MINNESOTA DEPARTMENT OF HEALTH

DISEASE CONTROL NEWSLETTER

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Annual Summary of Communicable Diseases Reported to the Minnesota Department of Health, 2014

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 certain 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 (page 2) must be reported to MDH. As stated in the rules, physicians, health care facilities, laboratories, veterinarians, and others are required to report these diseases. Reporting sources may designate an individual within an institution to perform routine reporting duties (e.g., an infection preventionist for a hospital). Data maintained by MDH are private and protected under the Minnesota Government Data Practices Act (Section 13.38). Provisions of the Health Insurance Portability and Accountability Act (HIPAA) allow for routine disease reporting without patient authorization.

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

Isolates of pathogens from certain diseases are required to be submitted to MDH (Table 1). The MDH Public Health Laboratory (PHL) performs microbiologic evaluation of isolates, such as pulsed-field gel electrophoresis (PFGE), to determine whether isolates (e.g., enteric pathogens such as *Salmonella* and *Escherichia coli* O157:H7, and invasive pathogens such as *Neisseria meningitidis*) are related, and potentially associated with a common source. Testing of submitted isolates also allows detection and monitoring of antimicrobial resistance, which continues to be an important problem (see pp. 28-29).

Table 2 summarizes cases of selected communicable diseases reported during 2014 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.

Anaplasmosis

Anaplasmosis, caused by *Anaplasma phagocytophilum*, is a rickettsial disease transmitted to humans by bites from *Ixodes scapularis* (the blacklegged tick or deer tick). Although anaplasmosis was initially referred to as human granulocytic ehrlichiosis, anaplasmosis and ehrlichiosis (due to *Ehrlichia chaffeensis*) are distinct diseases caused by different rickettsial species, and only anaplasmosis is endemic in Minnesota. In Minnesota, the same tick vector also transmits the etiologic agents of Lyme disease, babesiosis, ehrlichiosis (due to *Ehrlichia muris*-like), and a strain of Powassan virus. *A. phagocytophilum* can also be transmitted by blood transfusion.

In 2014, 448 confirmed or probable cases of anaplasmosis (8.3 cases per 100,000 population) were reported (Figure 1), down from the 627 cases reported in 2013. Despite occasional decreases in reported cases, the overall trend is an increase in yearly case totals. Two hundred ninety-two (65%) cases reported in 2014 were male. The median age of cases was 59 years (range, 3 to 87 years), 20 years older

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Table 1. Diseases Reportable to the Minnesota Department of Health

Report Immediately by Telephone

Anthrax (*Bacillus anthracis*) a
Botulism (*Clostridium botulinum*)
Brucellosis (*Brucella* spp.) a
Cholera (*Vibrio cholerae*) a
Diphtheria (*Corynebacterium diphtheriae*) a
Hemolytic uremic syndrome a
Measles (rubeola) a
Meningococcal disease (*Neisseria meningitidis*) (all invasive disease) a, b
Orthopox virus a
Plague (*Yersinia pestis*) a
Poliomyelitis a
Q fever (*Coxiella burnetii*) a
Rabies (animal and human cases and suspected cases)
Rubella and congenital rubella syndrome a
Severe Acute Respiratory Syndrome (SARS) (1. Suspect and probable cases of SARS. 2. Cases of health care workers hospitalized for pneumonia or acute respiratory distress syndrome.) a
Smallpox (variola) a
Tularemia (*Francisella tularensis*) a
Unusual or increased case incidence of any suspect infectious illness a

