

DISEASE CONTROL NEWSLETTER

Volume 48, Number 1 (pages 1-23)

2022

Annual Summary of Communicable Diseases Reported to the Minnesota Department of Health, 2020

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).

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) 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 2020 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).

Due to the COVID-19 pandemic, data collection was eliminated or greatly delayed for some diseases.

Anaplasmosis

2020 data summary to be added in the future.

Arboviral Diseases

2020 data summary to be added in the future.

Blastomycosis

In 2020, 84 blastomycosis cases were reported, the highest number since enhanced surveillance began in 1999 but just 5 above last year's previous high. This continues the increase in cases seen in the past few years. Enhanced surveillance for blastomycosis was affected by response to the COVID-19 pandemic. We were unable to obtain full clinical details or exposure information for all cases.

The median age of cases was 50 years (range, 2 to 84 years), and 49 (60%) were male. Of the 74 cases where race and ethnicity were reported, 47 (63%) cases were white, 12 (16%) were Asian, 3 (4%) were black, 5 (7%) were American Indian/Alaska Native, and 6 were of another race. Thirteen cases (18%) were Hispanic.

When hospitalization status was known, 52 (72%) were hospitalized for a median of 7 days (range, 1 to 33 days). Six (8%) cases died, and outcome was unknown for 6 cases. Blastomycosis was the cause of death for 5 cases, while the cause of death for the sixth was unknown. When the body system infected with Blastomycosis was known, 52 (78%) cases had a pulmonary-only infection, 11 (16%) had a disseminated infection, and 4 (6%) had an extra-pulmonary infection.

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

<p>Anthrax (<i>Bacillus anthracis</i>) (1)</p> <p>Botulism (<i>Clostridium botulinum</i>)</p> <p>Brucellosis (<i>Brucella</i> spp.) (1)</p> <p>Cholera (<i>Vibrio cholerae</i>) (1)</p> <p>Diphtheria (<i>Corynebacterium diphtheriae</i>) (1)</p> <p>Free-living amebic infection (1) (including at least: <i>Acanthamoeba</i> spp., <i>Naegleria fowleri</i>, <i>Balamuthia</i> spp., <i>Sappinia</i> spp.)</p> <p>Glanders (<i>Burkholderia mallei</i>) (1)</p> <p>Hemolytic uremic syndrome (1)</p> <p>Measles (rubeola) (1)</p>	<p>Melioidosis (<i>Burkholderia pseudomallei</i>) (1)</p> <p>Meningococcal disease (<i>Neisseria meningitidis</i>) (invasive) (1) (2)</p> <p>Middle East Respiratory Syndrome (MERS) (1)</p> <p>Orthopox virus (1)</p> <p>Plague (<i>Yersinia pestis</i>) (1)</p> <p>Poliomyelitis (1)</p> <p>Q fever (<i>Coxiella burnetii</i>) (1)</p> <p>Rabies (animal and human cases and suspected cases)</p> <p>Rubella and congenital rubella syndrome (1)</p>	<p>Severe Acute Respiratory Syndrome (SARS) (1) (3)</p> <p>Smallpox (variola) (1)</p> <p>Tularemia (<i>Francisella tularensis</i>) (1)</p> <p>Unusual or increased case incidence of any suspect infectious illness (1)</p> <p>Viral hemorrhagic fever (1) (including but not limited to Ebola virus disease and Lassa fever)</p>
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REPORT WITHIN ONE WORKING DAY

<p>Amebiasis (<i>Entamoeba histolytica/dispar</i>)</p> <p>Anaplasmosis (<i>Anaplasma phagocytophilum</i>)</p> <p>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)</p> <p>Babesiosis (<i>Babesia</i> spp.)</p> <p>Blastomycosis (<i>Blastomyces dermatitidis</i>)</p> <p>Campylobacteriosis (<i>Campylobacter</i> spp.) (1)</p> <p><i>Candida auris</i> (1)</p> <p>Carbapenem-resistant Enterobacteriaceae (CRE) (1)</p> <p>Cat scratch disease (infection caused by <i>Bartonella</i> species)</p> <p>Chancroid (<i>Haemophilus ducreyi</i>)</p> <p>Chikungunya virus disease</p> <p><i>Chlamydia trachomatis</i> infections</p> <p>Coccidioidomycosis</p> <p><i>Cronobacter sakazakii</i> in infants under one year of age (1)</p> <p>Cryptosporidiosis (<i>Cryptosporidium</i> spp.) (1)</p> <p>Cyclosporiasis (<i>Cyclospora</i> spp.) (1)</p> <p>Dengue virus infection</p> <p><i>Diphyllobothrium latum</i> infection</p> <p>Ehrlichiosis (<i>Ehrlichia</i> spp.)</p> <p>Encephalitis (caused by viral agents)</p> <p>Enteric <i>Escherichia coli</i> infection (1) (<i>E. coli</i> O157:H7, other Shiga toxin-producing <i>E. coli</i>, enterohemorrhagic <i>E. coli</i>, enteropathogenic <i>E. coli</i>, enteroinvasive <i>E. coli</i>, enteroaggregative <i>E. coli</i>, enterotoxigenic <i>E. coli</i>, or other pathogenic <i>E. coli</i>)</p> <p>Giardiasis (<i>Giardia intestinalis</i>)</p> <p>Gonorrhea (<i>Neisseria gonorrhoeae</i> infections) (1)</p>	<p><i>Haemophilus influenzae</i> disease (all invasive disease) (1) (2)</p> <p>Hantavirus infection</p> <p>Hepatitis (all primary viral types including A, B, C, D, and E) (1)</p> <p>Histoplasmosis (<i>Histoplasma capsulatum</i>)</p> <p>Human immunodeficiency virus (HIV) infection, including Acquired Immunodeficiency Syndrome (AIDS) (1)</p> <p>Influenza (1) (unusual case incidence, critical illness, or laboratory-confirmed cases)</p> <p>Kawasaki disease</p> <p><i>Kingella</i> spp. (invasive only) (1) (2)</p> <p>Legionellosis (<i>Legionella</i> spp.) (1)</p> <p>Leprosy (Hansen's disease) (<i>Mycobacterium leprae</i>)</p> <p>Leptospirosis (<i>Leptospira interrogans</i>)</p> <p>Listeriosis (<i>Listeria monocytogenes</i>) (1)</p> <p>Lyme disease (<i>Borrelia burgdorferi</i>, and other <i>Borrelia</i> spp.)</p> <p>Malaria (<i>Plasmodium</i> spp.)</p> <p>Meningitis (caused by viral agents)</p> <p>Mumps (1)</p> <p>Neonatal sepsis (1) (2) (bacteria isolated from a sterile site, excluding coagulase-negative <i>Staphylococcus</i> less than seven days after birth)</p> <p>Pertussis (<i>Bordetella pertussis</i>) (1)</p> <p>Psittacosis (<i>Chlamydia psittaci</i>)</p> <p>Retrovirus infections</p> <p>Salmonellosis, including typhoid (<i>Salmonella</i> spp.) (1)</p> <p>Shigellosis (<i>Shigella</i> spp.) (1)</p> <p>Spotted fever rickettsiosis (<i>Rickettsia</i> spp. infections, including Rocky Mountain spotted fever)</p>	<p><i>Staphylococcus aureus</i> (1) (only vancomycin-intermediate <i>Staphylococcus aureus</i> [VISA], vancomycin-resistant <i>Staphylococcus aureus</i> [VRSA], and death or critical illness due to community-associated <i>Staphylococcus aureus</i> in a previously healthy individual)</p> <p>Streptococcal disease - invasive disease caused by Groups A and B streptococci and <i>S. pneumoniae</i> (1) (2)</p> <p>Streptococcal disease - non-invasive <i>S. pneumoniae</i> (urine antigen laboratory-confirmed pneumonia)</p> <p>Syphilis (<i>Treponema pallidum</i>) (1)</p> <p>Tetanus (<i>Clostridium tetani</i>)</p> <p>Toxic shock syndrome (1)</p> <p>Toxoplasmosis (<i>Toxoplasma gondii</i>)</p> <p>Transmissible spongiform encephalopathy</p> <p>Trichinosis (<i>Trichinella spiralis</i>)</p> <p>Tuberculosis (<i>Mycobacterium tuberculosis</i> complex) (1) (pulmonary or extrapulmonary sites of disease, including clinically diagnosed disease). Latent tuberculosis infection is not reportable.</p> <p>Typhus (<i>Rickettsia</i> spp.)</p> <p>Unexplained deaths and unexplained critical illness (possibly due to infectious cause) (1)</p> <p>Varicella (chickenpox) (1)</p> <p><i>Vibrio</i> spp. (1)</p> <p>Yellow fever</p> <p>Yersiniosis (enteric <i>Yersinia</i> spp. regardless of specimen source) (1)</p> <p>Zika virus disease (1)</p> <p>Zoster (shingles) (1) (all cases <18 years old; unusual case incidence/ complications regardless of age)</p>
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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* (1) (2)
- Candidemia (*Candida* spp.) (blood isolates only) (1) (2)
- Carbapenem-resistant *Acinetobacter* spp. (CRA), and *Pseudomonas aeruginosa* (CR-PA) (1)
- Clostridium difficile* (1)
- Respiratory syncytial virus (RSV)
- Non-tuberculous Mycobacteria (NTM), pulmonary and extrapulmonary

TO REPORT

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



Note: check website for updates

FOOTNOTES

- (1) 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.
- (2) Invasive disease only: isolated from a normally sterile site, e.g.: blood, CSF, joint fluid, etc.
- (3) 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.
- (4) Also report a pregnancy in a person with Zika; or a person chronically infected with hepatitis B, HIV, or syphilis.

Table 2. Cases of Selected Communicable Diseases Reported to the Minnesota Department of Health by District of Residence, 2020

