIV infections in Minnesota occur among males. Trends in the annual number of new HIV infections diagnosed among males differ by race/ethnicity. New infections occurred primarily among white males in the 1980s and early 1990s. Whites still comprise the largest number of HIV infections among males, but the proportion of cases that white males account for is decreasing. In 2019, there were 84 new infections among white males, which is slightly less than half of new HIV infections among males (42%). Among black African American males,

## Figure 4. HIV/AIDS: Number of New Cases, Prevalent Cases, and Deaths by Year, 1996-2019




* Includes all new cases of HIV infection (both HIV [non-AIDS] and AIDS at first diagnosis) diagnosed within a given calendar year.
** Deaths among HIV cases, regardless of cause.
^ Includes all new cases of AIDS diagnosed within a given calendar year, including AIDS at first diagnosis. This includes refugees in the HIV+ Resettlement Program, as well as other refugee/immigrants diagnosed with AIDS subsequent to their arrival in the United States.

there were 51 new HIV diagnoses in 2019, which is about a quarter of new HIV infections among males (26%). Among Hispanic males of any race and black African-born males, there were 33 and 12 new HIV infections in 2019 respectively.

Females account for an increasing percentage of new HIV infections, from 11% of new infections in 1990 to 28% in 2019. Trends in HIV infections diagnosed annually among females also differ by race/ethnicity. Early in the epidemic, whites accounted for the majority of newly diagnosed infections. Since 1991, the number of new infections among women of color has exceeded that of white women.

In 2019, women of color accounted for 68% of new HIV infections among females in Minnesota. The number of diagnoses among African-born women has been increasing over the past decade. In 2019, the number of new cases among African-born women was 25, accounting for 33% of all new diagnoses among women. In 2019, there were 11 cases (14%) diagnosed among African American women.

Despite relatively small numbers of cases, HIV/AIDS affects persons of color disproportionately in Minnesota. In 2019, men of color comprised approximately 17% of the male population in Minnesota and 58% of new HIV diagnoses among men. Similarly, persons of color comprised approximately 13% of the female population in Minnesota and 68% of new HIV infections among women. The use of race can be a proxy for other risk factors, including lower socioeconomic status and education, and race is not considered a biological cause of disparities in the occurrence of HIV.

Historically, race/ethnicity data for HIV/AIDS in Minnesota have grouped non-African born blacks and black African-born persons together as "black." In 2001, MDH began analyzing these groups separately, and a marked trend of increasing numbers of new HIV infections among black African-born persons was observed. In 2019, there were 37 new HIV infections reported among black Africans. While black African-born persons comprise less than 1% of the state's population, they accounted for 14% of all HIV infections diagnosed in Minnesota in 2019.

In 2019, there were 111 diagnosed with HIV <30 years of age, accounting for 40% of all cases. Most of the cases were among young males where 82% of cases <30 years were male.

Since the beginning of the epidemic, male-to-male sex (men who have sex with men; MSM) has been the predominant mode of exposure to HIV reported in Minnesota. In 2019, MSM (including MSM who also inject drugs) accounted for 67% of new diagnoses among men. Heterosexual contact with a partner who has or is at increased risk of HIV infection is the predominant mode of exposure to HIV for women.

In the fall of 2019, an outbreak was declared among persons who inject drugs (PWID) diagnosed with HIV in Minnesota. Statewide there was a two-fold increase among PWID with 11 cases in 2018 increasing to 22 cases in 2019. The outbreak area includes residents of Hennepin and Ramsey counties where about three quarters of the statewide cases are located (16, 72%). Persons likely to be at high risk for HIV infection include sex partners or syringe-sharing partners of people known to be living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with HIV, PWID and their sex partners and needle sharing partners, persons who exchange sex for income or other items they need, and persons who experienced or are currently experiencing homelessness.

HIV perinatal transmission in the United States decreased 90% since the early 1990s. The trend in Minnesota has been similar. While the number of births to HIV-infected women increased nearly 7-fold between 1990 and 2018, with 57 births to pregnant persons in 2019, the rate of perinatal transmission decreased, from 15% in 1994-1996 to 0.6% over the last 3 years (2017-2019), with 1 HIV-positive birth in 2017.

## Influenza

Several influenza surveillance methods are employed. Data are summarized by influenza season (generally October-April) rather than calendar year.

### Hospitalized Cases

Surveillance for pediatric (<18 years of age) laboratory-confirmed hospitalized cases of influenza in the metropolitan area was established during the 2003-2004 influenza season and expanded to include adults for the 2005-2006 influenza season. For the 2008-2009 season surveillance was expanded statewide. Since the 2013-2014 season, clinicians have been encouraged to collect a throat or nasopharyngeal swab, or other specimen from all patients admitted to a hospital with suspect influenza, and submit the specimen to the PHL for influenza testing. For the 2014-2015 season, influenza B subtyping was added.

During the 2019-2020 influenza season (October 1, 2019 – April 30, 2020), there were 4,022 laboratory-confirmed hospitalized cases (71.3 cases per 100,000 persons compared to 44.6 cases per 100,000 in 2018-2019 and 112.8 cases per 100,000 in 2017-2018) reported. Cases included 3,029 influenza A (1,003 A[H1N1] pdm09, 24 H3, and 2,002 unknown A type), 986 influenza B (17 of Yamagata lineage and 285 of Victoria lineage), 2 positive for both influenza A and B, and 4 of unknown influenza types. Among the cases, 15% were 0-18, 19% were 19-49, 23% were 50-64, and 43% were 65 years of age and older. Median age was 61 years. Residents of the metropolitan area made up 59% of cases. Case report forms have been completed on all of the 760 metropolitan area cases that were selected for review. Of these, 32% were diagnosed with pneumonia, 20% required admission into an intensive care unit, and 8% were placed on mechanical ventilation. An invasive bacterial co-infection was present in 10% of hospitalized cases. Antiviral treatment was prescribed for 92% of cases. Overall, 92% of adult and 45% of pediatric cases had at least one chronic medical condition that would have put them at increased risk for influenza disease.

### Pediatric Deaths

There were 3 pediatric influenza-associated deaths, 2 positive for influenza B (no genotype), and 1 for influenza B/Victoria lineage.

### Laboratory Data

The Minnesota Laboratory System (MLS) Laboratory Influenza Surveillance Program is made up of more than 110 clinic- and hospital-based laboratories which voluntarily submit testing data on a weekly basis. These laboratories perform rapid testing for influenza and respiratory syncytial virus. Significantly fewer laboratories perform viral culture testing. Nine laboratories perform PCR testing for influenza, and three also perform PCR testing for other respiratory viruses. The PHL provides further characterization of submitted influenza isolates to determine the hemagglutinin serotype. Tracking laboratory results assists healthcare providers with patient diagnosis of influenza-like illness (ILI), and provides an indicator of the progression of the influenza season as well as prevalence of disease in the community. Between September 29, 2019–May 16, 2020, laboratories reported data on 74,599 influenza molecular tests, 16,293(22%) of which were positive for influenza. Of these, 12 (<0.1%) were positive for influenza A (H3), 597 (4%) were positive for influenza A (H1N1)pdm09, 8,043 (49%) were positive for influenza A-not subtyped, and 7,641 (47%) were positive for influenza B.

### Sentinel Surveillance

We conduct sentinel surveillance for ILI (fever >100° F, and cough, and/or sore throat in the absence of known cause other than influenza) through outpatient medical providers including those in private practice, public health clinics, urgent care centers, emergency rooms, and university student health centers. There were 33 sites in 20 counties. Participating providers report the total number of patient visits each week and number of patient visits for ILI by age group (0-4 years, 5-24 years, 25-64 years, ≥65 years). Percentage of ILI peaked during the week December 22-28, 2019 at 9.7%.

### Influenza Incidence Surveillance

MDH was one of 12 nationwide sites to participate in Optional Influenza Surveillance Enhancements. Nine clinic sites reported the number of ILI patients divided by the total patients seen by the following age groups: <1 year, 1-4 years, 5-17 years, 18-24 years, 25-64 years, and ≥65 years, each week. Clinical specimens were collected on the first 10 patients with ILI for PCR testing at the PHL for influenza and 13 other respiratory pathogens.

Minimal demographic information and clinical data were provided with each specimen. From September 29, 2019–May 16, 2020, these clinics saw 4,926 ILI patients. They submitted 175 specimens for influenza testing; 42 (24%) were positive for influenza. Of those, 1 (2%) was positive for influenza A (H3), 18 (43%) were positive for influenza A (H1N1) pdm09, 1 (2%) was positive for influenza A-type unspecified, 3 (7%) were positive for influenza B/ Yamagata lineage, 18 (43%) were positive for influenza B/ Victoria lineage, and 1 (2%) was positive for influenzaB/Unknown lineage.

### ILI Outbreaks in Schools and Long-term Care Facilities

Since 2009, schools reported outbreaks when the number of students absent with ILI reached 5% of total enrollment, or when three or more students with ILI were absent from the same elementary classroom. Nine hundred three schools in 79 counties reported ILI outbreaks during the 2019-2020 school year. The number of schools reporting ILI outbreaks since the 2009-2010 school year ranged from a low of 92 in 2013-2014 to a high of 1,302 in 2009-2010.

An influenza outbreak is suspected in a long-term care facility (LTCF) when two or more residents in a facility develop symptoms consistent with

influenza during a 48- to 72-hour period. An influenza outbreak is confirmed when at least one resident has a positive culture, PCR, or rapid antigen test for influenza and there are other cases of respiratory illness in the same unit. One hundred seven LTCFs in 43 counties reported confirmed outbreaks during the 2018-2019 influenza season. The number of LTCFs reporting outbreaks ranged from a low of three in 2008- 2009 to a high of 212 in 2017-2018.

## Legionnaires' Disease

In 2019, 118 confirmed cases of Legionnaires' disease (2.1 per 100,000 population) were reported. This is a 22% decrease from the 152 cases reported in 2018, which was the highest number of cases ever reported, and a 20% increase over the 98 cases reported in 2017. Prior to 2016, there were never more than 60 cases reported annually. The CDC criteria for confirmation of a case are a clinically compatible illness and at least one of the following: 1) isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid, or other normally sterile fluid by culture, or 2) detection of *L. pneumophila* serogroup 1 antigen in urine using validated reagents, or 3) seroconversion of fourfold or greater rise in specific serum antibody titer to *L. pneumophila* serogroup 1 using validated reagents. A single antibody titer of any level is not considered diagnostic. Patients positive only by PCR or DFA were classified as suspect cases (as of January 1, 2020, PCR positives will be classified as confirmed cases). In 2019, there were 7 suspect cases.

All 118 had pneumonia, and 116 (98%) were hospitalized, with a median duration of hospitalization of 5 days (range, 1 to 34 days). Of those hospitalized, 41 (35%) were admitted to an intensive care unit, and 22 (19%) required mechanical ventilation. Four (3%) cases died. Seventy (59%) were male. Older adults were more often affected, with 103 (87%) occurring among individuals ≥50 years (overall median age, 63 years; range, 33 to 94). Fifty-nine (50%) cases had onset dates in June through September. Seventy-five (64%) were residents of the metropolitan area and 43 (36%) were residents of Greater Minnesota.