Report Within One Working Day

Amebiasis (*Entamoeba histolytica/dispar*)
Anaplasmosis (*Anaplasma phagocytophilum*)
Arboviral disease (including but not limited to, La Crosse encephalitis, eastern equine encephalitis, western equine encephalitis, St. Louis encephalitis, and West Nile virus)
Babesiosis (*Babesia* spp.)
Blastomycosis (*Blastomyces dermatitidis*)
Campylobacteriosis (*Campylobacter* spp.) a
Cat scratch disease (infection caused by *Bartonella* spp.)
Chancroid (*Haemophilus ducreyi*) c
Chlamydia trachomatis infection c
Coccidioidomycosis
Cryptosporidiosis (*Cryptosporidium* spp.) a
Cyclosporiasis (*Cyclospora* spp.) a
Dengue virus infection
Diphyllobothrium latum infection
Ehrlichiosis (*Ehrlichia* spp.)
Encephalitis (caused by viral agents)
Enteric *E. coli* infection (*E. coli* O157:H7, other enterohemorrhagic [Shiga toxin-producing] *E. coli*, enteropathogenic *E. coli*, enteroinvasive *E. coli*, enterotoxigenic *E. coli*) a
Enterobacter sakazakii (infants under 1 year of age) a
Giardiasis (*Giardia lamblia*)
Gonorrhea (*Neisseria gonorrhoeae*) c
Haemophilus influenzae disease (all invasive disease) a,b
Hantavirus infection
Hepatitis (all primary viral types including A, B, C, D, and E)
Histoplasmosis (*Histoplasma capsulatum*)
Human immunodeficiency virus (HIV) infection, including Acquired Immunodeficiency Syndrome (AIDS) a, d
Influenza (unusual case incidence, critical illness, or laboratory confirmed cases) a
Kawasaki disease
Kingella spp. (invasive only) a, b
Legionellosis (*Legionella* spp.) a
Leprosy (Hansen's disease) (*Mycobacterium leprae*)
Leptospirosis (*Leptospira interrogans*)
Listeriosis (*Listeria monocytogenes*) a
Lyme disease (*Borrelia burgdorferi*)
Malaria (*Plasmodium* spp.)
Meningitis (caused by viral agents)
Mumps
Neonatal sepsis, less than 7 days after birth (bacteria isolated from a sterile site, excluding coagulase-negative *Staphylococcus*) a, b
Pertussis (*Bordetella pertussis*) a
Psittacosis (*Chlamydophila psittaci*)
Retrovirus infection
Reye syndrome
Rheumatic fever (cases meeting the Jones Criteria only)
Rocky Mountain spotted fever (*Rickettsia rickettsii*, *R. canada*)
Salmonellosis, including typhoid (*Salmonella* spp.) a
Shigellosis (*Shigella* spp.) a
Staphylococcus aureus (vancomycin-intermediate *S. aureus* [VISA], vancomycin-resistant *S. aureus* [VRSA], and death or critical illness due to community-associated *S. aureus* in a previously healthy individual) a
Streptococcal disease (all invasive disease caused by Groups A and B streptococci and *S. pneumoniae*) a, b
Syphilis (*Treponema pallidum*) c
Tetanus (*Clostridium tetani*)
Toxic shock syndrome a
Toxoplasmosis (*Toxoplasma gondii*)
Transmissible spongiform encephalopathy
Trichinosis (*Trichinella spiralis*)
Tuberculosis (*Mycobacterium tuberculosis* complex) (Pulmonary or extrapulmonary sites of disease, including laboratory confirmed or clinically diagnosed disease, are reportable. Latent tuberculosis infection is not reportable.) a
Typhus (*Rickettsia* spp.)
Unexplained deaths and unexplained critical illness (possibly due to infectious cause) a
Varicella disease
Vibrio spp. a
Yellow fever
Yersiniosis, enteric (*Yersinia* spp.) a
Zoster (all cases <18 years old; other unusual case incidence or complications regardless of age)

Sentinel Surveillance (at sites designated by the Commissioner of Health)

Methicillin-resistant *Staphylococcus aureus* a, b
Clostridium difficile a
Carbapenem-resistant Enterobacteriaceae spp. and carbapenem-resistant *Acinetobacter* spp. a

a Submission of clinical materials required. If a rapid, non-culture assay is used for diagnosis, we request that positives be cultured, and isolates submitted. If this is not possible, send specimens, nucleic acid, enrichment broth, or other appropriate material. Call the MDH Public Health Laboratory at 651-201-4953 for instructions.

b Isolates are considered to be from invasive disease if they are isolated from a normally sterile site, e.g., blood, CSF, joint fluid, etc.

c Report on separate Sexually Transmitted Disease Report Card.

d Report on separate HIV Report Card.

Table 2. Cases of Selected Communicable Diseases Reported to the Minnesota Department of Health by District of Residence, 2014