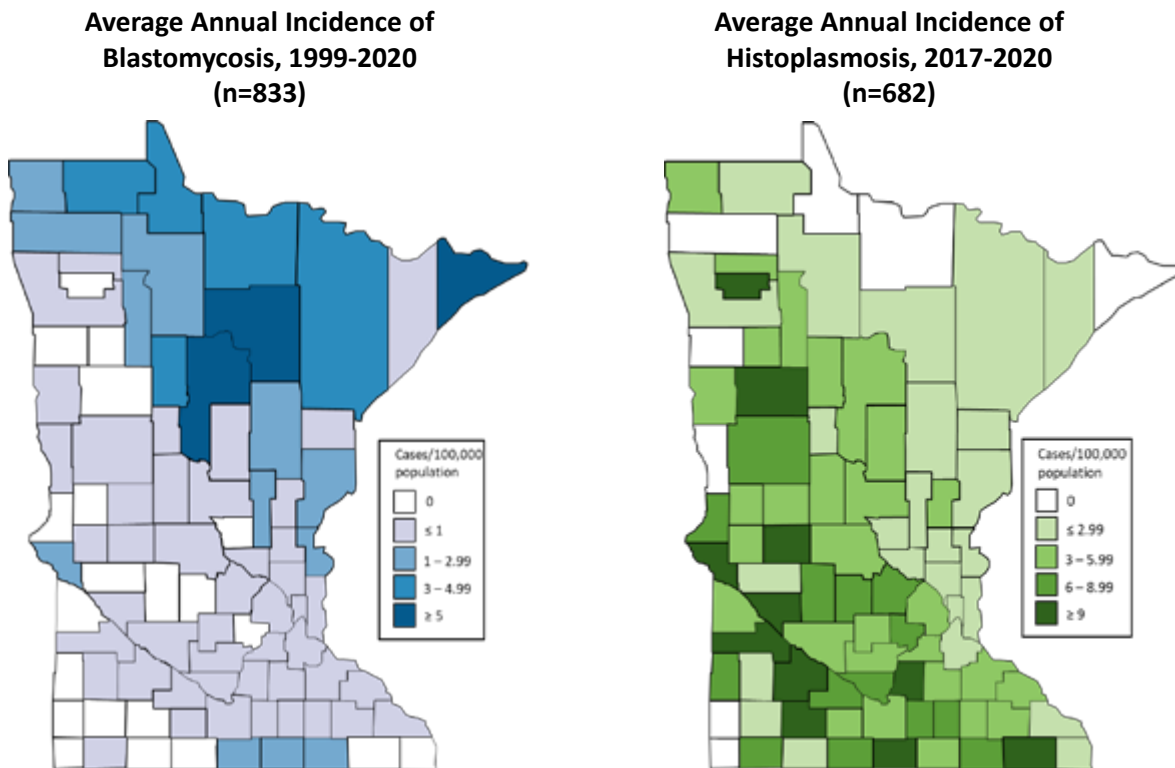
Disease	District (population per U.S. Census 2019 estimates)									
	Metropolitan (3,094,901)	Northwestern (158,963)	Northeastern (324,911)	Central (765,928)	West Central (243,383)	South Central (292,438)	Southeastern (509,346)	Southwestern (216,379)	Unknown Residence	Total (5,606,249)
Blastomycosis	35	7	18	13	1	3	4	3	0	84
Botulism (Infant)	0	0	0	0	0	0	1	0	0	1
Campylobacteriosis	327	12	26	134	26	60	129	12	0	726
Cryptosporidiosis	85	14	19	51	20	40	75	61	0	365
<i>Escherichia coli</i> O157 infection	22	1	1	15	6	5	5	10	0	65
Hemolytic uremic syndrome	1	0	0	1	0	0	0	1	0	3
Giardiasis	215	11	44	49	18	14	41	24		416
<i>Haemophilus influenzae</i> disease	26	1	4	12	2	6	5	2	0	58
HIV (non-AIDS)	139	2	10	16	3	2	8	3	0	183
AIDS (diagnosed in 2020)	55	0	1	4	3	1	4	0	0	68
Legionnaires' disease	54	4	6	9	4	7	10	0	0	94
Listeriosis	6	1	0	3	1	2	1	2	0	16
Mumps	2	0	0	0	0	0	0	0	0	2
Pertussis	67	2	12	17	1	9	35	4	0	147
Q Fever (acute)	1	0	0	1	0	0	0	1	0	3
Q Fever (chronic)	0	0	0	0	0	0	0	0	0	0
Salmonellosis	311	13	27	97	49	41	62	60	0	660
Sexually transmitted diseases										
<i>Chlamydia trachomatis</i> - genital infections	14,192	394	1,045	2,161	710	855	1,528	572	485	21,942
Gonorrhea	7,571	118	390	801	233	285	454	158	207	10,217
Syphilis, total										
Primary/secondary	285	43	12	36	19	10	10	1	0	416
Early Non-Primary Non-Secondary*	259	48	220	16	11	6	6	1	0	567
Unknown Duration or Late**	217	15	12	22	9	11	12	5	0	303
Congenital	3	2	1	1	0	0	0	0	0	7
Other***	0	0	0	0	0	0	0	0	0	0
Shigellosis	56	1	2	6	0	2	12	0	0	79
Streptococcal invasive disease - Group A	142	16	41	22	7	9	29	5	0	271
Streptococcal invasive disease - Group B	256	14	56	87	21	38	46	24	0	542
<i>Streptococcus pneumoniae</i> disease	123	17	27	49	12	14	32	18	0	292
Tuberculosis	95	1	0	8	0	8	3	2	0	117
Tularemia	1	2	0	0	1	0	0	0	0	4
Varicella	80	2	2	13	2	5	14	7	0	125
Viral hepatitis, type A	38	2	9	11	0	1	5	4	0	70
Viral hepatitis, type B (acute infections only, not perinatal)	4	1	0	0	0	0	0	2	0	7
Viral hepatitis, type C (acute infections only)	55	0	1	2	1	1	0	1	0	61

* 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, Mahnomon, 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

Figure 1. Comparison of Average Annual Incidence of Endemic Fungal Diseases in Minnesota



Note the difference in geographical distribution of Minnesota’s endemic fungal diseases, blastomycosis and histoplasmosis. Blastomycosis occurs more frequently in northern and northeastern counties, and histoplasmosis occurs more often in western and southern counties. While clinicians should test for both diseases when clinical illness is consistent with a fungal infection, these maps may trigger questions about travel or otherwise help assess risk.

Numerous outbreaks and clusters of blastomycosis among family members occurred in 2020. The first outbreak involved two adults and two young children who reside in Hennepin County and a family member who lives in Wisconsin, who were exposed at the Willow River in Wisconsin. The second outbreak involving a family cabin in Pine County spans 3 years and includes two relatives who were infected in 2019, one woman in 2020, and a fourth 2021 case. The first cluster of 2 cases involved a mother and daughter who usually reside in Hennepin County, but moved to their cabin in Cass County during spring 2020 to reduce their chances of COVID-19 infection. The second cluster involved two sisters who were infected at the family cabin in Hubbard County, the same location where their father was infected in 2014. The third cluster involved a father and son from Faribault County, whose likely exposure was in Cass County.

When clusters or outbreaks of blastomycosis occur in Minnesota, the demographics may be different than the sporadic cases. Of the 9 cluster or outbreak-related cases reported in 2020 and the 3 related cases from 2019 and 2021, 8/12 (66%) were persons of color, and 6/12 (50%) were female. In the past 21 years of data, only 20% of all cases occurred in persons of color and only 30% in women.

From 1999 to 2020, 834 cases were reported; the annual median number was 34 cases (range, 22 to 84), but the median for the most recent 5 years was 58 cases/year. In 2020, the incidence statewide was 1.5 cases/100,000 population, compared to the 1999-2020 median annual incidence of 0.63 cases/100,000. Exposure information is available for 617 cases. The largest number, 131 (21%), were likely exposed in St. Louis County. Seventy-five (12%) cases were likely exposed in Itasca County, 56 (9%) in Cass County,

21 (3%) in Hennepin County, and 17 (3%) in Beltrami County. Seventy cases (11%) were exposed in Wisconsin.

Average annual incidence of blastomycosis by county clearly shows the highly endemic regions, which include the northern and northeastern counties of Minnesota (Figure 1). This contrasts to the other endemic fungal disease found in Minnesota, histoplasmosis, which has higher incidence levels in southern and western counties. While clinicians should test for both diseases when clinical illness is consistent with a fungal infection, these maps may help assess differential risk in various regions of the state.

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 2020, one infant, one adult intestinal colonization, and one iatrogenic botulism case were reported. The adult intestinal colonization case occurred in a 40 year-old female with multiple underlying conditions, including Crohn's disease. The disease was caused by toxin types B and F. The iatrogenic botulism case occurred in a 78 year-old male who received Botox injections for a vocal cord dysfunction. Because of the localized nature of his presentation, his case was not confirmed through mouse bioassay

From 2001-2020, 15 cases of infant

botulism and 2 cases of foodborne botulism were reported. The median age of infants was 18 weeks (range, 5 to 41 weeks). Eleven (73%) cases were caused by botulinum toxin type B, and 4 (27%) by toxin type A. Twelve 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, 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.

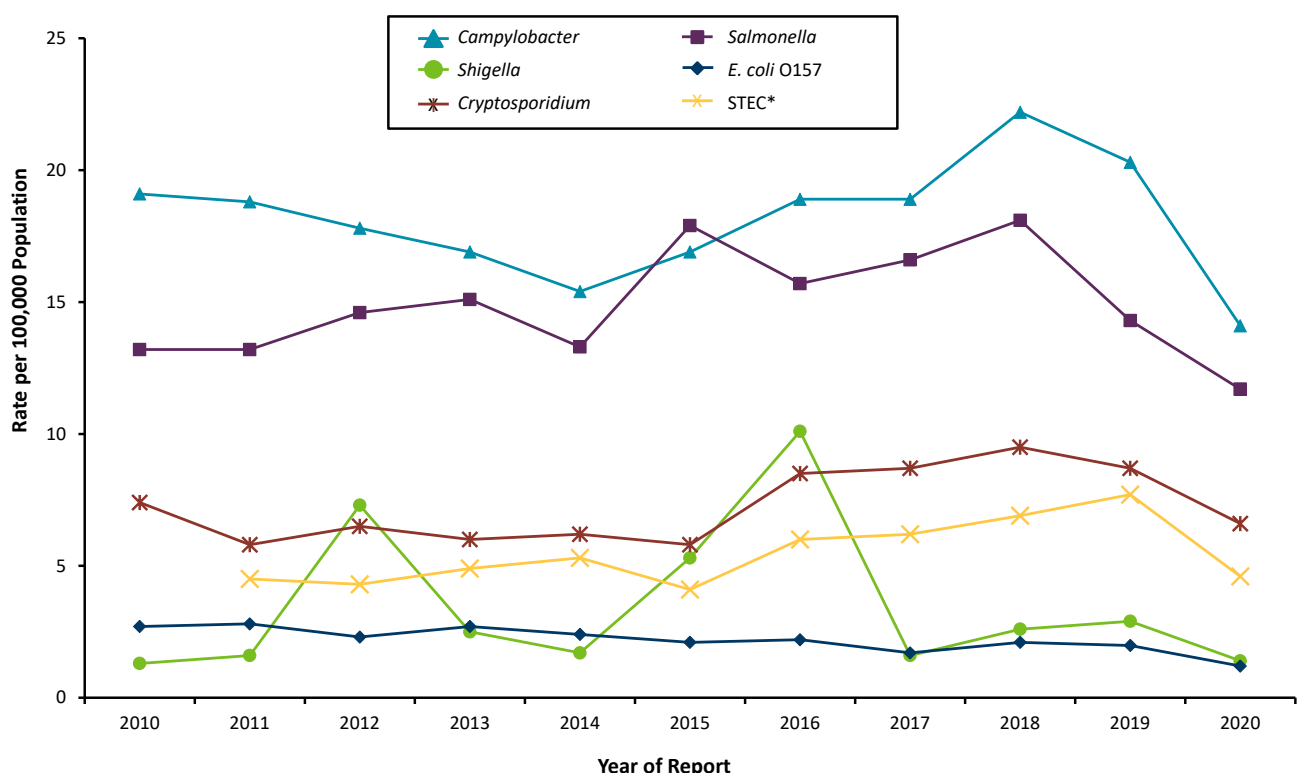
In 2020, 1 confirmed case was reported. This case was a 10-year-old female infected with *B. melitensis*. She was hospitalized for 7 days and survived. The case was likely exposed while drinking raw camel milk in Somalia.

From 2007 to 2020, 27 cases were reported. Twenty 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). Twenty 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 793 culture-confirmed *Campylobacter* cases reported in 2020 (14.1 per 100,000 population). This is a 30% decrease from the 1,141 cases reported in 2019, and a 14% decrease from the annual median of 1,002 cases reported from 2010 to 2019 (range, 834 to 1,238) (Figure 2). In 2020, 41% of cases occurred in people who

Figure 2. Incidence of Selected Enteric Pathogens, 2000-2020



*STEC (Shiga toxin producing *E. coli*) includes O157 and non-O157 STEC case counts.

resided in the metropolitan area. Of the 722 *Campylobacter* isolates confirmed and identified to species by MDH, 80% were *C. jejuni* and 12% were *C. coli*.

The median age of cases was 43 years (range, 2 months to 96 years). Forty-eight percent were between 20 and 49 years of age, and 11% were ≤5 years of age. Fifty-three percent were male. Eighteen percent were hospitalized; the median length of hospitalization was 2 days. Four (0.5%) cases died. Forty-six percent of infections occurred during June through September. Of the 551 cases for whom data were available, 53 (10%) reported travel outside the United States during the week prior to illness onset. The most common travel destinations were Mexico (n=15), and India (n=7).

Three outbreaks of *Campylobacter* infections were identified in 2020. Nine cases were associated with contact with puppies, 2 cases were associated with contact with live poultry, and 1 case was associated with person-to-person transmission in a childcare facility.