Four cases were associated with an outbreak linked to a hotel spa pool. Two cases were associated with an outbreak at a senior living community that had an outbreak of 5 cases in 2018. One case (and 1 additional suspect PCR-only case) was associated with an outbreak at a hospital campus that had 5 cases associated with it in prior years. Three cases were associated with outbreaks in other states. The remaining 108 cases (92%) were epidemiologically classified as sporadic. Of the 98 sporadic cases for whom information was available, 18 (18%) had traveled out of state, and 5 (5%) had traveled out of the country during the 10 days prior to illness onset.

Although most cases are diagnosed by *Legionella* urinary antigen test, culture is useful for public health purposes because clinical and environmental isolates can be compared by molecular typing in outbreak investigations. MDH requests that clinical laboratories submit isolates or available lower respiratory tract (sputum, BAL) specimens from confirmed and suspect cases for culture and molecular typing.

## Listeriosis

Sixteen listeriosis cases were reported in 2019. All were hospitalized, and 3 died. The median age of cases was 65 years (range, newborn to 94 years). Twelve (75%) had *Listeria monocytogenes* isolated from blood, 1 from cerebrospinal fluid, 1 from peritoneal fluid, 1 from pleural fluid, and 1 from a joint aspirate. Three cases were pregnancy-associated: two pregnant women who had a positive culture from blood, one who was still pregnant at 27 weeks and one who suffered a fetal demise; and a neonate who had a positive culture from blood and who survived. Eleven cases were white, 2 were Asian, 1 was black, 1 reported other race, and 1 had unknown race; 1 was of Hispanic ethnicity. The 16 cases was twice the median number of cases reported from 1996 through 2017 (median, 8 cases; range, 3 to 19). No cases were part of recognized outbreaks in 2019.

In 2019, national case definitions were modified to include "probable" cases of listeriosis. In 2019, 3 probable cases were identified: two were a mother/infant pair where a blood specimen from the mother was culture-independent test positive at a clinical laboratory, but had no growth at the PHL and could not be tested; and, one was the mother of the culture-positive newborn who was not tested but was assumed to be infected.

## Lyme Disease

Lyme disease is caused by *Borrelia burgdorferi*, a spirochete transmitted to humans by bites from *Ixodes scapularis,* the blacklegged tick. Recently, a new species, *B. mayonii*, has also been identified as a cause of human disease, and 10 cases have been reported in Minnesota residents since 2013, 1 in 2019. In Minnesota, the same tick vector also transmits the agents of babesiosis, human anaplasmosis, one form of human ehrlichiosis, and a strain of Powassan virus.

In 2019, 915 confirmed Lyme disease cases (16 cases per 100,000 population) were reported. In addition, 612 probable cases (physician-diagnosed cases that did not meet clinical evidence criteria for a confirmed case but that had laboratory evidence of infection) were reported. Overall, the number of reported cases of Lyme disease has been increasing despite yearly fluctuations, as evidenced by the median number of cases from 2010 through 2018 (median, 1,203; range, 896 to 1,431) compared to the median from 2000 to 2009 (median, 915; range, 463 to 1,239) (Figure 1).

Of the confirmed Lyme disease cases reported, 551 (60%) cases were male, and the median case age was 48 years (range, 2 to 90). Physician-diagnosed erythema migrans (EM) was present in 650 (71%) cases. Three hundred fifteen (34%) cases had one or more late manifestations of Lyme disease (including 231 with a history of objective joint swelling, 69 with cranial neuritis including Bell's Palsy, 4 with lymphocytic meningitis, 15 with acute onset of 2nd or 3rd degree atrioventricular conduction defects, and 7 with radiculoneuropathy) and confirmation by Western immunoblot (positive IgM ≤30 days post-onset or positive IgG). Of the 840 cases


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with known onset dates, onset of symptoms peaked from June through August, with 65% of EM cases experiencing symptom onset in June or July. This timing corresponds with peak activity of nymphal *I. scapularis* ticks in mid-May through mid-July. The majority of cases either resided in or traveled to endemic counties in north-central, east-central, or southeast Minnesota, or Wisconsin.

## Malaria

Malaria is a febrile illness caused by several protozoan species in the genus Plasmodium. The parasite is transmitted to humans by bites from infected Anopheles genus mosquitoes. The risk of malaria is highest in the tropical and sub-tropical regions of the world. Although local transmission of malaria frequently occurred in Minnesota over 100 years ago, all of the cases reported in Minnesota residents in recent years have been imported infections acquired abroad.

In 2019, 77 cases (1.4 per 100,000 population) were reported. Sixty-four (83%) cases were identified with P. falciparum, 5 (7%) with P. vivax, 3 (4%) with P. ovale, 3 (4%) with P. malariae and 1 (1%) with mixed Plasmodium species infection. In 1 case, the species was unable to be determined. The median age of cases was 37 years (range, 4 to 75). Of the 68 cases with known race, 68 (81%) were black, 3 (4%) were white and 3 (4%) were Asian. Seventy-five cases were Minnesota residents at the time of their illness, 56 (75%) of which resided in the metropolitan area. Of the 59 cases with known country of birth, 6 (8%) were born in the United States. 74 (96%) cases likely acquired malaria in Africa, and 1 patient reported travel to Central America. Exposure information was not available for 2 cases. Seventeen countries were considered possible exposure locations for malaria infections, including Liberia (19), Nigeria (13), Kenya (9), Sierra Leone (7), and Cameroon (5) as well as several other countries in sub-Saharan Africa.

## Meningococcal Disease

Four *Neisseria meningitidis* (NM) invasive disease cases (0.07 per 100,000 population) were reported in 2019; there were no cases in 2018, 5 cases in 2017, and 5 cases in 2016. Three were serogroup B and 1 was serogroup Y. All cases were sporadic.

Cases ranged in age from 19 years to 46 years. All cases occurred in the metropolitan area. Three cases had meningitis and 1 had bacteremia without another focus of infection. There were no deaths.

Incidence of invasive NM was stable at about 0.30 cases per 100,000 persons since 2005 (with the exception of 2008 when incidence increased to 0.57 cases per 100,000 persons); however, invasive NM incidence has decreased since 2011. The quadrivalent conjugate vaccine, MenACWY is recommended at 11- 12 years with a booster at age 16. Vaccination rates for at least 1 dose among 13-17 year old Minnesota adolescents is 78.5%; rates for the booster are lagging at 26.9% (Minnesota Immunization Information Connection, 2018 data). Meningococcal B vaccine is recommended for persons 10 years of age and older with specific risk factors. It should especially be considered for those 16-23 years of age, especially in outbreak situations.

## Mumps

In 2019, 11 mumps cases were reported. Nine were classified as confirmed (tested positive by PCR), and 2 as probable (tested positive by IgM serology or were linked to another case or outbreak). Two were genotyped as K, a common genotype circulating in mainland southeast Asia. The remaining confirmed cases were genotyped as G, which is the dominant genotype circulating in the United States since 2006. Eight cases had a documented history of receiving at least 1 dose of mumps-containing vaccine, 1 was unvaccinated, and 2 reported unknown vaccination status. No case reported a previous history of mumps disease.

Seven cases occurred in a county jail housing U.S. Immigration and Customs Enforcement detainees linked to larger national outbreak involving 898 cases in 19 states. Two cases were acquired in Minnesota and were not linked to outbreaks occurring elsewhere, 1 acquired mumps from domestic travel, and 1 from international travel. The median age of cases was 27 years (range 3 to 36 years). Ten cases occurred in persons 18-49 years, and 1 was <18 years of age. Ten experienced parotitis, and 1 reported orchitis.

Mumps surveillance is complicated by nonspecific clinical presentation in nearly half of cases, asymptomatic infections in an estimated 30% of cases, and suboptimal sensitivity and specificity of serologic testing. A number of viruses can cause sporadic parotitis including parainfluenza virus types 1 and 3, influenza A virus, human herpes virus 6, enterovirus, Epstein- Barr virus, lymphocytic choriomeningitis virus, bocavirus, and human immunodeficiency virus. Acute bacterial parotitis may present with unilateral swelling. Noninfectious causes include drugs, tumors, and immunologic diseases.

## Neonatal Sepsis

Statewide surveillance for neonatal sepsis includes reporting of any bacteria (other than coagulase-negative *Staphylococcus*) isolated from a sterile site in an infant <7 days of age, and mandatory submission of isolates. In 2019, 58 cases (0.87 cases per 1,000 live births) were reported compared to 38 cases in 2018. There were 4 deaths. All were identified via blood. There was 1 meningitis case. Most cases (87%) were culture-positive within the first 2 days of life. *Escherichia coli* was most common (14) followed by , Group B *Streptococcus* (13), *Streptococcus anginosus* (4), Group D *Streptococcus (4), Haemophilus influenzae* (3)*, Enterococcus* spp. (3), *Streptococcus viridans* (3), *Klebsiella pneumoniae* (2), *Staphylococcus aureus* (2), *Streptococcus pneumoniae* (2), other *Streptococcus* spp (2), and 1 each of *Acinetobacter, Candida* spp., Group C *Streptococcus, Listeria* spp., *Proteus mirabilis*, and *Pseudomonas* spp.

## Pertussis

In 2019, 469 pertussis cases (8 per 100,000 population) were reported. Laboratory confirmation was available for 320 (73%) cases, 36 (11%) of which were confirmed by culture and 284 (89%) of which were confirmed by PCR. In addition, 66 (21%) cases met the clinical case

definition and were epidemiologically linked to laboratory confirmed cases, and 37 (12%) met the clinical case definition only. Two hundred thirty-five (50%) cases occurred in residents of the metropolitan area.

Paroxysmal coughing was the most commonly reported symptom, which 432 (92%) cases experienced. Approximately one third (138) reported whooping. Although commonly referred to as "whooping cough," very young children, older individuals, and persons previously immunized may not have the typical "whoop". Post-tussive vomiting was reported in 206 (44%) cases. Infants and young children are at the highest risk for severe disease and complications. Pneumonia was diagnosed in 17 (4%) cases, only 3 (18%) of which were in infants; 3 (18%) were 2 to 16 years old, 9 (53%) were 20 to 70 years old. Eleven (2%) cases were hospitalized; 1 hospitalized patient was <6 months of age. One death occurred.

Pertussis is increasingly recognized in older children and adults. During 2019, cases ranged in age from <1 month to 92 years. Eighty-six (18%) cases occurred in adolescents 13-17 years, 149 (32%) in children 5-12 years, 109 (23%) in adults ≥18 years, 80 (17%) in children 6 months through 4 years, and 15 (5%) in infants <6 months of age. The median age of cases was 11 years. Infection in older children and adults may result in exposure of unprotected infants. During 2019, 16 cases were in infants <1 year of age. A likely source of exposure was identified for all of those cases; 2 were infected by adults ≥18 years, 2 by an adolescent 13-17 years, 12 by a child <13 years. ACIP recommends vaccination of women at ≥20 weeks gestation during each pregnancy in an effort to protect young infants. Ensuring up-to-date vaccination of children, adolescents, and adults, especially those in contact with young children is also important. Vaccinating adolescents and adults with Tdap will decrease the incidence of pertussis in the community and thereby minimize infant exposures.