Disease	Metropolitan (2,919,177)	Northwestern (157,393)	Northeastern (326,026)	Central (732,492)	West Central (235,563)	South Central (290,521)	Southeastern (498,011)	Southwestern (212,847)	Unknown Residence	Total (5,372,030)
	District (population per U.S. Census 2013 estimates)									
Anaplasmosis	103	76	73	111	46	6	31	2	0	448
Arboviral disease										
La Crosse	2	0	0	1	0	0	1	0	0	4
West Nile	8	0	0	3	5	1	0	4	0	21
Jamestown Canyon	1	0	1	0	0	1	1	0	0	4
Babesiosis	15	12	4	10	7	0	1	0	0	49
Blastomycosis	8	2	12	5	1	0	4	0	0	32
Campylobacteriosis	397	8	43	107	59	26	115	79	0	834
Cryptosporidiosis	70	17	37	46	60	23	56	28	0	337
Escherichia coli O157 infection	28	4	28	21	6	8	26	7	0	128
Hemolytic uremic syndrome	2	0	0	0	3	1	3	1	0	10
Shiga-toxin producing non-O157 *E. coli*	82	2	6	24	3	11	12	10	0	150
Giardiasis	408	17	42	84	14	16	50	25	0	656
Haemophilus influenzae disease	48	9	16	21	5	6	13	5	0	123
HIV (non-AIDS)	203	0	3	11	0	6	9	3	0	235
AIDS (diagnosed in 2014)	122	2	9	3	3	4	14	3	0	160
Legionellosis	33	1	8	6	1	0	8	1	0	58
Listeriosis	8	1	2	4	0	0	2	0	0	17
Lyme disease	395	58	129	180	51	9	72	2	0	896
Measles (rubeola)	2	0	0	0	0	0	0	0	0	2
Meningococcal disease	4	0	0	2	0	0	0	0	0	6
Mumps	19	1	0	2	0	0	0	0	0	22
Pertussis	463	13	22	160	62	43	176	11	0	950
Q Fever (acute)	1	0	0	0	1	0	0	0	0	2
Salmonellosis	420	16	25	102	31	27	60	41	0	722
Sexually transmitted diseases										
Chlamydia trachomatis - genital infections	12,501	400	1,001	1,874	450	753	1,524	406	988	19,897
Gonorrhea	3,233	49	164	206	81	50	96	43	151	4,073
Syphilis, total	574	2	7	14	7	8	16	1	0	629
Primary/secondary	238	2	3	7	1	3	3	0	0	257
Early latent*	152	0	1	2	2	1	1	0	0	159
Late latent**	184	0	3	5	4	4	12	1	0	213
Congenital	0	0	0	0	0	0	0	0	0	0
Shigellosis	71	1	0	3	6	3	4	5	0	93
Streptococcal invasive disease - Group A	152	6	17	36	8	11	22	7	0	259
Streptococcal invasive disease - Group B	306	11	58	68	19	27	43	16	0	548
Streptococcus pneumoniae disease	198	17	50	94	15	28	50	24	0	476
Toxic shock syndrome (Staphylococcal)	10	0	0	2	0	1	0	0	0	13
Tuberculosis	101	3	1	9	2	5	21	5	0	147
Viral hepatitis, type A	6	0	0	8	1	1	3	0	0	19
Viral hepatitis, type B (acute infections only, not perinatal)	13	0	1	2	0	0	0	0	0	16
Viral hepatitis, type C (acute infections only)	18	0	13	3	0	2	2	2	0	40

* Duration ≤1 year

** Duration >1 year

County Distribution within Districts

Metropolitan - Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, Washington

Northwestern - Beltrami, Clearwater, Hubbard, Kittson, Lake of the Woods, Marshall, Pennington, Polk, Red Lake, Roseau

Northeastern - Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, St. Louis

Central - Benton, Cass, Chisago, Crow Wing, Isanti, Kanabec, Mille Lacs, Morrison, Pine, Sherburne, Stearns, Todd, Wadena, Wright

West Central - Becker, Clay, Douglas, Grant, Mahnomen, Norman, Otter Tail, Pope, Stevens, Traverse, Wilkin

South Central - Blue Earth, Brown, Faribault, Le Sueur, 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

than the median age of Lyme disease cases. As is typical, most cases had illness onsets during the summer months, with 58% reporting illness onsets in June and July. In 2014, 124 (28%) cases were hospitalized at some point for their infection, with a median duration of 4 days (range, 2 to 17 days).

Arboviral Diseases

Mosquito-borne Arboviruses

Historically, the primary arboviral encephalitides found in Minnesota have been La Crosse encephalitis, Western equine encephalitis (WEE), and more recently, West Nile virus (WNV). Both WNV and WEE are maintained in mosquito-to-bird transmission cycles involving several different species of each, and regional variation in vectors and reservoirs is likely. WNV is established throughout Minnesota, and will probably be present to some extent every year, whereas human infections of WEE occur more sporadically. Human disease risk will likely continue to be higher in central and western Minnesota where the primary mosquito vector, *Culex tarsalis*, is most abundant. Interpreting the effect of weather on arboviral transmission is complex, making it extremely difficult to predict the number of people who will become infected in any given year.

In Minnesota, 21 cases of WNV disease were reported in 2014. There were no deaths, but 6 (29%) had neuroinvasive presentations including encephalitis or meningitis. The other 15 (71%) cases had West Nile (WN) fever. Seventy-one percent (15) of the cases in 2014 were male, and the median age was 48 years (range, 9 to 73 years). Seven (33%) cases were hospitalized. The majority (86%) reported symptom onset in July, August, or September, although onsets ranged from June 1 to October 8. Similar to past years, most cases occurred among residents of western and central Minnesota (Table 2). Five asymptomatic WNV-positive blood donors were also identified in 2014.