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 2020, the overall proportion of ciprofloxacin resistance among *Campylobacter* isolates tested was 26%. However, historically, 80-90% of *Campylobacter* isolates from 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 diagnostic test (CIDT) became commercially available for the qualitative detection of *Campylobacter* antigens in stool. In 2020, 35 patients were positive for *Campylobacter* by an antigen detection CIDT conducted in a clinical laboratory. However, only 12 (34%) 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 2020, 854 patients were positive

for *Campylobacter* by a PCR gastrointestinal panel; 616 (72%) 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 2020, 186 cases were reported among residents of the metropolitan area. The overall incidence rate was 6.0 per 100,000, and the highest county-level incidence was in Ramsey County (8.0 per 100,000). The median age was 57 years (range, newborn to 93 years). One hundred cases (54%) were male; 133 (72%) were white, 22 (11%) were black, 6 (3%) were Asian/Pacific Islander, and race was unknown for 11 cases.

Of the 186 cases, 98% were hospitalized at time of diagnosis, and 58 (31%) died while hospitalized. Underlying conditions included malignancy (27%), chronic lung condition (18%), diabetes (40%), renal disease (25%), neurologic condition (18%), skin condition (7%), and chronic liver disease (12%). Healthcare risk factors included receiving systemic antibiotics in the 14 days prior to diagnosis (85%); presence of a central venous catheter in the 2 days prior to diagnosis (64%); being admitted to the ICU in 14 days prior to, or 14 days after diagnosis (55%); and having surgery in the 90 days before diagnosis (23%).

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 186 cases, 43% were *C. albicans*, 33% *C. glabrata*, 10% *C. parapsilosis*, 4% *C. tropicalis*, 2% *C. dubliniensis*, 2% *C. kefyr*, 2% *C. krusei*, and 2% with other species including *C. nivariensis*, *C. pelliculosa*, and *C. lusitanae*. Seven

cases (4%) 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 (11%) cases, 2019, 16 (10%) cases and in 2020, 13 (7%) cases had IDU documented in their medical chart. MDH began collecting additional information regarding IDU in 2019 to monitor the changing trends in IDU and candidemia epidemiology.

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

Carbapenem-resistant *Enterobacteriales* (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 extended 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 *Enterobacteriales*. 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.

MDH first identified a KPC-producing CRE in February 2009, and began voluntary reporting, including isolate submission for all Enterobacterales and *A. baumannii* resistant to imipenem, meropenem, doripenem, or ertapenem using current Clinical and Laboratory Standards Institute (CLSI) breakpoints (ertapenem excluded for *A. baumannii* isolates). In 2012, MDH 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*. 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, MDH initiated statewide CRE surveillance for *E. coli*, *Enterobacter* spp., *Klebsiella* spp., and *Citrobacter* spp.; MDH also tracks other Enterobacterales including, but not limited to, *Morganella* spp., *Proteus* spp., and *Providencia* spp. The Minnesota Department of Health Public Health Laboratory (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 2020, 513 CRE incident cases representing 476 patients were identified from clinical cultures among Minnesota residents. The most common cases were *Enterobacter* spp. (257) and *Klebsiella* spp. (103), followed by *E. coli* (86), *Citrobacter* spp. (21), *Serratia* spp. (18), *Proteus* spp. (11), *Providencia* spp. (9), *Morganella* spp. (2), and other

Enterobacterales (6). Among 513 incident cases, there were 135 CRE MuGSI incident cases (representing 126 patients) reported among residents of Hennepin and Ramsey Counties. Sixty-four (47%) isolates were *Enterobacter* spp., 40 (30%) were *Klebsiella* spp., and 31 (23%) were *E. coli* with six isolates demonstrating carbapenemase production (three NDM, two KPC, and one OXA-48-like). CRE MuGSI incident cases were most frequently isolated from urine (120) followed by blood (8) and peritoneal fluid (7). We identified five additional CRE surveillance cases (from 4 patients) through colonization screening. Among surveillance cases with known organism, there were four *E. coli* isolates harboring New Delhi metallo- β -lactamase (NDM) carbapenemase.

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 carbapenemase-producing organisms (CPO). 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 comprehensive action includes prompt identification of the organism, notification and investigation with healthcare facilities, and response or “containing the spread” to slow the spread of novel or rare MDROs in Minnesota.

Among 513 CRE incident cases, 40 (8%) were carbapenemase-producing organisms. Twenty cases (from 18 patients) were KPC positive (*E. cloacae* [9], *C. freundii* [3], *K. pneumoniae* [2], *K. oxytoca* [2], *P. mirabilis* [2], *K. aerogenes* [1], and *Raoultella ornithinolytica* [1]). Ten cases (from 8 patients) were IMP positive (*P. rettgeri* [8], *P. mirabilis* [1], and *E. cloacae* [1]), 6 cases (from 5 patients) were NDM positive (*E. coli* [3], *K. pneumoniae* [1], *E. cloacae* [1], and *C. freundii* [1]), and 4 cases were OXA-48 positive (*E. coli* [3] and *K. pneumoniae* [1]). Urine (23) was the most common isolate source followed by blood (6), sputum (4), other non-sterile sites (4), wound (2), and peritoneal fluid (1).

Among 35 Minnesota residents with carbapenemase-producing CRE

isolates, the median age was 65 years (range, 27 to 87); 18 (51%) were male. There were cases in 20 counties; 9 (26%) were residents of Hennepin or Ramsey County, 5 (11%) were residents of Anoka County, and 2 (6%) each were residents of Freeborn, Renville, Stevens, and Washington Counties.

In 2020, 19 CRA incident cases representing 18 patients were identified from clinical cultures among Minnesota residents. Wound (5) was the most common isolate source followed by urine (4), other non-sterile site (4), sputum (3), blood (1), peritoneal fluid (1), and bone (1). Of 19 CRA incident cases, one incident case was reported for MuGSI isolated from urine. Six CRA incident isolates possessed genes for carbapenemase production (4 with OXA-24, one with OXA-23, and one with NDM). Among six Minnesota residents with carbapenemase-producing CRA isolates, the median age was 62 years (range, 54 to 78); 67% were male.

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 \geq 30 days after the last incident report. Despite surveillance discontinuation in 2018, PHL continues to test any submitted CRPA isolates for carbapenemase production. In 2020, 4 CRPA isolates demonstrated carbapenemase production (3 KPC and 1 IMP). These were the first ever reported CRPA harboring KPC carbapenemase in Minnesota and were part of an outbreak associated with a contaminated endoscope.

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 2009, in an effort to better understand the burden of CDI in Minnesota, as part of EIP, MDH 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 2020, 758 incident cases of CDI were reported in the five sentinel counties (180 per 100,000 population), a decrease from 207 per 100,000 population in 2019. Sixty-two percent of these cases were classified as CA, 21% as CO-HCFA, and 17% as HCFO. The median ages for CA, CO-HCFA, and HCFO cases were 55 years, 62 years, and 73 years, respectively. Forty-six percent of CA cases were prescribed antibiotics in the 12 weeks prior to stool specimen collection compared to 86% of HCFO cases and 87% of CO-HCFA cases. Of the 470 putative CA cases eligible for interview, only 36 were interviewed and confirmed

as CA cases. Fifty-three 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 (33%); urinary tract infections (22%); and dental procedures (11%). Unfortunately, due to COVID-19, interviews were no longer conducted after March 2020.

Cryptosporidiosis

During 2020, 365 cases of cryptosporidiosis (6.55 per 100,000 population) were reported. This is similar to the median number of cases reported annually from 2010 to 2019 (median, 367.5 cases; range, 307 to 532) (Figure 2). The median age of cases in 2020 was 27 years (range, 9 months to 86 years). Children 10 years of age or younger accounted for 21% of cases. Fifty-three percent of cases occurred during July through October. The incidence of cryptosporidiosis in the Southwestern, Southeastern, South Central, Northwestern, and West Central districts (28.1, 14.8, 13.7, 8.8, and 8.3 cases per 100,000, respectively) was significantly higher than the statewide incidence. Only 85 (23%) cases occurred among residents of the metropolitan area (2.8 per 100,000). Thirty-eight (10%) cases required hospitalization, for a median of 3 days (range, 1 to 49 days). One death was reported.

No confirmed outbreaks of cryptosporidiosis were identified in Minnesota in 2020. One laboratory-confirmed case was included in an outbreak identified at a waterpark in Wisconsin.

Cyclosporiasis

There were 143 Cyclospora cases reported in 2020 (2.56 per 100,000 population). This is markedly higher than the median number of cases reported from 2010 to 2019 (median, 3.5; range, 0 to 156 per year). In 2020, 27% of cases occurred in people who resided in the metropolitan area.

The median age of cases was 59 years (range, 19 to 89 years). Fifty percent were female. Two percent were hospitalized; the median length of hospitalization was 2 days (range, 1 to 4 days). Eighty-six percent of infections occurred during May through July. Of the 32 non-outbreak cases for whom data were available, none reported travel outside the United States during the 2 weeks prior to illness onset.

Two foodborne outbreaks of cyclosporiasis were identified in Minnesota in 2020. The first was a multi-state outbreak associated with a pre-packaged salad, accounting for 87 laboratory-confirmed Minnesota cases. The second was a multi-state outbreak associated with a home-delivery grocery service, accounting for 5 laboratory-confirmed Minnesota cases.

Escherichia coli O157 Infection, Other Shiga Toxin-producing E. coli, and Hemolytic Uremic Syndrome (HUS)

During 2020, 65 culture-confirmed cases of *Escherichia coli* O157 infection (1.2 per 100,000 population) were reported. The number of reported cases represents a 48% decrease from the median number of cases reported annually from 2010 to 2019 (median, 124 cases; range, 96 to 146) (Figure 2). During 2020, 22 (34%) cases occurred in the metropolitan area. Forty-six (71%) cases occurred during May through October. The median age of the cases was 24 years (range, 10 months to 81 years). Eighteen percent of the cases were 4 years of age or younger. Twenty-three (35%) cases were hospitalized; the median hospital stay was 2 days (range, 1 to 17 days). No cases died.

In addition to the 65 culture-confirmed *E. coli* O157 cases, 193 cases of Shiga toxin-producing *E. coli* (STEC) infection other than O157 were identified in 2020. Among the 193 cases with non-O157 STEC, *E. coli* O103 was the serogroup for 33 (17%) cases, *E. coli* O26 for 33 (17%), *E. coli* O111 for 26 (13%), *E. coli* O121 for 9 (5%), *E. coli* O145 for 7 (4%), and *E. coli* O45 for 3 (2%). The median age of the non-O157 STEC cases was 24 years (range, 11 months to 92 years). Thirty-one (16%) cases were hospitalized; the median hospital stay was 2 days (range, 1 to 24 days). No cases died.

Culture-independent tests have become increasingly adopted by clinical laboratories for the detection of Shiga toxin or Shiga toxin genes in stool. One hundred-fifty-six patient specimens that were positive by a culture-independent test 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.

Two *E. coli* O157 outbreaks were identified during 2020. In October, a national outbreak of *E. coli* O157 infections was associated with leafy greens. Two cases were identified in Minnesota. No cases developed HUS or died. In addition, there was one multistate investigation with 2 Minnesota cases that CDC classified as an outbreak with an unknown source.

Four non-O157 STEC outbreaks were identified during 2020. One outbreak was due to person-to-person transmission in a childcare setting, and one was due to foodborne transmission. In February, an outbreak of *E. coli* O26:H11 infections associated with person-to-person transmission occurred at a childcare facility in Hennepin County. Three cases, two laboratory-confirmed, were identified. No cases developed HUS or died. In July, an outbreak of *E. coli* O26:H11 infections was associated with a restaurant in Scott County. Two cases, both laboratory-confirmed, were identified. Neither case developed HUS nor died. In addition, there were two multistate investigations that included 6 Minnesota cases which CDC classified as outbreaks with an unknown source.