Although unvaccinated children are at highest risk for pertussis, fully immunized children may also develop disease, particularly as the number of years since vaccination increase. Disease in those previously immunized is usually mild. Efficacy for currently licensed DTaP vaccines is estimated to be 71-84% in preventing typical disease within the first 3 years of completing the series. Waning immunity sharply increases at 7 years of age, and most are susceptible by 11-12 years of age when Tdap booster is recommended. Recent studies suggest that immunity wanes sharply 2 years from receipt of Tdap. Of the 112 (24%) cases who were 7 months to 6 years of age, 44 (40%) were known to have received at least a primary series of 3 doses of DTP/ DTaP vaccine prior to onset of illness; 66 (59%) received fewer than 3 doses and were considered preventable cases.

Reporting rules require clinical isolates of *Bordetella pertussis* be submitted to the PHL in order to track changes in circulating strains. Isolates for 33 (79%) culture-confirmed cases were received and sub-typed, with four distinct PFGE patterns identified. Nationally, isolates have had low minimum inhibitory concentrations (falling within the reference range for susceptibility) to erythromycin and azithromycin. Only 11 erythromycin-resistant *B. pertussis* cases have been identified in the United States.

Laboratory tests should be performed on all suspected cases. However, *B. pertussis* is rarely identified late in the illness; therefore, a negative culture does not rule out disease. A positive PCR result is considered confirmatory in patients with a 2-week history of cough illness. PCR can detect non-viable organisms. Consequently, a positive PCR result does not necessarily indicate current infectiousness. Patients with a 3-week or longer history of cough illness, regardless of PCR result, may not benefit from antibiotic therapy. Whenever possible, culture should be done in conjunction with PCR testing. Serological tests may be useful for those with coughs >2 weeks.

Pertussis remains endemic despite an effective vaccine and high coverage rates with the primary series. Reported incidence of pertussis has consistently increased over the past 10 years, particularly in middle school-aged children, adolescents, and adults.

## Q Fever

Q fever is an acute or chronic illness caused by *Coxiella burnetii*. Cattle, sheep, and goats are the primary sources of infection. Transmission can occur through contact with infected animal tissue, inhalation of aerosolized bacteria, ingestion of unpasteurized dairy products, and tick bites.

In 2019, 4 confirmed cases were reported, 2 acute and 2 chronic. The acute cases were a 45 year-old and 69 year-old, 1 of whom was likely exposed through lambing sheep, the other through contact with cattle. The chronic cases were a 74 year-old and a 78 year-old who both likely had animal exposures. All 4 cases were hospitalized; the acute cases were hospitalized for 6 and 7 days respectively, and the chronic cases were hospitalized for 18 and 10 days respectively. All cases survived.

From 1997 to 2019, 25 confirmed acute cases, and 10 chronic cases were reported. The median age of acute cases was 59 years (range, 11 to 77 years); the median age of chronic cases was 66 years (range, 5 to 78 years). Seventeen (85%) cases for which both race and ethnicity were known were white, non-Hispanic; 2 (10%) were black, non-Hispanic; and 1 (5%) was mixed race, non-Hispanic. During this time, 23 (82%) of the 28 cases for whom exposure information was available were likely exposed through direct or indirect contact with infected animals, 3 (11%) were likely exposed through ingestion of unpasteurized dairy products, and 2 (7%) through a tick bite. Nine (47%) of the 19 cases with known occupations were currently employed in an agriculture-related occupation.

## Rabies

In Minnesota, the animal reservoirs for rabies are skunks and multiple bat species. Dogs, cats, and livestock are generally exposed to rabies through encounters with skunks. Vaccinating these domestic animals for rabies provides a buffer between wildlife and people.

In 2019, 36 (1.6%) of 2,206 animals tested were positive for rabies. This is similar to 2018 (32 [1.5%]) and consistent with the number of positives seen in 2017. The majority of positive animals in 2019 were


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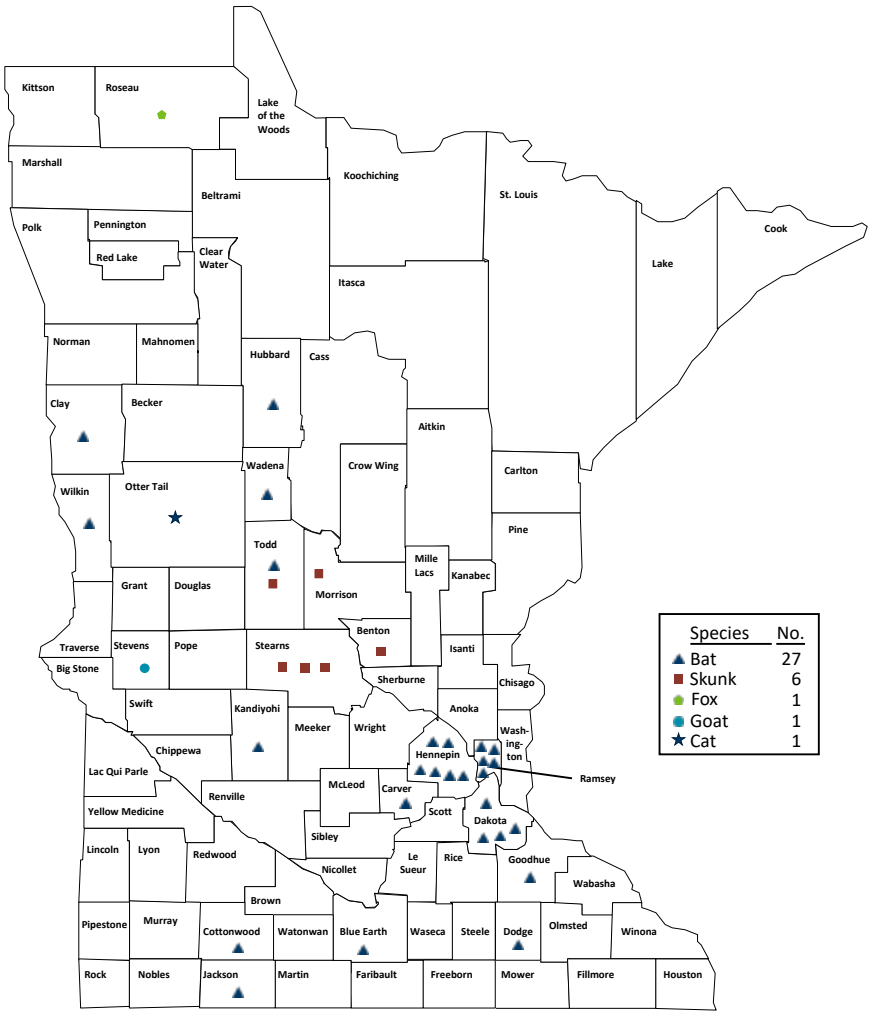
## Figure 5. Rabid Animals by County, 2019 (n=36)*




* Placement of symbol in county does not represent exact geographical location of the case.

bats (27/37 [73%] followed by skunks (6/37 [16.2%]). There was 1 positive fox (1/37 [2.7%]), 1 positive goat (1/37 [2.7%]), and 1 positive cat (1/37 [2.7%]) (Figure 5). There were no human cases of rabies.

From 2003 to 2019, 902 (2.4%) of 39,576 animals tested were positive for rabies. The median number of rabies positive animals identified annually was 55 (range 28 to 94). From 2003 to 2019, 329/729 (40%) skunks, 56/914 (6.1%) cattle, 418/11,546 (3.6%) bats, 9/353 (2.5%) horses, 48/11,764 (0.4%) cats, 29/11,130 (0.3%) dogs, 1/1,218 (0.1%) raccoons, and 12/1,920 (0.6%) other animals (fox [6], goat [3], woodchuck, bison, deer) tested positive for rabies. In contrast to the Eastern United States, where raccoons are the most common source of terrestrial rabies, rabies in raccoons is rare in Minnesota.

### Respiratory Syncytial Virus

Laboratory-confirmed respiratory syncytial virus disease (RSV) became reportable for all hospitalized residents of the metropolitan area September 2016. Any death occurring statewide within 60 days of a positive RSV test is also reportable.

From October 1, 2019 – April 30, 2020, 774 cases were reported (13.7 cases per 100,000 persons) compared to 721 cases (12.9 cases per 100,000 persons) from October 2018 – April 2019. The overall median age was 10 months (range: 8 days – 100 years). Sixty-six percent (514) were <2 years: 38% (291) were <6 months, 15% (116) were 6 months – 11 months, and 14% (107) were 1 year – <2 years. Eight percent (64) were 2-4 years, 2% (14) were 5 – 17 years, 4% (31) were 18 – 49 years, 6% (46) were 50 – 64 years, and 14% (105) were >65 years of age. Overall, 53% of RSV cases were male and 52% were white.

Forty-five percent of cases had a co-morbid condition at the time of their illness, and presence of a co-morbid condition increased significantly as age increased. The most common co-morbid conditions for cases <2 years of age were prematurity (18%), cardiovascular disease (5%), and chronic lung disease (4%). For cases 2 – 17 years of age, chronic lung disease (24%), asthma/ reactive airway disease (18%), and neurologic conditions (17%) were recorded. The most common underlying conditions for adults 18-64 years of age and older adults (≥65 years) were chronic metabolic disease (29% and 46% respectively), cardiovascular disease (38% and 72% respectively), and chronic lung disease (45% and 51% respectively).

Nineteen RSV-associated deaths were reported for the 2019-2020 respiratory season: 11 died during hospitalization, and 8 within 60 days of discharge from the hospital. The median age of fatal RSV cases was 73 years (range: 11 years – 90 years), and all 19 had co-morbid conditions. Identification of additional RSV-associated deaths is ongoing.

### Salmonellosis

In 2019, 805 *Salmonella* cases (14.3 per 100,000 population) were reported. This is similar to the median annual number of cases reported from 2009 to 2018 (median, 796 cases; range, 578 to 1,009).

Of the 86 serotypes identified in 2019, 5 serotypes, *S.* Enteritidis (203), *S.* I 4,[5],12:i:- (73), *S.* Typhimurium (69), *S.* Newport (50), and *S.* Infantis (38) accounted for 54% of cases. *Salmonella* was isolated from stool in 702 (87%), urine in 47 (6%), and blood in 46 (6%) cases. Other specimen sources included wound/swab/abscess (4), pleural fluid (2), peritoneal fluid (2), pericardial fluid, and perineum.

One hundred eighty-two (23%) cases were hospitalized; the median length of hospital stay was 4 days (range, 1 to 38 days). Two culture-confirmed cases died: a 73 year-old died of adenocarcinoma 10 days after a hospitalization during which *S.* Poona was isolated from stool, and an 83 year-old with lymphoma died 10 days after *S.* Typhimurium was isolated from blood.

Of the 727 cases with known travel history, 190 (26%) had travelled internationally during the week prior

to their illness onset. There were 10 *S.* Typhi cases; 3 travelled to India, 1 to Pakistan, 1 to El Salvador, 1 to Thailand and India, and 4 had no known international travel. There was 1 *S.* Paratyphi A case who had travelled to Bangladesh and Qatar.

In 2015, culture-independent tests (CIDTs) for the detection of *Salmonella* nucleic acid in stool became commercially available. In 2019, 49 patient specimens that were positive by a CIDT conducted at a clinical laboratory were not subsequently culture-confirmed, and therefore did not meet the surveillance case definition for inclusion in MDH case count totals.

Eighty-eight culture-confirmed cases were part of 28 *Salmonella* outbreaks in 2019, including 2 cases that were part of outbreaks that began before 2019. Twenty of the 28 outbreaks involved foodborne transmission, 3 involved animal contact, 2 were due to person-to-person transmission, and the transmission route was unknown for 3 outbreaks. Sixteen of the outbreaks involved cases with exposure in multiple states. The 28 outbreaks resulted in a median of 2 culture-confirmed cases per outbreak (range, 1 to 16).

Ten cases of *S.* Montevideo infection (including one food worker) and 1 case of *S.* Oranienberg infection (also a food worker) were part of a multi-state outbreak of 32 cases in 13 states that was likely associated with iceberg lettuce from fast food restaurants. The Minnesota cases were linked to two locations of a fast food burger chain. No common lettuce supplier was identified.

Nine cases of *S.* Bovismorbificans were part of a multi-state outbreak of 107 cases in 35 states. The national investigation determined this to be an outbreak with an unknown source, but epidemiological data among cases in Minnesota suggested that contaminated watermelon was the most likely source.

Three cases of *S.* Carrau infection were part of a multi-state outbreak of 137 cases from 10 states associated with pre-cut melon (including cantaloupe, watermelon, and honeydew) commercially distributed by an Indiana company. A product recall was initiated.

Three cases of *S.* Javiana infection were part of a multi-state outbreak of 16 cases from 8 states associated with eating a pre-packaged salad mix that contained iceberg lettuce, romaine lettuce, red cabbage, carrot, and radish.

Two cases of *S.* Enteritidis infection were part of a multi-state outbreak of 52 cases from 16 states that was associated with chicken; national laboratory and traceback evidence suggested a possible single facility as the source.

Two cases of *S.* Infantis infection were part of a multi-state outbreak that included 4 cases in Wisconsin. The implicated vehicle was vegetable trays purchased from a convenience store chain. In a separate outbreak, 1 case of *S.* Infantis infection was associated with a multi-state outbreak of 154 cases in 34 states that included 7 serotypes and spanned 4 years. The outbreak was associated with pig ear pet treats. No single supplier/brand/distributor was identified, and the Minnesota case's exposures were unknown.

One culture-confirmed case a *S.* Newport infection was part of a multi-state outbreak of 13 cases in 7 states associated with raw tuna. A product recall was issued.

One case of *S.* Paratyphi B Var. L(+) Tartrate(+) infection was part of a multi-state outbreak of 12 cases in 6 states that was associated with raw tuna.

Sixteen cases of *S*. Enteritidis (n=14, includes a food worker), *S.* Infantis (n=1), and both *S.* Enteritidis and *S.* Infantis (n=1) infection were part of an outbreak at a county jail that was most likely associated with a raw, mechanically separated chicken product used in some jail meals. Leftover product tested positive for the same serotypes of *Salmonella* found in the human cases, and epidemiologic evidence suggested a meal that included the chicken product as the most likely source of many of the infections. Lack of temperature testing during food preparation likely contributed to the outbreak.

Seven culture-confirmed (including 2 food workers) and 2 probable cases of *S.* Braenderup infection were associated with a foodborne outbreak at a Minnesota restaurant. Tomato and romaine lettuce consumption were statistically associated with illness. The positive food workers may have been the source of the outbreak.

Four cases of *S.* Enteritidis infection were associated with an outbreak at a restaurant. The outbreak vehicle was not identified, although the environmental assessment identified multiple issues that could have led to potential contamination of either food items or equipment. Whole genome sequencing (WGS) analyses indicated that there likely was a common source of illness between cases in this outbreak and a 2018 outbreak linked to the same restaurant. In a separate outbreak, 2 cases of *S.* Enteritidis infection were associated with a restaurant/ grocery store outbreak; no vehicle of transmission was identified.

Three cases of *S.* Reading infection were associated with a restaurant. The outbreak vehicle was not identified, although turkey was a plausible source, given that the outbreak cases were closely related to isolates from a recent multi-state outbreak associated with turkey. Issues were identified at the restaurant related to turkey preparation and handling that could have allowed for *Salmonella* survival and proliferation.

Two culture-confirmed cases of *S.* IV 50:z4,z23:- infection were associated with bubble tea served by a vendor at a festival. While both cases reported consuming tea from the same vendor, it is possible that they shared additional exposures at the market that were not reported, as no source of contamination was identified during the investigation.

Three culture-confirmed and 1 probable case of *S.* Typhi infection were associated with a fundraising event at a private home. The source of contamination and vehicle of transmission were not identified. A local health alert was issued to clinicians.

Three cases of *S.* Typhimurium infection were associated with horse contact. Hand hygiene training for barn crew student workers was recommended.

Two cases of *S.* Saintpaul infection were both inpatients at the same hospital facility prior to specimen collection. The route of transmission was unknown.

Two cases of *S.* Infantis infection were part of a person-to-person outbreak at a childcare center. One culture-confirmed case and 2 probable cases of *S.* I 4,5,12:i:- infection were part of a person-to-person outbreak at an in-home child care.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One culture-confirmed and 5 probable cases of *S.* Reading infection were associated with a game feed event in Iowa. The implicated vehicle was smoked turkey sourced from a Minnesota producer.

One culture-confirmed case of *S.* Paratyphi B Var. L(+) Tartrate(+) was part of an outbreak associated with a restaurant in Kentucky.

One culture-confirmed case of *S.* I 4,5,12:i:- infection was part of an outbreak of salmonellosis and rotavirus gastroenteritis associated with a private gathering in Wisconsin. The transmission route was unknown.

One culture-confirmed case and 1 probable case of *S.* Enteritidis infection were part of a foodborne outbreak at a Wisconsin restaurant associated with steak tartare.

One case of *S.* Javiana infection was associated with a family reunion outbreak in Arkansas with an unknown transmission route.

One case of *S.* Javiana infection was part of a foodborne outbreak at a hotel in New York City.

Among the 2 *Salmonella* cases in 2019 who were part of outbreaks that began before 2019, 1 (*S.* Typhimurium) was part of a 2018 outbreak associated with hedgehogs, and 1 (*S.* Infantis*)* was part of a 2018 national outbreak associated with chicken.

## Sexually Transmitted Diseases

Gonorrhea and chlamydia are monitored through a mostly passive surveillance system involving review of submitted case reports and laboratory reports. Syphilis is monitored through active surveillance, which involves immediate follow-up with the clinician upon receipt of a positive laboratory report. Although overall incidence rates for STDs in Minnesota are lower than those in many other areas of the United States, certain population subgroups have very high STD rates. Specifically, STDs disproportionately affect adolescents, young adults, and persons of color.

### Chlamydia

*Chlamydia trachomatis* infection is the most commonly reported infectious disease in Minnesota. In 2019, 24,535 chlamydia cases (463 per 100,000 population) were reported. This is a 4% increase compared to 2018 (Table 3).

Adolescents and young adults are at highest risk for acquiring a chlamydia infection (Table 4). The chlamydia rate is highest among 20 to 24-year-olds (2,467 per 100,000), followed by the 15 to 19-year-old age group (1,696 per 100,000). The incidence of chlamydia among adults 25 to 29 years of age (1,180 per 100,000) is considerably lower but has increased in recent years. The chlamydia rate among females (584 per 100,000) is nearly twice the rate among males (338 per 100,000), most likely due to more frequent screening among females.

Chlamydia infection incidence is highest in communities of color (Table 4). The rate among black non-Hispanics (2,092 per 100,000) is 9.7 times higher than the rate among white non-Hispanics (216 per 100,000*).* Although black, non-Hispanic persons comprise approximately 5% of Minnesota's population, they account for 24% of reported chlamydia cases. Rates among Asian/ Pacific Islanders (420 per 100,000), Hispanic, any race (897 per 100,000), and American Indian/Alaskan Natives (1,025 per 100,000) are over 2 to 6 times higher than the rate among white, non-Hispanic persons.

Chlamydia infections occur throughout the state, with the highest reported rates in Minneapolis (1,321 per 100,000) and St. Paul (1007 per 100,000). Suburban Minnesota had the greatest increase in rates between 2018 and 2019 at 6%. Every county in Minnesota had at least 2 cases in 2019.

### Gonorrhea

Gonorrhea is the second most commonly reported STD in Minnesota. In 2019, 8,063 cases (152 per 100,000 population) were reported. This is the highest reported rate of gonorrhea in the last decade with a 7% rate increase compared to 2018 (Table 3).

Adolescents and young adults are at greatest risk for gonorrhea (Table 4), with rates of 324 per 100,000 among 15 to 19- year-olds, 553 per 100,000 among 20 to 24-year olds, and 462 per 100,000 among 25 to 29-year-olds. Gonorrhea rates for males (165 per 100,000) were higher than females (139 per 100,000).

Communities of color are disproportionately affected by gonorrhea. The incidence of gonorrhea among black, non-Hispanics (1042 per 100,000) is 18 times higher than the rate among

**Table 3. Number of Cases and Rates (per 100,000 Persons) of Chlamydia, Gonorrhea, and Syphilis, 2015-2019**

| Disease | 2015 | | 2016 | | 2017 | | 2018 | | 2019 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Rate | No. | Rate | No. | Rate | No. | Rate | No. | Rate |
| Chlamydia | 21,238 | 400 | 22,675 | 428 | 23,528 | 444 | 23,564 | 444 | 24,535 | 463 |
| Gonorrhea | 4,097 | 77 | 5,104 | 96 | 6,519 | 123 | 7,542 | 142 | 8,063 | 152 |
| Syphilis, Total | 654 | 12.3 | 852 | 16.1 | 934 | 17.6 | 918 | 17.3 | 1127 | 21.2 |
| Primary/Secondary | 246 | 4.6 | 306 | 5.8 | 292 | 5.5 | 292 | 5.5 | 385 | 7.3 |
| Early NP/NS* | 185 | 3.5 | 251 | 4.7 | 313 | 5.9 | 286 | 5.4 | 367 | 6.9 |
| Unknown/Late | 220 | 4.1 | 288 | 5.4 | 327 | 6.2 | 330 | 6.2 | 354 | 6.7 |
| Congenital** | 2 | 2.9 | 7 | 10.2 | 2 | 3.0 | 10 | 15.1 | 21 | 32.3 |

* NP=Non-primary; NS=Non-secondary

** Congenital syphilis rate per 100,000 live births.

Note: Data exclude cases diagnosed in federal or private correctional facilities.

white, non-Hispanics (59 per 100,000). Rates among Asian/Pacific Islanders (89 per 100,000), Hispanic, any race (194 per 100,000), and American Indian/Alaskan Natives (654 per 100,000) are up to 11 times higher than among white, non-Hispanic persons.