Hemolytic Uremic Syndrome (HUS)

In 2020, 3 HUS cases were reported. The number of reported cases represents a 74% decrease from the median number of cases reported annually from 2010 to 2019 (median, 11.5 cases; range, 9 to 17). In 2020, the median age of HUS cases was 7 years (range, 1 year to 10 years). All 3 cases were hospitalized, with a median hospital stay of 17 days (range, 7 to 17 days). No cases died. From 1997 through 2020, the overall case fatality rate among HUS cases was 5.3%. All 3 HUS cases reported in 2020 were post-diarrheal. *E. coli* O157:H7 was cultured from the stool of 2 (67%) cases. The third case was Shiga toxin positive by PCR but not culture-confirmed. In 2019, there were no outbreak-associated HUS cases.

Giardiasis

During 2020, 416 cases of *Giardia* infection (7.4 per 100,000) were reported. This represents a 39% decrease from the median number of cases reported annually from 2010 through 2019 (median, 638 cases; range, 508 to 846). Recent immigrants and refugees accounted for 2% of cases. An additional 4% of cases reported international travel in the 3 weeks prior to illness onset.

Excluding recent immigrants and refugees, the median age of cases was 42 years (range, 3 months to 94 years). Sixteen percent of cases were <10 years of age, and 39% were >50 years of age. Fifty-three percent of non-immigrant and refugee cases were male. *Giardia* infections had a summer/fall seasonality; 52% of non-immigrant and refugee cases occurred during July through October. Twenty-five (6%) cases required hospitalization, for a median of 3 days (range, 2 to 24 days). Three outbreaks were identified in Minnesota that accounted for 9 laboratory-confirmed cases. These outbreaks were associated with person-to-person transmission in child-care settings.

Haemophilus influenzae

Fifty-eight *Haemophilus influenzae* disease cases (1.0 per 100,000 population) were reported in 2020. Cases ranged in age from newborn to 97 years (median, 61 years). Allowing for more than one syndrome per case, 26 (45%) cases had pneumonia, 15 (26%) bacteremia, 6 (10%) septic shock, 5 (9%) meningitis, 3 (5%) septic arthritis, 2 (3%) cellulitis, and the following each had 1 (2%): bronchitis, cholesteatoma, cholangitis, chorioamnionitis, empyema, septic abortion, epiglottitis, and otitis media. Four (7%) cases died.

Of 51 *H. influenzae* isolates for which typing was performed at PHL, 11 were type a, 1 type b (Hib), 1 type e, 5 type f, and 33 were untypeable. The 1 Hib disease case compared to 3 cases in 2019, 1 in 2018, 2 in 2017, 5 in 2016, 2 in 2015, and 1 in 2014. The case was a child <1 year of age, who had cellulitis and survived. The child had not received Hib vaccinations.

The 4 deaths occurred in patients ranging in age from 25 to 97 years. Three had bacteremia (1 of those also had septic shock), and 1 had pneumonia and septic shock. All four had *H. influenzae* isolated from blood. Comorbidities were reported in three of them and one was unknown. Of the 4 that died, there were 3 case-isolates that were untypeable, and one isolate was not available for serotyping.

Histoplasmosis

In 2020, there were 54 confirmed and 47 probable cases of histoplasmosis reported. Surveillance for histoplasmosis was severely affected by response to the COVID-19 pandemic, and these numbers, which are lower than past years, likely reflect that. Additionally,

MDH received laboratory reports for 74 cases which would have counted as probable cases, but we were unable to obtain the necessary clinical information.

The median age of cases was 52 years (range, 1 to 92 years); 71 (70%) were male. Of the 87 cases with race reported, 75 (86%) were white, 6 (7%) were black, 3 (3%) were Asian, and 3 (3%) were Native Hawaiian/Pacific Islander. Of the 84 with ethnicity reported, 9 (11%) were Hispanic. Fifty-four cases (53%) were hospitalized, for a median of 4.5 days (range, 1 to 27 days) and of the 34 whose status was known, 29 (85%) were immunocompromised. Of the 75 cases whose outcome was reported, 7 (9%) cases died, and histoplasmosis was the primary cause of death in 4 of those cases, while the cause of death was not reported for the other 3. Again, this case fatality rate is higher than previous years and likely results from underreporting of the outcome when patients survived.

From 2017 to 2020, 682 cases of histoplasmosis were reported. The 2020 annual incidence of histoplasmosis in Minnesota was 1.8 cases per 100,000 population. However, the average annual incidence for 2017 – 2019 was 3.5 cases per 100,000 which is more likely reflective of the true disease burden.

The average annual incidence of histoplasmosis by county shows that cases occur more frequently in southern and western counties (Figure 1). This contrasts to the other endemic fungal disease found in Minnesota, blastomycosis, whose highly endemic region includes the northern and northeastern counties of Minnesota. While clinicians should test for both diseases when clinical illness is consistent with a fungal infection, these maps may help assess possible risks in different parts of the state.

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.

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 29.2 per 100,000 in Georgia. Minnesota had the 14th lowest rate (6.1 cases per 100,000 population). In 2018, state-specific AIDS diagnosis rates ranged from 0.4 per 100,000 persons in Wyoming to 13.9 per 100,000 population in Georgia. Minnesota had the 15th lowest rate (2.5 cases per 100,000 population).

As of December 31, 2020, a cumulative total of 12,339 cases of HIV infection (2,355 AIDS at first diagnosis, and 9,987 HIV [non-AIDS] cases) were reported among Minnesota residents. By the end of 2020, an estimated 9,422 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 2020, 68 new AIDS cases (Figure 3) and 93 deaths among persons living with HIV infection in Minnesota were reported.

The number of HIV (non-AIDS) diagnoses has varied over the past decade (Figure 3). There was a peak of 278 newly diagnosed HIV (non-AIDS) cases in 2009, and a low of 183 new HIV (non-AIDS) cases reported in 2020. Before 2020, the lowest number of cases reported was 215 new HIV (non-AIDS) cases reported in 2017.

In 2020, 76% (173/226) of new HIV diagnoses (both HIV [non-AIDS] and AIDS at first diagnosis) occurred in the metropolitan area. In Greater Minnesota there were 53 cases in 28 of 80 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 2020, there were 65 new infections among white males, which is 34% of new HIV infections among males. Among black African American males, there were 61 new HIV diagnoses in 2020, which is about a third of new HIV infections among males (32%). Among Hispanic males of any race and black African-born males, there were 30 and 14 new HIV infections in 2020 respectively.

Females account for an increasing percentage of new HIV infections, from 11% of new infections in 1990 to 20% in 2020. 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 2020, women of color accounted for 81% of new HIV infections among females in Minnesota. The number of diagnoses among African-born women has been increasing over the past decade. In 2020, the number of new cases among African-born women was 11, accounting for 30% of all new diagnoses among women. In 2020, there were 11 cases (30%) diagnosed among African American women.

Despite relatively small numbers of cases, HIV/AIDS affects persons of color disproportionately in Minnesota. In 2020, men of color comprised approximately 17% of the male population in Minnesota and 66% of new HIV diagnoses among men. Similarly, persons of color comprised approximately 13% of the female population in Minnesota and 81% of new HIV infections among women. It bears noting 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.

In 2020, there were 88 diagnosed with HIV <30 years of age, accounting for 39% of all cases. Most of the cases were among young males where 89% 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 2020, MSM (including MSM who also inject drugs) accounted for 55% 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.

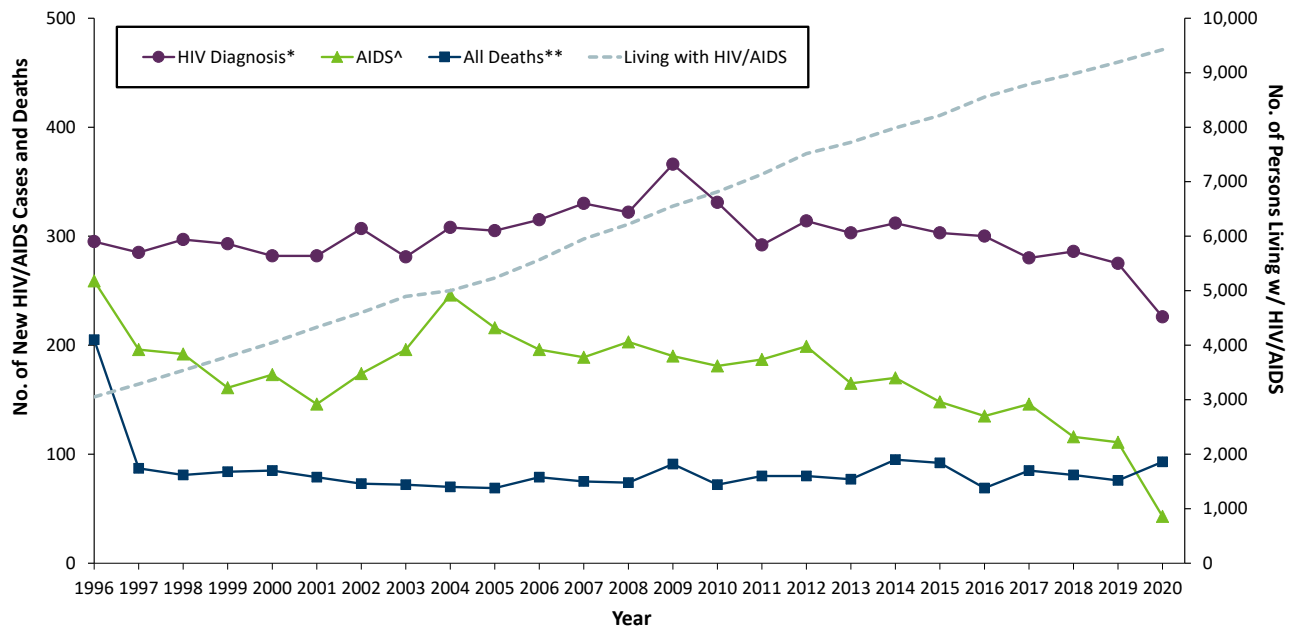
In the fall of 2019, an outbreak was declared among persons who inject drugs (PWID) diagnosed with HIV in Minnesota. Statewide there was a two-fold increase among PWID with 11 cases in 2018 increasing to 22 cases in 2019. The outbreak area includes residents of Hennepin and Ramsey counties where an alert was indicated among PWID. At the end of 2020, the outbreak included 27 cases. Persons likely to be at high risk for HIV infection include sex partners or syringe-sharing partners of people known to be living 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.

In fall 2020, an alert for the Duluth area was indicated among newly diagnosed HIV infections in which an outbreak was declared in March 2021. There have been 13 cases associated with the outbreak between September 2019 and February 2021 when the outbreak was declared. Typically, there are 1 to 5 cases of HIV annually in St. Louis County. The health alert also indicated a rise in the number of syphilis cases in the Duluth area. Both declared outbreaks are currently on-going.

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 2020, there were 25 new HIV infections reported among black Africans. While black African-born persons comprise less than 1% of the state's population, they accounted for 11% of all HIV infections diagnosed in Minnesota in 2020.

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 2019, with 42 births to pregnant persons in 2020, the rate of perinatal transmission

Figure 3. HIV/AIDS: Number of New Cases, Prevalent Cases, and Deaths by Year, 1996-2020



* 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.

decreased, from 15% in 1994-1996 to 0% over the last 3 years (2018-2020), with the last HIV-positive Minnesota 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

Since the 2008-2009 season, statewide surveillance for pediatric and adults cases has occurred. 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.

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 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 positive 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 influenza B/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 3 in 2008-2009 to a high of 212 in 2017-2018.

Legionnaires' Disease

In 2020, 94 confirmed cases of Legionnaires' disease (1.7 per 100,000 population) were reported. This is a 20% decrease from the 118 cases reported in 2019 and is lower than the 5-year median number of cases reported annually from 2015 to 2019 (median, 115; range, 51 to 153 per year).

Fifty-nine (63%) cases were male. Older adults were more often affected, with 76 (81%) cases occurring among individuals ≥50 years (overall median age, 61 years; range, 24 to 90 years). Fifty (53%) cases were diagnosed during June through September. Fifty-four (57%) were residents of the metropolitan area and 40 (43%) were residents of Greater Minnesota. No outbreaks were identified during 2020. Due to the COVID-19 pandemic response, data on hospitalizations for Legionnaires' disease could not be systematically collected.