Gonorrhea rates are highest in the cities of Minneapolis and St. Paul (Table 4). The incidence in Minneapolis (685 per 100,000) is over 1.5 times higher than the rate in St. Paul (416 per 100,000), almost 7 times higher than the rate in the suburban metropolitan area (103 per 100,000), and almost 9 times higher than the rate in Greater Minnesota (79 per 100,000). In 2019, the city of Minneapolis saw the largest increase in cases at 11%.

### Syphilis

Surveillance data for primary and secondary syphilis are used to monitor morbidity trends because these represent recently acquired infections. Data for early syphilis (which includes primary, secondary, and early non-primary/non-secondary stages of disease) are used in outbreak investigations because these represent infections acquired within the past 12 months and signify opportunities for disease prevention.

### Primary and Secondary Syphilis

The incidence of primary/secondary syphilis in Minnesota is lower than that of chlamydia or gonorrhea (Table 3), but has remained elevated since an outbreak began in 2002 among men who have sex with men (MSM). In 2019, there were 385 cases of primary/secondary syphilis in Minnesota (7.3 cases per 100,000 persons), which is a 32% increase compared to 2018.

### Early Syphilis

In 2019, the number of early syphilis cases increased by 30%, with 752 cases, compared to 578 cases in 2018. The incidence remains highly concentrated among MSM. Of the early syphilis cases in 2019, 574 (76%) occurred among men; 396 (68%) of these were MSM; with 39% of the MSM diagnosed with early syphilis that were co-infected with HIV. However, the number of women reported has continued to increase over the past 10 years from 9 early syphilis cases in 2009 to the highest number of cases reported in 2019 at 173.

## Table 4. Number of Cases and Incidence Rates (per 100,000 Persons) of Chlamydia, Gonorrhea, and Primary/Secondary Syphilis by Residence, Age, Race/Ethnicity, and Gender, 2019

| Disease | Chlamydia | | Gonorrhea | | Primary/ Secondary Syphilis | |
|---|---|---|---|---|---|---|
| | No. | Rate | No. | Rate | No. | Rate |
| Total | 24,535 | 463 | 8,063 | 142 | 385 | 7.3 |
| Residence | | | | | | |
| Minneapolis | 5,052 | 1321 | 2,620 | *685* | 118 | 30.8 |
| St. Paul | 2,872 | 1007 | 1,185 | *416* | 43 | 15.1 |
| Suburban** | 8,250 | 378 | 2,252 | *103* | 103 | 4.7 |
| Greater Minnesota | 8,114 | 331 | 1,931 | *79* | 121 | 4.9 |
| Age | | | | | | |
| <15 years | 141 | 13 | 41 | *4* | 0 | 0.0 |
| 15-19 years | 6,237 | 1,696 | 1,191 | *324* | 14 | 3.8 |
| 20-24 years | 8,807 | 2,476 | 1,965 | *553* | 67 | 18.8 |
| 25-29 years | 4,396 | 1,180 | 1,720 | *462* | 90 | 24.1 |
| 30-34 years | 2,256 | 658 | 1,270 | *370* | 63 | 18.4 |
| 35-39 years | 1,275 | 388 | 808 | *246* | 47 | 14.3 |
| 40-44 years | 622 | 176 | 426 | *121* | 37 | 10.5 |
| 45-49 years | 372 | 92 | 262 | *64* | 17 | 4.2 |
| 50-54 years | 215 | 54 | 184 | *46* | 21 | 5.2 |
| 55+ years | 214 | 16 | 196 | *15* | 29 | 2.2 |
| Gender | | | | | | |
| Male | 8902 | 338 | 4,338 | 165 | 312 | 11.9 |
| Female | 15, 605 | 584 | 3,704 | 139 | 70 | 2.6 |
| Transgender/unknown^^ | 28 | x | 21 | x | 3 | x |
| Race^/Ethnicity | | | | | | |
| White, non-Hispanic | 10,000 | 216 | 2,718 | 59 | 163 | 3.5 |
| Black, non-Hispanic | 5,877 | 2,092 | 2,927 | 1042 | 103 | 36.7 |
| American Indian/ Alaskan Native | 690 | 1,025 | 440 | 654 | 55 | 81.7 |
| Asian/PI | 927 | 420 | 197 | 89 | 11 | 5.0 |
| Other^^ | 642 | x | 130 | x | 10 | x |
| Unknown^^ | 4,153 | x | 1,166 | x | 5 | x |
| Hispanic^^ | 2,246 | 897 | 485 | 194 | 38 | 15.2 |

* Residence information missing for 247 cases of chlamydia and 75 cases of gonorrhea.
** Suburban is defined as the metropolitan area (Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, and Washington Counties), excluding the cities of Minneapolis and St. Paul.
^ Case counts include persons by race alone. Population counts used to calculate results include race alone or in combination.
^^ No comparable population data available to calculate rates.
^^^ Persons of Hispanic ethnicity may be of any race.
Note: Data exclude cases diagnosed in federal or private correctional facilities.


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## Congenital Syphilis

Twenty-one congenital syphilis cases were reported in 2019, which is the highest number of cases reported for Minnesota in more than 50 years. Syphilis may be passed from a pregnant person to the unborn baby through the placenta. The infection can cause miscarriages and stillbirths, and infants born with congenital syphilis can suffer a variety of serious health problems, including deformities, seizures, anemia, and jaundice. The CDC reported that the number of infants born with syphilis has nearly tripled since 2015 and in 2018 reached a 20-year high. In Minnesota, the number and rate of congenital syphilis cases among infants has increased years from 2 in 2015 to 32.3 per 100,000 live births in 2019.

## Shigellosis

In 2019, 165 culture-confirmed cases of shigellosis (2.9 per 100,000 population) were reported. This represents a 13% increase from the 146 cases reported in 2018, and is 45% more than the median annual number of cases reported during 2009-2018 (median, 113.5 per year; range, 66 to 556). *S. sonnei* accounted for 88 (53%) cases, *S. flexneri* for 72 (44%) cases, and *S. boydii* for 2 (1%) cases. The species was not identified for 3 (2%) cases. Cases ranged in age from 4 months to 74 years (median, 37 years). Fourteen percent of cases were ≤5 years of age; 81% of cases were 18 years of age or older. Seventy-eight percent of cases were male. Forty-one (25%) cases were hospitalized. One case died.

Thirty-three percent of cases reported either non-white race (43 of 159 cases) or Hispanic ethnicity (19 of 158 cases). Of the 148 cases for which travel information was available, 41 (27%) travelled internationally (25 of 80 [31%] *S. sonnei*, and 12 of 63 [19%] *S. flexneri*). Eighty-four percent of cases resided in the metropolitan area, including 59% in Hennepin County and 13% in Ramsey County.

One outbreak of shigellosis in a childcare center was identified. Additionally, an outbreak of *Shigella* infections among Minnesota residents who dined at a restaurant in Costa Rica was also investigated.

In 2019, 273 patients were positive for *Shigella* by a culture-independent diagnostic test conducted in a clinical laboratory. Of the 268 specimens that were received at MDH, 135 (50%) were subsequently culture-confirmed and therefore met the surveillance case definition for inclusion in MDH case count totals.

In 2019, 55 of the 157 *Shigella* isolates received at MDH were tested for antimicrobial resistance. Of the 55 isolates, 78% (43 isolates) were resistant to trimethoprim-sulfamethoxazole, 73% (40 isolates) were resistant to ampicillin, and 45% (25) had decreased susceptibility to azithromycin (DSA). Twenty-four (96%) of 25 of the DSA isolates were collected from adult males. Among the 17 adult male cases with DSA infection and available information, 10 (59%) reported sexual contact with a male during the week before illness onset.

## *Staphylococcus aureus*

Invasive *Staphylococcus aureus* (SA) infections are classified into one of three categories: hospital-onset (HO-SA), healthcare-associated, community-onset (HACO-SA), and community-associated (CA-SA). SA must be isolated from a normally sterile body site greater than three days after the date of initial hospital admission for a case to be considered HO-SA. HACO-SA cases have at least one HA risk factor identified in the year prior to infection; examples of risk factors include residence in a long term care facility, recent hospitalization(s), dialysis, presence of an indwelling central venous catheter, and surgery. CA-SA cases do not have any identifiable HA risk factors present in the year prior to infection.

In 2005, as part of the EIP Active Bacterial Core surveillance (ABCs) population-based surveillance of invasive methicillin-resistant SA (MRSA) was initiated in Ramsey County; surveillance was expanded to include Hennepin County in 2008. The incidence rate was 13.5 per 100,000 in 2019 compared to 12.9 per 100,000 population in 2018. In 2019, MRSA was most frequently isolated from blood (76%, 187/245), and 9% (22/245) of the cases died in the hospital. HACO-MRSA cases comprised the majority (60%, 147/245) of invasive MRSA infections in 2019; CA-MRSA cases accounted for 27% (66/245) and 13% (32/245) cases were HO-MRSA. The median age for all cases was 57 years (range, <1 to 97); the median age was 57 (range, 1 to 90), 63 (range, 19 to 97), and 46 (range, 1 to 94) for HO-, HACO-, and CA-MRSA cases, respectively.

In August 2014, as part of the EIP ABCs population-based surveillance of invasive methicillin-sensitive SA (MSSA) was initiated in Hennepin and Ramsey Counties. The incidence rate was 32.5 per 100,000 in 2019 compared to 32.7 per 100,000 population in 2018. In 2019, MSSA was most frequently isolated from blood (74%, 438/590), and 8% (47/590) of the cases died in the hospital. HACO-MSSA cases comprised the majority (52%, 307/590) of invasive MSSA infections in 2019; CA-MSSA cases accounted for 38% (226/590) and 10% (57/590) cases were HO-MSSA. The median age for all cases was 59 years (range, <1 to 100); the median age was 51 (range, 1 to 87), 61 (range, 1 to 100), and 58 (range, 2 to 95) for HO-, HACO-, and CA- MSSA cases, respectively.

Vancomycin-intermediate (VISA) and vancomycin-resistant *S. aureus* (VRSA) are reportable in Minnesota, as detected and defined according to Clinical and Laboratory Standards Institute approved standards and recommendations: a minimum inhibitory concentration (MIC)=4-8 µg/ml for VISA and MIC≥16 µg/ml for VRSA. Patients at risk for VISA and VRSA generally have underlying health conditions such as diabetes and end stage renal disease requiring dialysis, previous MRSA infections, recent hospitalizations, and recent exposure to vancomycin. There have been no VRSA cases in Minnesota. One case of VISA was confirmed in 2019. Between 2008 and 2019, we confirmed 19 VISA cases; 2008 (3), 2009 (3), 2010 (2), 2011 (5), 2013 (3), 2016 (2) and 2019 (1). Among these cases, 11 (58%) were male and the median age was 64 years (range, 27 to 86). Of those cases with known history (18), 89% reported recent exposure to vancomycin.

## Streptococcal Invasive Disease - Group A

Invasive Group A Streptococcus disease (GAS) is defined as GAS isolated from a usually sterile site such as blood, cerebrospinal fluid, or a wound when accompanied with necrotizing fasciitis or streptococcal toxic shock syndrome (STSS). Three hundred twenty-six cases (5.8 cases per 100,000 population), including 21 deaths, were reported in 2019, compared to 367 cases and 37 deaths in 2018. The median age of cases was 56 years (range, newborn to 96 years). Forty-six percent of cases were residents of the metropolitan area. Allowing for multiple presentations per patient, 129 (40%) had cellulitis, 62 (19%) septic shock, 55 (17%) bacteremia without another focus of infection,

44 (14%) pneumonia, 34 (10%) septic arthritis and/or osteomyelitis, 27 (8%) necrotizing fasciitis, 25 (8%) abscess, and 13 (4%) had STSS. Twenty-five cases (8%) were injection drug users in 2018, including one death, compared to 23 cases (6%) in 2019. Nineteen (6%) cases were residents of long-term care facilities. Seventeen facilities had a single case, one facility had 2 cases.

The 21 deaths included 14 that presented with septic shock, 4 pneumonia, 3 bacteremia without another focus of infection, and 3 cellulitis (individuals could have more than one infection type). Of the 21 deaths, the most frequently reported underlying conditions were diabetes (8), current tobacco smoker (5), chronic kidney disease (4), solid organ malignancy (3), obesity (2), heart failure (2), atherosclerotic cardiovascular disease (2), asthma (2), dementia (2), cirrhosis (2), and chronic skin breakdown (2). Eighteen fatal cases had two or more underlying conditions, and 3 had none reported.

### Streptococcal Invasive Disease – Group B

Six hundred six cases of invasive group B Streptococcus (GBS) disease (10.7 per 100,000 population), including 34 deaths, were reported in 2019. By age group, annual incidence was highest among infants <1 year of age (57.7 per 100,000 population) and cases aged ≥70 years (39.2 per 100,000). Twenty-two (65%) of the 34 deaths were among cases ≥65 years. Fifty percent of cases were residents of the metropolitan area. Bacteremia without a focus of infection occurred most frequently (28%), followed by cellulitis (23%), septic shock (9%), septic arthritis (8%), osteomyelitis (6%), abscess (5%), pneumonia (5%), and meningitis (2%). The majority (83%) of cases had GBS isolated from blood; other isolate sites included joint fluid (9%), peritoneal fluid (2%), cerebrospinal fluid (1%), and bone (1%).

Thirty-seven cases were infants and 5 were maternal cases, compared to 33 cases in 2018. Thirteen infants developed early-onset disease (occurred within 6 days of birth [0.2 cases per 1,000 live births]), and 24 infants developed late-onset disease (occurred at 7 to 89 days [0.4 cases per 1,000 live births]). One stillbirth/spontaneous abortion was associated with the 5 maternal GBS infections.

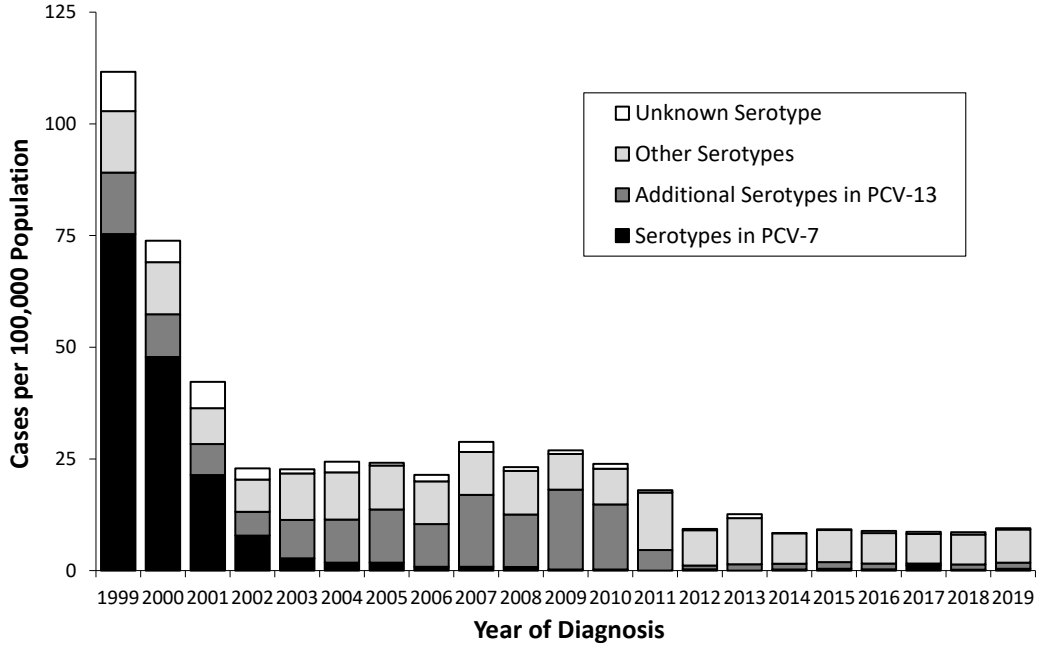
Since 2002, there has been a recommendation for universal prenatal screening of all pregnant women at 35 to 37 weeks gestation. In light of this, we reviewed the maternal charts for all early-onset cases reported in 2019. Overall, 7 of 13 women who delivered GBS-positive infants underwent prenatal screening for GBS. Of these, 3 were positive and 4 were negative. Two of the 6 women who did not receive prenatal screening were screened upon admission to the hospital and prior to delivery, and both were positive. Among the 13 women who delivered GBS-positive infants, 6 received intrapartum antimicrobial prophylaxis. An update of GBS perinatal prevention guidance was published by the American College of Obstetricians and Gynecologists, and by the American Academy of Pediatrics in July 2019.

### *Streptococcus pneumoniae* Invasive Disease

In 2019, 531 (9.4 per 100,000) cases of invasive pneumococcal disease (IPD) were reported. By age group, annual incidence rates per 100,000 were 10.2 cases among children aged ≤5 years, 2.1 cases among children and adults aged 5-39 years, 10.8 cases among adults 40-64 years, and 27.2 cases among adults aged ≥65 years.

Pneumonia occurred most frequently (60% of infections), followed by bacteremia without another focus of infection (13%), septic shock (11%), and meningitis (5%). Forty-six (9%) cases died. Health histories

**Figure 6. Invasive Pneumococcal Disease Incidence Among Children <5 Years of Age, by Year and Serotype Group, Metropolitan Area, 1999-2001; Minnesota, 2002-2019**




PCV-13 contains the 7 serotypes in PCV-7 (4,6B,9V,14,18C,19F, and 23F) plus 6 additional serotypes (1,3,5,6A,7F, and 19A).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were available for 43 deaths; all had an underlying health condition. The conditions most frequently reported were current tobacco smoker (18), heart disease (15), solid organ malignancy, (13), chronic kidney disease (11), emphysema/chronic obstructive pulmonary disease (10), diabetes (10), and obesity (6).

In 1999, the year before the pediatric pneumococcal conjugate vaccine (Prevnar [PCV-7]) was licensed; the rate of IPD among children <5 years of age in the metropolitan area was 111.7 cases/100,000. Over the years 2000-2002 there was a major downward trend in incidence in this age group (Figure 6). Rates in each of the subsequent 8 years were level or somewhat higher. Based on the distribution of serotypes among isolates from these cases, this increase was limited to disease caused by non-vaccine serotypes (i.e. serotypes other than the 7 included in PCV-7) (Figure 6).

In March 2010, the U.S. Food and Drug Administration approved a 13-valent pediatric pneumococcal conjugate vaccine (PCV-13 [Prevnar 13]) which replaced PCV-7. This vaccine provides protection against the same serotypes in PCV-7, plus 6 additional serotypes (serotypes 1, 3, 5, 6A, 7F, and 19A). From 2007 to 2010, the majority of IPD cases among children <5 years of age was caused by the 6 new serotypes included in PCV-13 (Figure 6). Since 2011, the majority of IPD cases among children <5 years of age has been caused by serotypes not included in PCV-13. In 2019, 20% of cases with isolates available for testing were caused by 6 of the PCV-13-included serotypes: 3 (14%), 19F (4%), 19A (2%), 9V (<1%), 18C (<1%), and 4 (<1%).

In August 2014, the Advisory Committee on Immunization Practices (ACIP) recommended that all adults ≥65 years receive 1 dose of PCV-13 followed by 1 dose of 23-valent pneumococcal polysaccharide vaccine 6 to 12 months later. Among adults ≥65 years, 18% of cases in 2019 had PCV-13 serotypes.

Of the 516 isolates submitted for 2019 cases, 100 (19%) isolates were resistant to penicillin using meningitis breakpoints. Using non-meningitis breakpoints, 2 (<1%) of 516 isolates were resistant to penicillin. (Note: CLSI penicillin breakpoints changed in 2008).

## Toxoplasmosis

Toxoplasmosis is an illness caused by the coccidian protozoan *Toxoplasma gondii*. Cats are the primary reservoir. *T. gondii* transmission in the United States is primarily foodborne, through handling or consumption of undercooked pork, lamb, or venison containing bradyzoites, the microscopic tissue cyst form of the parasite. People also can be infected through direct contact with cat feces that contains *Toxoplasma* oocysts or though consumption of food or water that has been contaminated with oocysts.

In 2019, 17 cases were reported (13 confirmed and 4 probable), similar to the 15 reported in 2018. Three cases had immunocompromising conditions. Eleven cases were diagnosed with ocular toxoplasmosis, 4 with generalized toxoplasmosis, and 2 were diagnosed with cerebral toxoplasmosis. Two cases were congenital while the others were acquired. There was 1 pregnant case. The case's baby was carried to term and delivered with no apparent complications to mother or newborn. The median age of cases was 32 years (range, newborn to 75 years). Ten cases (59%) were male. Ten were white, 2 were black, 4 were Asian/Pacific Islander; 11 cases were non-Hispanic, while 1 was Hispanic, and 5 were of unknown ethnicity.

## Tuberculosis

In 2019, 148 tuberculosis (TB) cases (2.6 per 100,000 population) were reported. This represents a 14% decrease in the number of cases compared to 2018, when there were 172 new cases. The TB incidence rate in Minnesota was lower than the overall rate in the United States, which was 2.7 per 100,000 in 2019. The TB case count has decreased 38% since 2007, when 238 cases were reported, and has remained under 200 since 2009. Seven cases (5%) from 2019 have died, all due to TB disease.