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. We request clinical laboratories submit Legionella isolates, as well as available lower respiratory tract (sputum, BAL) specimens from confirmed and suspect cases for culture and molecular typing.

Listeriosis

Sixteen confirmed listeriosis cases were reported in 2020. All were hospitalized, and 4 died. The median age of cases was 69 years (range, 15 to 93 years). Fifteen (94%) cases had Listeria monocytogenes isolated from blood, and 1 from cerebrospinal fluid. There were no pregnancy-associated cases in 2020. Thirteen cases were white, 1 was Native Hawaiian/Pacific Islander, 1 reported other race, and 1 had unknown race; 1 was of Hispanic ethnicity. The 16 cases were the same number as reported in 2019, but twice the median number of cases reported from 1996 through 2019 (median, 8 cases; range, 3 to 19). Two cases were part of a multi-state outbreak associated with an unknown

commercially distributed vehicle; the Minnesota cases were part of a restaurant subcluster, which was the first outbreak of invasive listeriosis associated with a restaurant reported in Minnesota.

In 2019, national case definitions were modified to include “probable” and “suspected” cases of listeriosis. In 2020, 1 suspected case was identified in an individual with *L. monocytogenes* isolated from a leg wound.

Lyme Disease

2020 data summary to be added in the future.

Malaria

2020 data summary to be added in the future.

Meningococcal Disease

Six *Neisseria meningitidis* (NM) invasive disease cases (0.1 per 100,000 population) were reported in 2020; there were 4 cases in 2019, 0 cases in 2018, 5 cases in 2017, and 5 cases in 2016. Three were serogroup B, one was serogroup Y, and 2 were non-groupable. All cases were sporadic.

Cases ranged in age from 25 to 70 years. Four cases occurred in the metropolitan area and 2 were outstate Minnesota. Four cases had meningitis (2 of these also had septic shock, and 1 also had pneumonia), 1 had bacteremia without another focus of infection, and 1 had septic arthritis. There were no deaths.

Incidence of invasive NM was stable at about 0.3 cases per 100,000 persons since 2005 (with the exception of 2008 when incidence increased to 0.6 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. The 2020 vaccination rates for MenACWY among 13 year old Minnesota adolescents dropped 7% to 71.8%. This gap developed during the COVID-19 pandemic likely due to stay-at-home measures. Clinicians are urged to recall adolescents for catch-up vaccination that have missed vaccines usually given at 11-12 years. Rates for the MenACWY booster dose by age 19 years are improving; 2020 data show a rate of 53.7%. (Minnesota Immunization Information Connection, 2020 data). Meningococcal B vaccine

is recommended for persons 10 years of age and older with specific risk factors. It should also be considered and offered to those 16-23 years of age, especially in outbreak situations.

Mumps

In 2020, 2 mumps cases were reported. The two cases reported were classified as probable (tested positive by IgM serology). The first case occurred in an individual with recent travel to Mexico. The second case had an unknown source. One case was 18-49 years, and the second case was ≥50 years of age. Both cases reported not knowing their vaccination status, and no vaccination records could be located. Both cases reported parotitis and one reported orchitis. Neither case was hospitalized.

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, 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 2020, 45 cases (0.68 cases per 1,000 live births) were reported compared to 58 cases in 2019. There were 2 deaths. All were bacteremic. There was 1 meningitis case. Most cases (91%) were culture-positive within the first 2 days of life. Group B *Streptococcus* was most common (12) followed by, *Escherichia coli* (9), *Enterococcus* spp. (7), *Haemophilus influenzae* (2), *Streptococcus viridans* (3), group A *Streptococcus* (2), other *Streptococcus* spp. (2), *Streptococcus anginosus* (2), and 1 each of *Acinetobacter*, *Brevibacterium* spp., *Candida* spp., group C *Streptococcus*, *Streptococcus salivarius*, and *Staphylococcus aureus*.

Pertussis

In 2020, 147 pertussis cases (3 per 100,000 population) were reported. Laboratory confirmation was available for 122 (83%) cases, 6 (5%) of which were confirmed by culture and 122 (83%) of which were confirmed by PCR. In addition, 37 (25%) cases met the clinical case definition and were epidemiologically linked to laboratory confirmed cases, and 2 (8%) met the clinical case definition only. Sixty-five (44%) cases occurred in residents of the metropolitan area.

Paroxysmal coughing was the most commonly reported symptom, which 118 (80%) cases experienced. Approximately 22% (33) 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 65 (44%) cases. Infants and young children are at the highest risk for severe disease and complications. Pneumonia was diagnosed in 3 (8%) cases, only 1 (33%) of which was an infant; 1 was 2-16 years old, and 1 was 20-69 years old. Five (3%) cases were hospitalized; 3 hospitalized patients were <6 months of age. No deaths occurred.

Pertussis is increasingly recognized in older children and adults. During 2020, cases ranged in age from <1 month to 83 years. Thirty-seven (25%) cases occurred in adolescents 13-17 years, 8 (33%) in children 5-12 years, 28 (19%) in adults ≥18 years, 23 (41%) in children 6 months through 4 years, and 6 (4%) 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 2020, 7 cases were in infants <1 year of age. A likely source of exposure was identified for 3 of those cases; all 3 were infected by a child <13 years of age. 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 36 (29%) cases who were 7 months to 6 years of age, 10 (28%) were known to have received at least a primary series of 3 doses of DTP/DTaP vaccine prior to onset of illness; 22 (61%) 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 all 6 culture-confirmed cases were received and sub-typed, with six 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 2020, 3 confirmed cases were reported, all acute. One case was a 67-year-old male who had a tick bite prior to getting ill. The other two cases were a 69 year-old male and a 63 year-old male, whose exposures are unknown. All 3 cases were hospitalized for 38, 7, and 18 days, respectively. All cases survived.

From 1997 to 2020, 28 confirmed acute cases, and 10 chronic cases were reported. The median age of acute cases was 61 years (range, 11 to 77 years); the median age of chronic cases was 66 years (range, 5 to 78 years). Twenty (87%) cases for which both race and ethnicity were known

were white, non-Hispanic; 2 (9%) were black, non-Hispanic; and 1 (5%) was mixed race, non-Hispanic. During this time, 23 (79%) of the 29 cases for whom exposure information was available were likely exposed through direct or indirect contact with infected animals, 3 (10%) were likely exposed through ingestion of unpasteurized dairy products, and 3 (10%) through a tick bite. Nine (43%) of the 21 cases with known occupations were currently employed in an agriculture-related occupation.

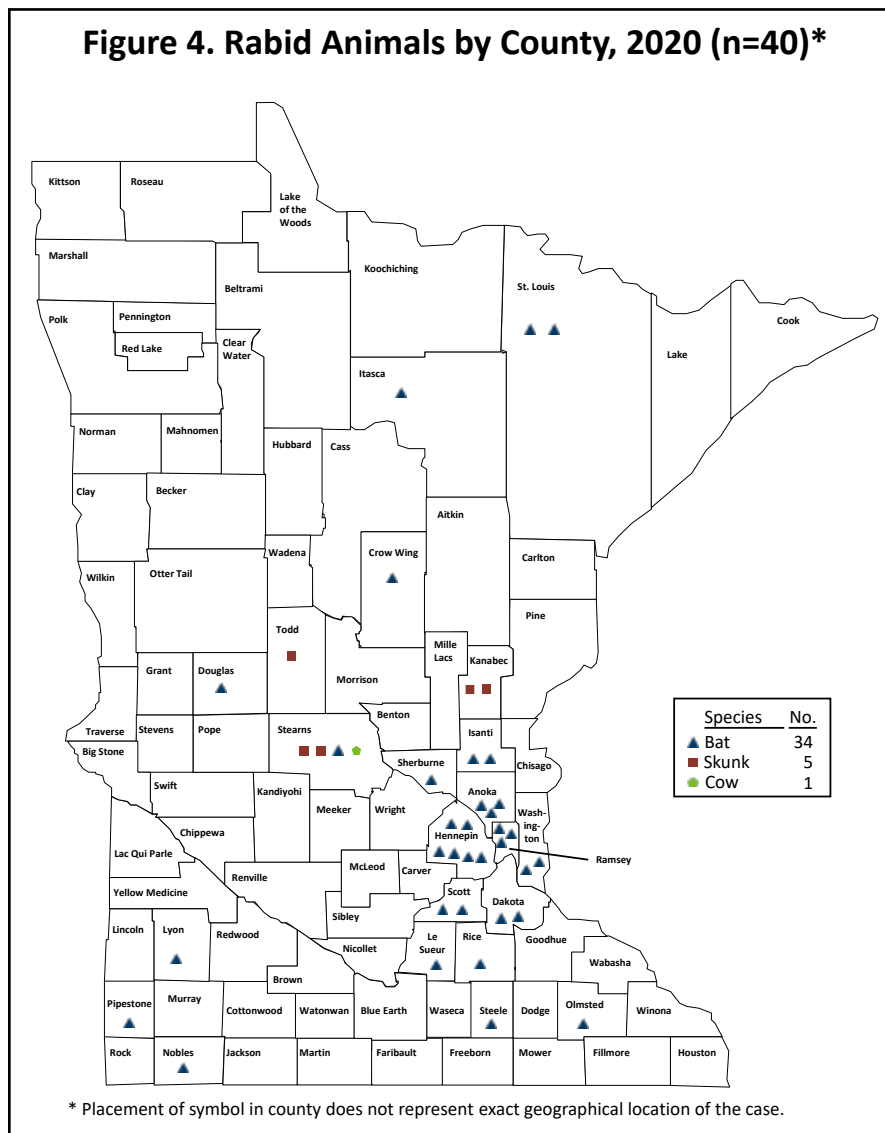
Rabies

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 2020, 40 (1.8%) of 2,284 animals tested were positive for rabies. This is similar to 2019 (36 [1.6%]) and consistent with the number of positives seen in 2018. The majority of positive animals in 2020 were bats (34/40 [85%]) and followed by skunks (5/40 [12.5%]). There was 1 positive cow (1/40 [2.5%]) (Figure 4). There were no human cases of rabies.

From 2003 to 2020, 941 (2.3%) of 41,689 animals tested were positive for rabies. The median number of rabies positive animals identified annually was 48 (range 28-94). From 2003 to 2020, 334/747 (44.7%) skunks, 57/938 (6.1%) cattle, 452/12,318 (3.7%) bats, 9/365 (2.5%) horses, 48/12,262 (0.4%) cats, 29/11,777 (0.2%) dogs, 1/1,272 (0.1%) raccoons, and 12/2,064 (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.

Figure 4. Rabid Animals by County, 2020 (n=40)*



Respiratory Syncytial Virus

Laboratory-confirmed respiratory syncytial virus disease (RSV) became reportable for all hospitalized residents of the metropolitan area in 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.

Salmonellosis

In 2020, 660 Salmonella cases (11.7 per 100,000 population) were reported. This is an 18% decrease from the median annual number of cases reported from 2010 to 2019 (median, 808 cases; range, 695 to 1,009) (Figure 2).

Of the 82 serotypes identified in 2020, 5 serotypes, *S. Enteritidis* (159), *S. Typhimurium* (80), *S. I 4,[5],12:i:-* (70), *S. Newport* (42), and *S. Paratyphi B* var. *L(+)* *tartate+* (formerly *Java*) (25) accounted for 57% of cases. *Salmonella* was isolated from stool in 552 (84%), blood in 51 (8%), and urine in 46 (7%) cases. Other specimen sources included wound/swab/abscess (5), lung, buttock, peritoneal fluid, gallbladder fluid, abdominal fluid, and groin tissue.

One hundred seventy-five (27%) cases were hospitalized; the median length of hospital stay was 4 days (range, 1 to 40 days). Three culture-confirmed cases died: a 43 year-old died of COVID-19 13 days after *S. Dublin* was isolated from blood; a 76 year-old died of septic shock 3 days after *S. Pomona* was isolated from stool; and, *S. Enteritidis* was isolated after death from the stool, spleen, and lung of a 47 year-old.