Twenty-four counties (28%) had at least 1 case in 2019. The majority of cases (73%) occurred in the metropolitan area, primarily in Hennepin (36%) and Ramsey Counties (20%). Twenty-six cases (18%) were from the other five metropolitan counties, and the remaining 27% of cases were reported from greater Minnesota. Among metropolitan area counties, the highest TB incidence rate in 2019 was reported in Ramsey County (5.3 per 100,000), followed by Hennepin County (4.2 per 100,000). The combined TB incidence rate for the other metropolitan counties (excluding Hennepin and Ramsey Counties) was 2.0 per 100,000, and 1.6 per 100,000 for all greater Minnesota counties.

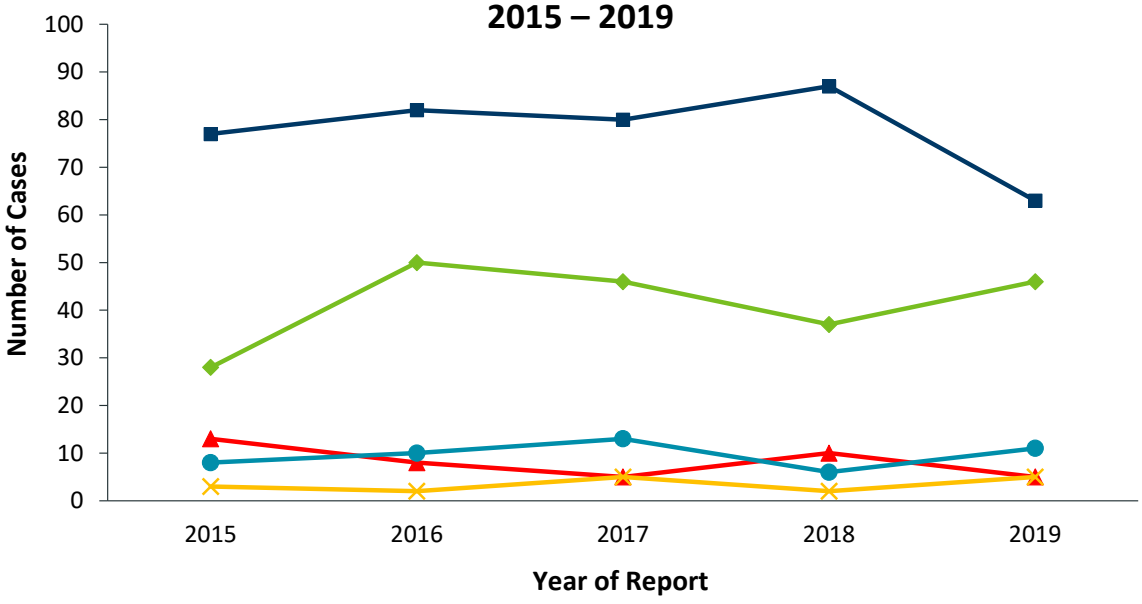
The largest group of new TB cases were those 25-44 years of age at time of diagnosis (42%), followed by cases 45-64 years of age (22%). Two percent of new cases were <5 years of age when they were diagnosed.

Most TB cases (85%) were identified only after seeking medical care for symptoms of disease. Various targeted public health interventions identified the majority of the remaining 15% of cases. Such case identification methods are high priority core prevention and control activities, and include contact investigations (6%) and follow-up evaluations of individuals with abnormal findings on pre-immigration exams where infectious TB disease had been ruled out (<1%). An additional 4% were identified through other screening (e.g., other immigration medical exams, employment screening, and other targeted testing for TB). Six cases (4%) were diagnosed with active TB disease incidentally while being evaluated for another medical condition.

TB incidence is disproportionately high among racial and ethnic minorities in Minnesota as well as nationally. In 2019, 11 cases occurred among non-Hispanic whites, a case rate of 0.2 per 100,000. In contrast, among non-Hispanic persons of other races, 72 cases occurred among blacks/African-born persons (17.7 cases per 100,000), and 54 among Asian/Pacific Islanders (17.9 cases per 100,000). Eleven cases were Hispanic persons of any race (3.6 cases per 100,000). The majority of Hispanic (100%), Asian (94%), and black cases (89%) were non-U.S. born.

In 2019, the percentage of TB cases in Minnesota occurring in persons born outside the United States was 88%, compared to 71% of TB cases reported nationally. The 130 non U.S.-born TB cases represented 25 different countries of birth; the most common region of birth among these cases was Sub-Saharan Africa (49% of non-U.S. born cases), followed by South/Southeast Asia (35%), Latin America (including the Caribbean) (9%), and East Asia/Pacific (4%). Patients from other regions (North Africa/Middle East, and Eastern Europe) accounted for the remaining 4% of cases (Figure 7).

**Figure 7. Non U.S.-Born Tuberculosis Cases by Region of Birth and Year of Report, 2015 – 2019**




* "Other" includes: Eastern Europe, North Africa/Middle East, and Western Europe

Compared to the percentage of cases who have lived in areas of the world where TB is more common, individuals in other high risk groups comprised smaller proportions of the cases. Note that patients may fall under more than one risk category. Thirty-eight percent occurred in persons with certain medical conditions that increase the risk for progression from latent TB infection to active TB disease (e.g., diabetes, prolonged corticosteroid or other immunosuppressive therapy, end stage renal disease). The next most common risk factor was substance abuse (including excess alcohol use and/or injection and non-injection drug use) during the 12 months prior to their TB diagnosis (3%). Three percent of cases were co-infected with HIV. Three percent reported being homeless during the 12 months prior to diagnosis, 1% were residents of long-term care facilities, and 1% were in a correctional facility at time of diagnosis.

By site of disease, 53% of cases had pulmonary disease exclusively. Another 18% had both pulmonary and extrapulmonary sites of disease, and 28% had extrapulmonary disease exclusively. Among the 69 patients with an extrapulmonary site of disease, the most common sites were lymphatic (46%), followed by musculoskeletal (25%). Extrapulmonary disease is generally more common among persons born outside the United States. Forty-eight percent of non U.S.-born cases in Minnesota had at least one extrapulmonary site of disease, compared to only 39% of U.S.-born cases.

Of 123 culture-confirmed TB cases with drug susceptibility results available, 17 (14%) were resistant to at least one first-line anti-TB drug (i.e., isoniazid [INH], rifampin, pyrazinamide, or ethambutol), including 13 cases (11%) resistant to at least INH. There were 6 new cases of multidrug-resistant TB (MDR-TB, or resistance to at least INH and rifampin) reported in 2019, making up 5% of culture-confirmed cases.

## Tularemia

Tularemia is an acute illness caused by *Francisella tularensis* subspecies *tularensis* (type A) or *holarctica* (type B). Routes of transmission include arthropod bites (particularly ticks and deer flies), contact with infected animals, and exposure to contaminated water or soil. There are six main clinical forms of disease and all include fever: ulceroglandular, glandular, pneumonic, oropharyngeal, oculoglandular, and typhoidal.

In 2019, 2 cases were reported; 1 was culture-confirmed and 1 was a probable case. Both cases had ulceroglandular tularemia. One case had type B tularemia, and the other was diagnosed by serology only and had an unidentified subtype. Case ages were 25 and 69 years old; 1 was male. Neither case was hospitalized; both survived. One case likely was infected through a biting fly bite on his property in Washington County. The other case was likely infected by taking a sick rabbit out of his dog's mouth.

From 2007 to 2019, 20 tularemia cases were reported, with a range of 0 to 6 cases annually. Twelve cases had ulceroglandular, 4 had glandular, 2 had pneumonic, and 2 had typhoidal tularemia. Nine of 14 cases with a known tularemia subtype had type B, and 5 had type A. The median age of cases was 42.5 years (range, 2 to 87). Eleven cases were most likely exposed through a tick or biting fly bite, 2 through water exposures, 2 through a cat scratch or bite, 2 were exposed by inhaling the bacteria, and 2 cases' exposures could not be determined. Fifteen of 18 cases for which race was known were white, 1 was black, and 1 was American Indian/Alaskan Native, and 1 was Asian/Pacific Isalnder.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## Unexplained Critical Illnesses and Deaths of Possible Infectious Etiology and Medical Examiner Deaths Surveillance

We conduct surveillance for unexplained deaths and critical illnesses in an effort to identify those that may have an infectious etiology. This surveillance is performed through two complementary surveillance systems, Unexplained Critical Illnesses and Deaths of Possible Infectious Etiology (known as UNEX), and Medical Examiner (ME) Infectious Deaths Surveillance (known as MED-X) which is not limited to deaths with infectious hallmarks. Focus is given to cases <50 years of age with no significant underlying conditions; however, any case should be reported regardless of the patient's age or underlying medical conditions to determine if further testing conducted or facilitated by MDH may be indicated. Testing of pre-mortem and post-mortem specimens is conducted at the PHL and the CDC Infectious Diseases Pathology Branch (IDPB).

In 2019, 67 cases met UNEX criteria (49 deaths, 18 critical illnesses), compared to 111 cases in 2018. Of the 67, all were reported by providers. Due to the COVID-19 response, no deaths were found by death certificate review as the review and testing is still under way. Thirty-one (46%) cases presented with respiratory symptoms; 15 (22%) with sudden unexpected death; 10 (15%) with neurologic symptoms; 10 15%) with shock/ sepsis; and 1 (1%) with cardiac symptoms. The age of cases ranged from 4 days to 67 years, the median age was 30 years. Fifty-eight percent resided in the metropolitan area, 57% were male, and 12% were non-Minnesota residents who were either hospitalized in Minnesota or investigated by a Minnesota ME.

There were 207 MED-X cases in 2019; 49 of these also met UNEX criteria. The median age of the cases was 44 years, and 56% were male. There were 129 (62%) cases found through death certificate review; MEs reported 80 (39%) cases. The most common syndrome was pneumonia/ upper respiratory infection (n=86 [42%]).

There were 166 potential UNEX or MED-X cases that had specimens tested at the PHL and/or the IDPB. Thirty-five cases had pathogens identified as confirmed, probable, or possible cause of illness, including 35 UNEX deaths (Table 5). Seventy-one were determined to be non-infectious. Among 35 unexplained deaths occurring in those <50 years of age without any immunocompromising conditions, UNEX helped to identify the pathogen(s) involved in 20 (57%) cases. MED-X surveillance detected an additional 16 cases with pathogens identified by MEs as the cause of death (Table 5). Cases with pathogens of public health importance detected included a 64 year-old male who presented to an emergency department with sepsis-like syndrome. He had recently traveled to Texas and participating in a triathlon. Although initial leptospirosis serology was negative, CDC was able to detect *Leptospira* spp. DNA by PCR from a blood and urine leading to a public health investigation by Texas public health authorities. Repeated serology detected antibodies to *L. interrogans* sub. Bratislava. Finally, during the 2019 MDH response to E-cigarette or vaping product use-associated lung injury (EVALI), UNEX received reports from infectious disease clinicians and MEs of 8 possible EVALI cases including 6 that were later confirmed. Preexisting relationships allowed timely submission of autopsy specimens from MDH to CDC for pathologic review and toxicological testing, a process that contributed to the identification of vitamin E acetate within lung tissues, with vitamin E acetate determined to be the causitive agent of the national outbreak.

## Table 5. UNEX/MED-X Pathogens Identified as Confirmed, Probable, or Possible Cause of Illness, 2019*

| Table 5. UNEX/MED-X Pathogens Identified as Confirmed, Probable, or Possible Cause of Illness, 2019* | | |
|---|---|---|
| **Pathogen Identified** | **UNEX (n=35)** | **MED-X (n=16)**** |
| *Blastomyces dermatitidis* | 1 | 1 |
| *Candida albicans* | 0 | 1 |
| *Candida glabrata* | 0 | 1 |
| *Candida* spp. | 1 | 0 |
| Coxsackievirus B4 | 1 | 0 |
| *Cryptococcus neoformans* | 0 | 1 |
| Enterovirus | 0 | 1 |
| *Escherichia coli* | 0 | 1 |
| *Fusobacterium nucleatum* | 1 | 0 |
| Group A Streptococcus/ *Streptococcus pyogenes* | 3 | 1 |
| Group B Streptococcus | 0 | 1 |
| *Haemophilus* spp. | 1 | 0 |
| *Haemophilus influenzae* | 1 | 1 |
| Herpes simplex virus 1 | 1 | 0 |
| Influenza A virus (no hemagglutinin typing information available) | 0 | 2 |
| Influenza A – H1 | 3 | 0 |
| Influenza A – H3 | 1 | 0 |
| *Leptospira interrogans* var. Bratislava | 1 | 0 |
| *Moraxella catarrhalis* | 1 | 0 |
| Parainfluenza virus type 1 | 1 | 0 |
| Parainfluenza virus type 3 | 1 | 0 |
| Parainfluenza virus type 4 | 2 | 0 |
| Powassan virus | 2 | 0 |
| Rhinovirus | 1 | 0 |
| *Staphylococcus aureus* | 4 | 2 |
| *Staphylococcus aureus* - MRSA | 1 | 0 |
| *Streptococcus* spp. | 4 | 0 |
| *Streptococcus constellatus* | 1 | 0 |
| *Streptococcus mitis* | 1 | 0 |
| *Streptococcus oralis* | 1 | 0 |
| *Streptococcus pneumoniae* | 6 | 3 |

* Some cases had multiple pathogens identified as possible coinfections contributing to illness/death.
** MED-X includes pathogens identified by the Medical Examiner. If the cause was found through testing at MDH/CDC it is included in the UNEX column.

## Varicella and Zoster

In 2019, 366 varicella cases (6.5 per 100,000 population) were reported. Two hundred ten (57%) were from the metropolitan area. Cases ranged from 28 days to 66 years of age. Forty-four cases (12%) were <1 year, 123 (34%) were 1-6, 89 (24%) were 7-12, 40 (11%) were 13-17, and 70 (19%) were ≥18 years of age. Nine cases were hospitalized; 3 were <1 year, 1 was 1-17, and 5 were ≥18 years. Eight of the hospitalized cases had never been vaccinated; 3 were underage for vaccination, and the other 5 were adults who had never been offered the vaccine.

Varicella cases are often identified by parents/guardians reporting to schools and childcare facilities, rather than directly reported by a clinician. Of the 366 cases for which information regarding diagnosis was available, 264 (72%) had visited a health care provider, 18 (5%) had consulted a provider or clinic by telephone, 2 had been identified by a school health professional, and 82 (22%) had not consulted a health care provider. Of the 361 cases for which information regarding laboratory testing was available, 150 (41%) had appropriate testing performed. Seventeen percent of cases occurred as part of an outbreak, defined as ≥5 cases in the same setting. Four outbreaks occurred in schools. Three were private schools, and one was a public school. The largest outbreak had 8 cases; 1 case was partially vaccinated, 1 case had an unknown vaccination status, and 6 cases were unvaccinated. Of the unvaccinated cases, 4 were due to parental refusal, and 2 were unknown.

Zoster cases in children <18 years of age are reportable in Minnesota; 58 cases were reported in 2019. Cases may be reported by school health personnel, child care staff, or healthcare providers. Ages ranged from 1 to 17 years (median 9 years). Varicella vaccine became a requirement for entry into kindergarten and 7th grade in 2004, and the incidence of zoster in children has declined from 15.7 per 100,000 population in 2006 to 4.5 per 100,000 population in 2019.

Zoster with dissemination or complications (other than post-herpetic neuralgia) in persons of any age is also reportable; 80 such cases were reported, and 66 were hospitalized. Cases ranged from 13 to 99 years of age, with a median age of 56. Forty-six (58%) had co-morbidities or were being treated with immunosuppressive drugs. Twenty-six had disseminated rash or disease, 27 had meningitis, 20 had cellulitis or other bacterial superinfection, 9 had encephalitis, 3 had meningioencephalitis, and 6 had Ramsay-Hunt Syndrome. Cases with disseminated rash or disease tended to be older than cases with meningitis without dissemination (median age of 66 vs. 43 years), and were more likely to have immunocompromising conditions or immunosuppressive drug treatment (77% vs. 30%). Three deaths occurred; one had encephalitis and a disseminated infection, one had meningoencephalitis, and one had a disseminated infection. All deaths were in cases >65 years. Fifteen percent of cases ≥50 years of age had a record of receiving zoster vaccine.

## Vibriosis

There were 34 culture-confirmed *Vibrio* spp. cases reported in 2019 (0.57 cases per 100,000 population). This is a 15% decrease from the 40 cases reported in 2018, and a 70% increase from the median annual number of cases reported from 2008 to 2018 (median, 20 cases; range, 8 to 40). *V. parahaemolyticus* accounted for 18 (53%) cases, *V. cholerae* 11 (33%), *V. alginolyticus* 1 (3%), *V. cincinnatiensis* 1 (3%), *V. furnissii* 1 (3%), *V. metschnikovi* 1 (3%), and *V. vulnificus* 1 (3%). Serotyping was performed on an all *V. cholerae* specimens; 7 (63%) cases were non-O1/non-O139, 3 (27%) cases were O1 Inaba toxigenic, and 1 .9%) was O1 Inaba non-toxigenic.

*Vibrio* was isolated from stool in 29 (85%) cases, wounds or tissue in 3 (9%) cases, and blood in 2 (6%) cases. Six (18%) cases were hospitalized for a median duration of 2.5 days (range, 2 to 15 days). Two (5%) cases died (a 55 year-old and a 93 year-old). The first case had *V. vulnificus* isolated from a blood specimen and had chronic liver disease. The other had *V. metschnikovi* isolated from a blood specimen, and had chronic liver, kidney disease, and cancer.

Travel history was available for 33 cases. Nineteen (58%) cases traveled out of Minnesota in the week before symptom onset, including 10 (30%) who traveled internationally.

Of the 26 cases with *Vibrio* isolated from the stool who were able to be interviewed about exposure to seafood in the week before illness onset, 18 (69%) reported consuming raw oysters; an additional 3 (11%) reported eating another type of seafood, and 2 of those reported eating raw seafood. The 5 remaining cases with no seafood consumption traveled internationally in the week prior to illness onset to the Dominican Republic, Kenya, Mexico, Pakistan, and Panama.

In 2019, 64 patients were positive by culture-independent diagnostic tests conducted at a clinical laboratory. Thirty-two (56%) of the specimens received at MDH tested negative by culture and therefore were classified as probable cases.

Three (10%) of 31 probable cases traveled internationally. Among the 29 probable cases interviewed about food exposures, 4 (14%) reported eating raw oysters, and 17 (59%) reported eating another type of cooked seafood in the week prior to illness onset.

There was one outbreak of *V. parahaemolyticus* identified in 2019. The outbreak was associated with consumption of raw oysters at a restaurant. One culture-confirmed case and 3 probable cases who were not tested were part of this outbreak. The oysters consumed were harvested from the Hammersley Inlet in Washington State. This harvest area was closed in response to multiple outbreaks of *V. parahaemolyticus* across the country, including this one.

## Viral Hepatitis A

In 2019, 76 cases of hepatitis A (1.4 per 100,000 population) were reported. Fifty-one cases were residents of the metropolitan area. Forty cases were male. The median age was 31 years (range <1 to 87). Race was known for 72 cases; 35 (49%) were white, 22 (29%) were American Indian/Alaskan Native, 11 (19%) were black, 2 (3%) were


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Asian/Pacific Islander, and 2 (3%) were reported as other race. Three (4%) cases were known to be of Hispanic ethnicity.

Ongoing outbreaks of hepatitis A have been occurring in states across the country since 2016, with at least 35 states reporting outbreaks. An outbreak was declared in Minnesota in August 2019, and 65 cases are considered outbreak-associated. Fifty cases had risk factors that have been seen elsewhere, including injection and non-injection drug use, homelessness/transient housing, and recent incarceration. Five cases did not report risk factors, but were epidemiologically linked to other cases in the outbreak. An additional 4 cases did not report risk factors, but traveled to states with ongoing outbreaks. The remaining 6 cases did not report any risk factors for hepatitis A, but had not traveled internationally during their exposure period.

Of the cases not associated with the ongoing outbreak, 7 cases were associated with international travel. One case was associated with a national foodborne outbreak. No risk factor was identified for the 3 remaining cases.

## Viral Hepatitis B

In 2019, 16 cases of acute hepatitis B virus (HBV) infection (0.3 per 100,000 population) were reported. In 2012, the case definition for acute hepatitis B was revised to include laboratory confirmed asymptomatic acute cases. Three of the 16 cases were asymptomatic, laboratory-confirmed infections.

The median age was 56 years (range 21 to 76). Twelve (75%) cases were residents of the metropolitan area. Twelve (75%) cases were male. Race was known for 13 cases; 9 (56%) were white and 4 (25%) were black. No cases were of Hispanic ethnicity.

Two hundred seventy-two reports of newly identified cases of confirmed chronic HBV infection were received in 2019. A total of 26,160 persons are estimated to be alive and living in Minnesota with chronic HBV infection. The median age of chronic HBV cases in Minnesota is 47 years.

In 2019, no perinatal hepatitis B infections were identified in infants born to hepatitis B-positive mothers. Three hundred fifty-two infants born to hepatitis B-positive women during 2018 had post-serologic testing demonstrating no infection.

## Viral Hepatitis C

In 2019, 62 cases of acute hepatitis C virus (HCV) infection (1.1 per 100,000) were reported. In 2012, the case definition for acute hepatitis C changed to include documented asymptomatic seroconversion. Of the 62 cases, 32 (52%) were asymptomatic, laboratory-confirmed acute infection.

Forty-four (55%) were residents of the metropolitan area. The median age was 30 years (range, 19 to 70). Thirty-eight (61%) cases were male. Race was known for 59 cases; of those, 22 (35%) were white, 20 (32%) were American Indian/Alaskan Native, 9 (15%) was black, 4 (6%) were reported as multi-racial, and 4 (6%) were reported as other race. Five (8%) cases were known to be of Hispanic ethnicity.

We received 1,274 reports of newly identified chronic hepatitis C infections in 2019. In 2016, the case definition for chronic hepatitis C changed to exclude those reported as having resolved their infection. A total of 32,707 persons are estimated to be alive and living in Minnesota with chronic HCV infection. The median age of these cases is 59 years.

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