Of the 575 cases with known travel history, 55 (10%) had travelled internationally during the week prior to their illness onset. There were 3 *S. Typhi* cases and 1 *S. Paratyphi A* case; all had no international travel.

In 2015, culture-independent diagnostic tests (CIDTs) for the detection of *Salmonella* nucleic acid in stool became commercially available. In 2020, 53 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.

One hundred thirteen culture-confirmed cases were part of nine *Salmonella* outbreaks in 2020, including 1 case that was part of an outbreak that began before 2020. Seven of the nine outbreaks involved foodborne transmission, and two were due to animal contact. Eight of the outbreaks involved cases with exposure in multiple states. The nine outbreaks resulted in a median of 4 culture-confirmed cases per outbreak (range, 1 to 43).

Four cases of *S. Typhimurium* infection were part of a multi-state outbreak associated with hedgehog contact that included 49 cases from 25 states. No common breeder or source was identified. The outbreak strain was also identified in previous outbreaks associated with hedgehogs.

Eleven culture-confirmed cases and 5 probable cases of *S. Paratyphi B* var. *L(+)* *tartate+* (formerly *Java*) infection were part of a multi-state outbreak that included 18 cases from four states. An outbreak vehicle was not confirmed, though cashews were the most plausible vehicle. The Minnesota cases were part of a cluster associated with a juice bar.

Twenty-eight cases of *S. Enteritidis* infection were part of a multi-state outbreak that included 102 cases from 17 states. The outbreak vehicle was peaches from a single supplier. This was the first outbreak of salmonellosis associated with peaches to be reported to the CDC National Outbreak Reporting System.

Nineteen cases of *S. Newport* infection were part of a multi-state outbreak of 1,127 cases in 48 states that was associated with red onions, and likely also yellow, white, and sweet onions, sourced from a California supplier. The source and mechanism of contamination were not identified.

Four cases of *S. Dublin* infection were part of a multi-state outbreak that also included 4 Pennsylvania cases. The suspected outbreak vehicle was ground beef. Traceback investigations suggested that the beef was processed by a Wisconsin firm.

Two cases of *S. Enteritidis* infection were linked to a Minnesota restaurant

by epidemiology and whole genome-sequencing; the vehicle of transmission and source of contamination were not identified.

One case of *S. Newport* infection was part of a multi-state outbreak of 80 cases in 15 states that was associated with cantaloupe and watermelon. A farm in Indiana was suspected as the source. The source and mechanism of contamination were not identified.

Forty-three cases of *Salmonella* infection with various serotypes (*S. Enteritidis* [27], *S. Hadar* [11], *S. Braenderup* [2], *S. Infantis* [2], and *S. Anatum* [1]) were associated with a multi-state outbreak linked to live poultry contact. Nationally, there were 1,722 people infected with the outbreak strains across 50 states, with isolation dates ranging from January 6, 2020 to November 30, 2020.

One case of *S. Saintpaul* infection was part of a multi-state outbreak likely associated with strawberries that began in 2019 (there were 3 other Minnesota cases from 2019). The outbreak included 97 cases from 16 states and Washington D.C. A specific source or supplier was not identified.

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 2020, 21,942 chlamydia cases (414 per 100,000 population) were reported. This is a 11% decrease compared to 2019 (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 (2,253 per 100,000), followed by the 15 to 19-year-old age group (1,503 per

100,000). The incidence of chlamydia among adults 25 to 29 years of age (1,041 per 100,000) is considerably lower but has increased in recent years. The chlamydia rate among females (529 per 100,000) is nearly twice the rate among males (295 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 (1,999 per 100,000) is 10.5 times higher than the rate among white non-Hispanics (191 per 100,000). Although black, non-Hispanic persons comprise approximately 5% of Minnesota's population, they account for 25% of reported chlamydia cases. Rates among Asian/Pacific Islanders (328 per 100,000), Hispanic, any race (750 per 100,000), and American Indian/Alaska Natives (906 per 100,000) are over 3.9 to 4.7 times higher than the rate among white, non-Hispanic persons.

Chlamydia infections occur throughout the state, with the highest reported rates in Minneapolis (1,144 per 100,000) and St. Paul (876 per 100,000). All geographical areas around our state saw a decrease in the rate of chlamydia between 2019 and 2020. Every county in Minnesota had at least 2 cases in 2020.

Gonorrhea

Gonorrhea is the second most commonly reported STD in Minnesota. In 2020, 10,217 cases (193 per 100,000 population) were reported. This is the highest reported rate of gonorrhea in the last decade with a 27% rate increase compared to 2019 (Table 3).

Adolescents and young adults are at greatest risk for gonorrhea (Table 4), with rates of 452 per 100,000 among

15 to 19- year-olds, 714 per 100,000 among 20 to 24-year olds, and 560 per 100,000 among 25 to 29-year-olds. Gonorrhea rates for males (206 per 100,000) were higher than females (179 per 100,000).

Communities of color are disproportionately affected by gonorrhea. The incidence of gonorrhea among black, non-Hispanics (1429 per 100,000) is 20 times higher than the rate among white, non-Hispanics (72 per 100,000). Rates among Asian/Pacific Islanders (96 per 100,000), Hispanic, any race (194 per 100,000), and American Indian/Alaska Natives (633 per 100,000) are up to 9 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 (777 per 100,000) is over 1.5 times higher than the rate in St. Paul (535 per 100,000), almost 7 times higher than the rate in the suburban metropolitan area (141 per 100,000), and almost 9 times higher than the rate in Greater Minnesota (93 per 100,000). In 2020, the seven-county metro suburban area had the highest increase at 37%.

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 2020, there were 416 cases of primary/secondary syphilis in Minnesota (7.8 cases per 100,000 persons), which is an 8% increase compared to 2019.

Early Syphilis

In 2020, the number of early syphilis cases increased by 13%, with 783 cases, compared to 753 cases in 2019. The incidence remains highly concentrated among MSM. Of the early syphilis cases in 2020, 619 (79%) occurred among men; 407 (65%) of these were MSM; with 30% 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 14 early syphilis cases in 2010 to the near historic high of 163 cases reported in 2020.

Congenital Syphilis

Seven congenital syphilis cases were reported in 2020. 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 doubled since 2015 and in 2019 reached a 20-year high. In Minnesota, the number and rate of congenital syphilis cases among infants has increased from 2.9 in 2015 to 11.2 per 100,000 live births in 2020.

Table 3. Number of Cases and Rates (per 100,000 Persons) of Chlamydia, Gonorrhea, and Syphilis, 2016-2020

Disease	2016		2017		2018		2019		2020	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Chlamydia	22,675	428	23,528	444	23,564	444	24,535	463	21,942	413.7
Gonorrhea	5,104	96	6,519	123	7,542	142	8,063	152	10,217	192.6
Syphilis, Total	852	16.1	934	17.6	918	17.3	1127	21.2	1093	20.6
Primary/Secondary	306	5.8	292	5.5	292	5.5	385	7.3	461	7.8
Early NP/NS*	251	4.7	313	5.9	286	5.4	367	6.9	365	6.9
Unknown/Late	288	5.4	327	6.2	330	6.2	354	6.7	303	5.7
Congenital**	7	10.2	2	3.0	10	15.1	21	32.3	7	11.2

* 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.

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, 2020

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.

Shigellosis

In 2020, 79 culture-confirmed cases of shigellosis (1.4 per 100,000 population) were reported. This represents a 52% decrease from the 165 cases reported in 2019, and is 44% less than the median annual number of cases reported during 2010-2019 (median, 140 per year; range, 66 to 556) (Figure 2). *S. sonnei* accounted for 38 (48%) cases, and *S. flexneri* for 38 (48%) cases. The species was not identified for 3 (4%) cases. Cases ranged in age from 1 to 89 years (median, 39 years). Eleven percent of cases were ≤5 years of age; 82% of cases were 18 years of age or older. Eighty-one percent of cases were male. Seventeen (22%) cases were hospitalized. No cases died.

Thirty-five percent of cases reported either non-white race (22 of 76 cases) or Hispanic ethnicity (8 of 76 cases). Of the 59 cases for which travel information was available, 12 (20%) travelled internationally (8 of 31 [26%] *S. sonnei*, and 4 of 26 [15%] *S. flexneri*). Seventy-one percent of cases resided in the metropolitan area, including 40% in Hennepin County and 13% in Ramsey County.

No outbreaks of shigellosis were identified.

In 2020, 133 patients were positive for *Shigella* by a culture-independent diagnostic test conducted in a clinical laboratory. Of the 127 specimens that were received at MDH, 70 (55%) were subsequently culture-confirmed and therefore met the surveillance case definition for inclusion in MDH case count totals.

In 2020, 25 of the 70 *Shigella* isolates received at MDH were tested for antimicrobial resistance. Of the 25 isolates, 76% (19 isolates) were resistant to ampicillin, 68% (17 isolates) were resistant to trimethoprim-sulfamethoxazole, and 44% (11 isolates) had decreased susceptibility to azithromycin (DSA). All 11 of the DSA isolates were collected from adult males. Among the 7 adult male cases with DSA infection and available information, 6 (86%) 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 MRSA was initiated in Ramsey County; surveillance was expanded to include Hennepin County in 2008. The incidence rate was 14.8 per 100,000 in 2020 compared to 13.5 per 100,000 population in 2019. In 2020, MRSA was most frequently isolated from blood (84%, 224/268), and 14% (37/268) of the cases died in the hospital. HACO-MRSA cases comprised the majority (64%, 171/268) of invasive MRSA infections in 2020; CA-MRSA cases accounted for 23% (62/268) and 13% (35/268) cases were HO-MRSA. The median age for all cases was 55 years (range, <1 to 94); the median age was 57 years (range, 1 to 94), 59 (range, 12 to 88), and 41 (range, 2 to 89) for HO-, HACO-, and CA-MRSA cases, respectively.

In August 2014, as part of the EIP Active Bacterial Core surveillance (ABCs) population-based surveillance of invasive MSSA was initiated in Hennepin and Ramsey Counties. The incidence rate was 30.6 per 100,000 in 2020 compared to 32.5 per 100,000 population in 2019. In 2020, MSSA was most frequently isolated from blood (83%, 459/554), and 13% (75/554) of the cases died in the hospital. HACO-MSSA cases comprised the majority (53%, 297/554) of invasive MSSA infections in 2020; CA-MSSA cases accounted for 35% (194/554) and 11% (63/554) cases were HO-MSSA. The median age for all cases was 59 years (range, <1 to 98); the median age was 60 (range, 3 to 95), 62 (range, 4 to 86), and 52 (range, 1 to 98) 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 (MN). There were no VISA cases reported in 2020. Between 2008 and 2020, the PHL has confirmed 19 VISA cases; 2008 (3), 2009 (3), 2010 (2), 2011 (5), 2013 (3), 2016 (2) and 2019 (1). Among all cases of VISA in Minnesota, 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). Two hundred seventy-one cases (4.8 cases per 100,000 population), including 20 deaths, were reported in 2020, compared to 326 cases and 21 deaths in 2019. The median age of cases was 52 years (range, newborn to 99 years). Fifty-two percent of cases were residents of the metropolitan area. Allowing for multiple presentations per patient, 122 (45%) had cellulitis, 62 (23%) bacteremia without another focus of infection, 36 (13%) abscess (not skin), 34 (13%) septic shock, 26 (10%) necrotizing fasciitis, 21 (8%) pneumonia, and 15 (6%) had septic arthritis and/or osteomyelitis. Twenty-five (8%) cases were injection drug users in 2019, including one death, compared to 48 cases (18%) in 2020. Thirteen (5%) cases were residents of long-term care facilities. Eleven facilities had a single case, one facility had 2 cases.

Allowing for multiple infection types per patient, the 20 deaths included 8 that presented with septic shock, 6 bacteremia without another focus of infection, 5 cellulitis, 4 pneumonia, and 3 with necrotizing fasciitis. Of the 20 deaths, the most frequently reported

underlying conditions were diabetes (13), chronic kidney disease (11), current tobacco smoker (5), dementia (5), atherosclerotic cardiovascular disease (4), obesity (4), chronic dialysis (4), and heart failure (3). Fifteen fatal cases had two or more underlying conditions, and 1 had none reported.

Streptococcal Invasive Disease – Group B

Five hundred forty-two cases of invasive group B Streptococcus (GBS) disease (9.6 per 100,000 population), including 30 deaths, were reported in 2020. By age group, annual incidence was highest among infants <1 year of age (49.3 per 100,000 population) and cases aged ≥70 years (33.5 per 100,000). Eighteen (60%) of the 30 deaths were among cases ≥65 years. Forty-seven percent of cases were residents of the metropolitan area. Bacteremia without a focus of infection occurred most frequently (29%), followed by cellulitis (21%), septic arthritis (8%), osteomyelitis (8%), septic shock (7%), pneumonia (7%), abscess (5%), and meningitis (1%). The majority (84%) of cases had GBS isolated from blood; other isolate sites included joint fluid (9%), peritoneal fluid (1%), cerebrospinal fluid (1%), and bone (1%).

Thirty-three cases were infants and 2 were maternal cases, compared to 42 cases in 2019. Twelve infants developed early-onset disease (occurred within 6 days of birth [0.2 cases per 1,000 live births]), and 21 infants developed late-onset disease (occurred at 7 to 89 days [0.3 cases per 1,000 live births]). No stillbirth/spontaneous abortion were associated with the 2 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 2020. Overall, 8 of 12 women who delivered GBS-positive infants underwent prenatal screening for GBS. Of these, 4 were positive and 4 were negative. One of the 4 women who did not receive prenatal screening was screened upon admission to the hospital and prior to delivery and was positive. Among the 12 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 2020, 292 (5.2 per 100,000) cases of invasive pneumococcal disease (IPD) were reported. By age group, annual incidence rates per 100,000 were 3.1 cases among children aged ≤5 years, 1.1 cases among children and adults aged 5-39 years, 8.1 cases among adults 40-64 years, and 12.0 cases among adults aged ≥65 years.

Pneumonia occurred most frequently (51% of infections), followed by bacteremia without another focus of infection (13%), septic shock (12%), and meningitis (7%). Thirty-three (11%) cases died. Health histories were available for 31 deaths; 28 had an underlying health condition. The conditions most frequently reported were current tobacco smoker (14), current alcohol abuse (11), diabetes (10), emphysema/chronic obstructive pulmonary disease (7), cirrhosis (7), solid organ malignancy (5), chronic kidney disease (5), and asthma (4).

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 5).

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 2020, 13% of cases with isolates available for testing were caused by 8 of the PCV-13-included serotypes: 3 (7%), 19F (2%), 19A (2%), 9V (<1%), 18C (<1%), 6B (<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, 5% of cases in 2020 had PCV-13 serotypes.

Tuberculosis

In 2020, 117 tuberculosis (TB) cases (2.1 per 100,000 population) were reported. This represents a 21% decrease in the number of cases compared to 2019, when there were 148 new cases. This significant drop in newly reported TB cases was in line with the 20% decrease seen nationally in 2020. Many factors are thought to have contributed to the decline in both Minnesota and the United States: a true decrease in TB incidence due to COVID mitigation strategies and changing immigration and travel patterns, combined with an increase in missed and delayed diagnoses of TB due to decreased health care utilization and focus on COVID-19 by providers and clinics during the pandemic. The TB incidence rate in Minnesota was slightly lower than the overall rate in the United States, which was 2.2 per 100,000 in 2020. Ten cases (9%) from 2020 have died as of March 2022, 6 (5%) due to TB disease.

Seventeen counties (20%) reported at least 1 case in 2020. The majority of cases (81%) occurred in the metropolitan area, primarily in Hennepin (38%) and Ramsey Counties (27%). Twenty cases (17%) were from the other five metropolitan counties, and the remaining 19% of cases were reported from greater Minnesota. Among metropolitan area counties, the highest TB incidence rate in 2020 was reported in Ramsey County (5.6 per 100,000), followed by Hennepin County (3.5 per 100,000). The combined TB incidence rate for the other metropolitan counties (excluding Hennepin and Ramsey Counties) was 1.5 per 100,000, and 0.9 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 (34%), followed by cases 65 years of age and older (25%). Three (3%) were <5 years of age when they were diagnosed.

Most TB cases (88%) were identified only after seeking medical care for symptoms of disease. Targeted public health interventions identified a portion of the remaining 12% of cases, including contact investigations surrounding

Figure 5. Invasive Pneumococcal Disease Incidence Among Children <5 Years of Age, by Year and Serotype Group, Metropolitan Area, 1999-2001; Minnesota, 2002-2020

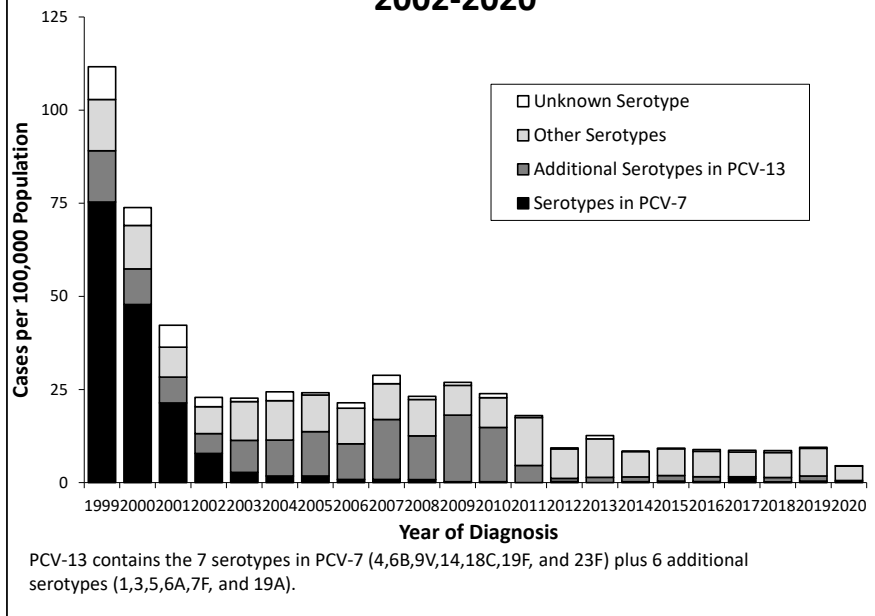
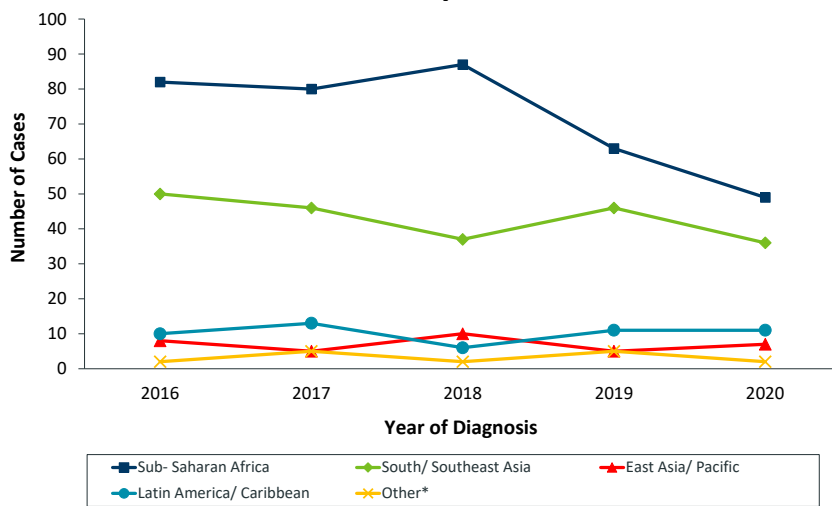


Figure 6. Non U.S.-Born Tuberculosis Cases by Region of Birth and Year of Report, 2016 – 2020



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

potentially infectious patients (5%). An additional 3% were identified through other targeted testing for TB. The remaining five 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 2020, 6 cases occurred among non-Hispanic whites, a case rate of 0.1 per 100,000. In contrast, among non-Hispanic persons of other races, 52 cases occurred among blacks/African-born persons (12.3 cases per 100,000), and 47 among Asians or Pacific Islanders (15.3 cases per 100,000). Twelve cases were Hispanic/Latino persons of any race (3.8 cases per 100,000). The majority of Hispanic/Latino (92%), Asian/Pacific Islander (91%), and black/African-born cases (94%) were non-U.S. born.

In 2020, the percentage of TB cases in Minnesota occurring in persons born outside the United States was 90%, compared to 72% of TB cases reported nationally. The 105 non U.S.-born TB cases represented 27 different countries of birth; the most common region of birth among these cases was Sub-Saharan Africa (47% of non-U.S. born cases), followed by South/Southeast Asia (34%), Latin America (including the Caribbean) (10%), and East Asia/Pacific (7%). Patients from other regions (North Africa/Middle East and Eastern Europe) accounted for the remaining 2% of cases (Figure 6).

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. Forty-eight percent occurred in persons with certain medical conditions (not including HIV/AIDS) that increase the risk for progression from latent TB infection to active TB disease (e.g., diabetes, active smoking, prolonged corticosteroid or other immunosuppressive therapy, end stage renal disease). Two percent of cases were co-infected with HIV. Substance use (including excess alcohol use and/or injection and non-injection drug use) during the 12 months prior to their TB diagnosis was reported by 3% of cases. One percent reported being homeless during the 12 months prior to diagnosis, and 1% were residents of long-term care facilities at time of diagnosis.

By site of disease, 44% of cases had pulmonary disease exclusively. Another 15% had both pulmonary and extrapulmonary sites of disease, and 40% had extrapulmonary disease exclusively. Among the 65 patients with an extrapulmonary site of disease, the most common sites were lymphatic (46%), followed by peritoneal (14%). Extrapulmonary disease is generally more common among persons born outside the United States, as seen in cases reported nationally as well as in Minnesota. Fifty-seven percent of non U.S.-born cases in Minnesota

had at least one extrapulmonary site of disease, compared to only 42% of U.S.-born cases.

Of 90 culture-confirmed TB cases with drug susceptibility results available, 12 (13%) were resistant to at least one first-line anti-TB drug (i.e., isoniazid [INH], rifampin, pyrazinamide, or ethambutol), including 10 cases (11%) resistant to at least INH. There were 3 new cases of multidrug-resistant TB (MDR-TB, or resistance to at least INH and rifampin) reported in 2020, making up 3% 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 2020, 3 cases were reported; 1 was culture-confirmed and 2 were probable cases. The confirmed case had glandular tularemia and was the isolate was determined to be Type B. The 2 probable cases were glandular and typhoidal, both diagnosed by serology, so the subtype is unknown. Case ages were 2, 2, and 42 years old; 2 were male. The probable typhoidal case was hospitalized for 7 days; all cases survived. One case likely was infected through tick bite on the scalp, one likely got the illness from his cat, and the last source is unknown.

From 2007 to 2020, 23 tularemia cases were reported, with a range of 0 to 6 cases annually. Twelve cases had ulceroglandular, 6 had glandular, 2 had pneumonic, and 3 had typhoidal tularemia. Ten of 15 cases with a known tularemia subtype had type B, and 5 had type A. The median age of cases was 41 years (range, 2 to 87). Twelve cases were most likely exposed through a tick or biting fly bite, 2 through water exposures, 3 through a cat scratch or bite, 2 were exposed by inhaling the bacteria, and 3 cases' exposures could not be determined. Sixteen of 19 cases for which race was known were white, 1 was black, and 1 was

American Indian/Alaska Native, and 1 was Asian/Pacific Islander.

Unexplained Critical Illnesses and Deaths of Possible Infectious Etiology and Medical Examiner Deaths Surveillance

MDH conducts surveillance for unexplained deaths and critical illnesses to identify those that may have an infectious etiology. Surveillance is performed through two complementary surveillance systems, Unexplained Critical Illnesses and Deaths of Possible Infectious Etiology (UNEX), and Medical Examiner (ME) Infectious Deaths Surveillance (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 2020, 131 cases met UNEX criteria (127 deaths, 4 critical illnesses), compared to 67 cases in 2019. Of the 131, 121 (92%) were reported by providers and 7 deaths were found by death certificate review. Eighty-four (64%) cases presented with respiratory symptoms; 25 (19%) with sudden unexpected death; 7 (5%) with neurologic symptoms; 7 (5%) with shock/sepsis; 5 (4%) with gastrointestinal symptoms; 2 (2%) with cardiac symptoms; and 1 (1%) with multiple symptoms.

The age of cases ranged from 25 days to 88 years, the median age was 46.5 years. Fifty-nine percent resided in the metropolitan area, 69% were male, and 9% were non-Minnesota residents who were either hospitalized in Minnesota or investigated by a Minnesota medical examiner.

There were 442 MED-X cases in 2020; 127 of these also met UNEX criteria. The median age of the cases was 52 years, and 64% were male. There were 203 (46%) cases found through death certificate review; MEs reported 239 (54%) cases. The most common syndrome was pneumonia/upper respiratory infection (n=239 [54%]).

There were 458 potential UNEX or MED-X cases that had specimens tested at the PHL and/or the IDPB. Two hundred thirty-nine cases were determined to be non-infectious. Seventy-four cases had pathogens identified as confirmed, probable, or possible cause of illness, including 73 UNEX deaths (Table 5). Among 39 unexplained deaths occurring in those <50 years of age without any immunocompromising conditions, UNEX helped to identify the pathogen(s) involved in 16 (41%) cases. MED-X surveillance detected an additional 132 cases with pathogens identified by MEs as the cause of death (Table 5). Cases with pathogens of public health importance detected included 132 deaths due to SARS-CoV-2 virus that occurred outside of traditional healthcare facilities such as hospitals or congregate care settings. The UNEX/MED-X program provided key testing resources for MEs when COVID-19 healthcare testing resources were scarce.

Due to the COVID-19 pandemic, the UNEX/MED-X team expanded surveillance testing to include swabs on suspect infectious deaths that did not have an autopsy performed. Nasal pharyngeal swabs were collected from decedents at funeral homes, decedents' homes, and long-term care facilities. A total of 173 specimens were submitted to MDH. Eighty-five decedents had known symptoms prior to death. Of those, 39 (46%) had potential pathogens detected including SARS-CoV-2 (n=38) and influenza A (n=1).

Table 5. UNEX/MED-X Pathogens Identified as Confirmed, Probable, or Possible Cause of Illness, 2020*

Pathogen Identified	UNEX (n=74)	MED-X (n=132)**
<i>Actinomyces</i> spp.	0	1
<i>Aspergillus</i> spp.	0	1
<i>Candida albicans</i>	0	1
<i>Clostridium difficile</i>	0	1
<i>Clostridium perfringens</i>	1	1
Coxsackievirus B4	0	0
<i>Cryptococcus</i> spp.	0	1
Cytomegalovirus	0	1
Enterovirus	1	0
<i>Enterococcus</i> spp.	1	1
<i>Escherichia coli</i>	0	8
Group A <i>Streptococcus</i> / <i>Streptococcus pyogenes</i>	0	2
Group B <i>Streptococcus</i>	1	4
<i>Haemophilus influenzae</i>	2	1
Influenza A virus (no hemagglutinin typing information available)	0	5
Influenza A – H1	2	0
Influenza B	1	0
<i>Klebsiella pneumoniae</i>	0	7
Parvovirus B-19	1	0
<i>Pneumocystis jirovecii</i>	1	1
Powassan virus	0	1
<i>Pseudomonas aeruginosa</i>	0	1
Rhinovirus	4	1
<i>Rhizomucor</i> spp.	0	1
<i>Salmonella enteritidis</i>	1	0
<i>Salmonella</i> spp.	1	0
SARS-CoV-2 virus	44	88
<i>Staphylococcus</i> spp.	0	1
<i>Staphylococcus aureus</i>	0	7
<i>Staphylococcus aureus</i> - MRSA	1	3
<i>Staphylococcus epidermiditis</i>	1	0
<i>Streptococcus</i> spp.	8	1
<i>Streptococcus agalactiae</i>	0	1
<i>Streptococcus anginosus</i>	0	1
<i>Streptococcus intermedius</i>	0	1
<i>Streptococcus pneumoniae</i>	5	3
<i>Toxoplasma gondii</i>	1	0
West Nile Virus	1	0

* 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 2020, 125 varicella cases (2.1 per 100,000 population) were reported. Eighty cases (64%) were from the metropolitan area. Cases ranged from 103 days to 72 years of age. Sixteen cases (13%) were < 1 year, 45 (36%) were 1-6 years, 25 (20%) were 7-12 years, 10 (8%) were 13-17 years, and 29 (23%) were ≥ 18 years of age. Four cases were hospitalized; 3 were 1-6 years, and 1 was >18 years. None of the hospitalized cases had been vaccinated; 2 had medical contraindications, 1 was an adult who had never been offered the vaccine, and 1 did not have this information available.

Varicella cases are often identified by parents/guardians reporting to schools and childcare facilities, rather than directly reported by a clinician. Of the 124 cases for which information regarding diagnosis was available, 82 (66%) had visited a health care provider, 20 (16%) had consulted a provider or clinic by telephone, 5 (4%) had been identified by a school health professional, and 17 (14%) had not consulted a health care provider. Of the 124 cases for which information regarding laboratory testing was available, 56 (45%) had appropriate testing performed (including PCR, DFA and culture).

One outbreak, defined as ≥5 cases in the same setting, was reported in 2020. This occurred in a private school and included 5 cases, all of which were unvaccinated. Three were not vaccinated due to parental refusal, 1 was underage for vaccination and 1 did not have vaccine status information available.

Zoster cases in children <18 years of age are reportable in Minnesota; 27 cases were reported in 2020. Cases may be reported by school health personnel, child care staff, or healthcare providers. Ages ranged from 1 to 17 years (median 8 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 2.1 per 100,000 population in 2020.

Zoster with dissemination or complications (other than post-herpetic neuralgia) in persons of any age is also reportable; 70 such cases were reported and 56 (80%) were hospitalized. Cases ranged from 17

to 92 years of age, with a median age of 68. Fifty-four (77%) had comorbidities or were being treated with immunosuppressive drugs. Thirty-three had disseminated rash or disease, 9 had meningitis, 20 had cellulitis or other bacterial superinfection, 12 had encephalitis, 8 had meningoencephalitis, 3 had Ramsay-Hunt Syndrome, 1 had pneumonia and 1 had myelitis. Cases with disseminated rash or disease tended to be older than cases with meningitis without dissemination (median age of 69 vs. 37 years) and were more likely to have immunocompromising conditions or immunosuppressive drug treatment (85% vs. 38%). Five deaths occurred; two had encephalitis, one had encephalitis and disseminated infection, one had pneumonia and disseminated infection, and one had meningoencephalitis and cellulitis or other bacterial superinfection. All deaths were in cases > 65 years. Thirty-three percent of cases ≥50 years of age had a record of receiving zoster vaccine.

Vibriosis

There were 14 culture-confirmed *Vibrio* spp. cases reported in 2020 (0.3 cases per 100,000 population). This is a 59% decrease from the 34 cases reported in 2019, and a 30% decrease from the median annual number of cases reported from 2009 to 2019 (median, 20 cases; range, 9 to 40). *V. parahaemolyticus* accounted for 6 (43%) cases, *V. alginolyticus* for 5 (36%), *V. cholerae* for 2 (14%), and *V. mimicus* for 1 (7%). Serotyping was performed on both *V. cholerae* specimens, and both were non-O1/non-O139.

Vibrio was isolated from stool in 8 (57%) cases, ear effusion in 5 (35%) cases, and a wound in 1 (7%) case. One (7%) case was hospitalized for 2 days, and no cases died.

Travel history was available for 6 cases. Two traveled out of Minnesota in the week before their symptom onset, and both traveled internationally. One went to Belize and the other to Vietnam.

Of the 3 cases with *Vibrio* isolated from stool who were able to be interviewed about exposure to seafood in the week before illness onset, 2 reported consuming raw oysters. The other did not recall consuming any seafood in the week before their symptom onset.

In 2020, 32 patients were positive by culture-independent diagnostic tests (CIDTs) conducted at a clinical laboratory. Twenty-four (75%) of the specimens received at MDH tested negative by culture and therefore were classified as probable cases.

Two (17%) of the 12 probable cases who were interviewed traveled internationally. Among the 12 probable cases interviewed about food exposures, 2 (17%) reported eating raw oysters, and 5 (42%) reported eating another type of cooked seafood in the week prior to illness onset.

There were no outbreaks of *Vibrio* spp. infections identified in 2020.

Viral Hepatitis A

In 2020, 70 cases of hepatitis A (1.2 per 100,000 population) were reported. Thirty-eight cases were residents of the metropolitan area. Forty-two cases were male. The median age was 36 years (range 2 to 64). Race was known for 68 cases; 45 (64%) were white, 16 (23%) were American Indian/Alaskan Native, 3 (4%) were black, and 4 (6%) were reported as other race. Six (9%) 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 37 states reporting outbreaks. An outbreak was declared in Minnesota in August 2019, and 60 cases are considered outbreak-associated. Thirty-eight cases had risk factors that have been seen elsewhere, including injection and non-injection drug use, homelessness/transient housing, and recent incarceration. Three cases did not report risk factors, but were epidemiologically linked to other cases in the outbreak. An additional 2 cases did not report risk factors, but traveled to states with ongoing outbreaks. The remaining 17 cases either were unable to be reached for interview or did not report any risk factors for hepatitis A. No outbreak-associated cases reported travelling internationally during their exposure period.

Of the cases not associated with the ongoing outbreak, 1 case was associated with international travel and 2 cases are presumed to be a result of foodborne exposure. No risk factor was identified for the 7 remaining cases.

Viral Hepatitis B

In 2020, 7 cases of acute hepatitis B virus (HBV) infection (0.1 per 100,000 population) were reported. In 2012, the case definition for acute hepatitis B was revised to include laboratory confirmed asymptomatic acute cases. Two of the 7 cases were asymptomatic, laboratory-confirmed infections.

The median age was 46 years (range 19 to 62). Four cases were residents of the metropolitan area. Five cases were male. Race was known for 6 cases: 3 were white, 1 was Asian, 1 was American Indian/Alaskan Native, and 1 was black. No cases were of Hispanic ethnicity.

MDH received 187 reports of newly identified chronic hepatitis B infections in 2020. A total of 26,770 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 2020, no perinatal hepatitis B infections were identified in infants born to hepatitis B-positive mothers. Three hundred forty-nine infants born to hepatitis B-positive women during 2019 had post-serologic testing demonstrating no infection.

Viral Hepatitis C

In 2020, 61 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 61 cases, 22 (36%) were asymptomatic, laboratory-confirmed acute infection.

Fifty-five (90%) were residents of the metropolitan area. The median age was 30 years (range, 19 to 78). Forty (66%) cases were male. Race was known for all cases: 25 (41%) were white, 18 (30%) were American Indian/Alaskan Native, 14 (23%) was black, 2 (3%) were Asian, 1 (2%) was reported as multi-racial, and 1 (2%) was reported as other race. Two (3%) cases were known to be of Hispanic ethnicity.

MDH received 1,036 reports of newly identified chronic hepatitis C infections in 2020. In 2016, the case definition for chronic hepatitis C changed to exclude those reported as having resolved their infection. A total of 32,667 persons are estimated to be alive and living in Minnesota with chronic HCV infection. The median age of these cases is 59 years.

In 2018, perinatal hepatitis C was added as a nationally notifiable condition. In 2020, 5 cases of perinatal hepatitis C were reported. Race was known for all cases: all were white. One case was known to be of Hispanic ethnicity.



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