In 2014, 4 cases of La Crosse encephalitis were reported. Cases ranged in age from 6 to 11 years, and all exhibited neuroinvasive symptoms like encephalitis. The disease, which primarily affects children, is transmitted through the bite of infected *Aedes triseriatus* (Eastern Tree Hole) mosquitoes, and is maintained in a cycle that includes mosquitoes and small mammals. Exposure to infected mosquitoes typically occurs in wooded or shaded areas inhabited by this mosquito species, especially in areas where water-holding containers (e.g., waste tires, buckets, or cans) that provide mosquito breeding habitats are abundant. Since 1985, 139 cases have been reported from 22 Minnesota counties, primarily in the southeastern part of the state. Many people who are infected with La Crosse encephalitis have no apparent symptoms, but severe disease can occur in children. The median case age for La Crosse encephalitis patients is 6 years (range, <1 to 49). Disease onsets have been reported from June through September, but most onsets have occurred from mid-July through mid-September. A 2012 Stearns County case represented the farthest north and west that La Crosse encephalitis has been reported to date in the United States.

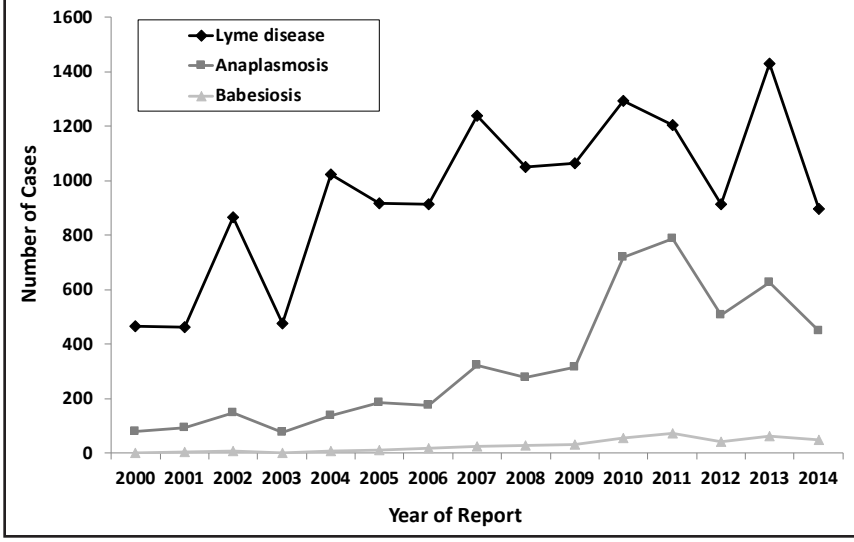
Four cases of Jamestown Canyon virus were reported in 2014, a California group virus related to La Crosse. The virus is transmitted by *Aedes* genus mosquitoes, and the maintenance cycle in nature is thought to include deer and other large mammals. Much remains unknown about the clinical spectrum of Jamestown Canyon virus, but the typical presentation includes fever, and in more severe cases, meningitis or encephalitis. The virus is likely widespread in Minnesota. Patients were aged 11 to 62 years, and disease presentations ranged from fever to more severe illness, including acute flaccid paralysis and encephalitis.

Tick-borne Arbovirus

Powassan virus (POW) is a tick-borne flavivirus that includes a strain (lineage II or "deer tick virus") that is transmitted by *I. scapularis*. The virus can cause encephalitis or meningitis, and long-term sequelae occur in approximately half of those patients. Approximately 10-15% of cases are fatal. Since 2008, 22 cases (1 fatal) of POW disease have been reported in Minnesota residents. Most of these patients had neuroinvasive disease (12 encephalitis and 8 meningitis) but 2 were non-neuroinvasive POW fever cases. Seventeen (77%) cases have been male, and the median age is 52 years (range, 3 mos. to 75 years). Seven patients (32%) were immunocompromised. Similar to other tick-borne diseases, the majority of patients (18, 82%) reported illness onsets between May and August. Four cases (18%) had onset dates in October or November. With the exception of 2014, cases have been reported every year since 2008, with a peak of 11 in 2011 (range, 1 to 11). Cases were exposed to ticks in several north-central Minnesota counties. MDH has also identified POW virus-positive ticks at sites in the six counties that have been investigated to date (Clearwater, Cass, Pine, Anoka, Morrison, and Houston). Thus, the virus appears to be widely distributed in the same wooded parts of the state that are endemic to other pathogens transmitted by *I. scapularis.*

POW virus testing is not widely available; however, the PHL will test cerebrospinal fluid and serum specimens from suspect cases (i.e., patients with viral encephalitis or meningitis of unknown etiology).

Figure 1. Reported *I. scapularis*-borne Disease Cases in Minnesota, 2000-2014



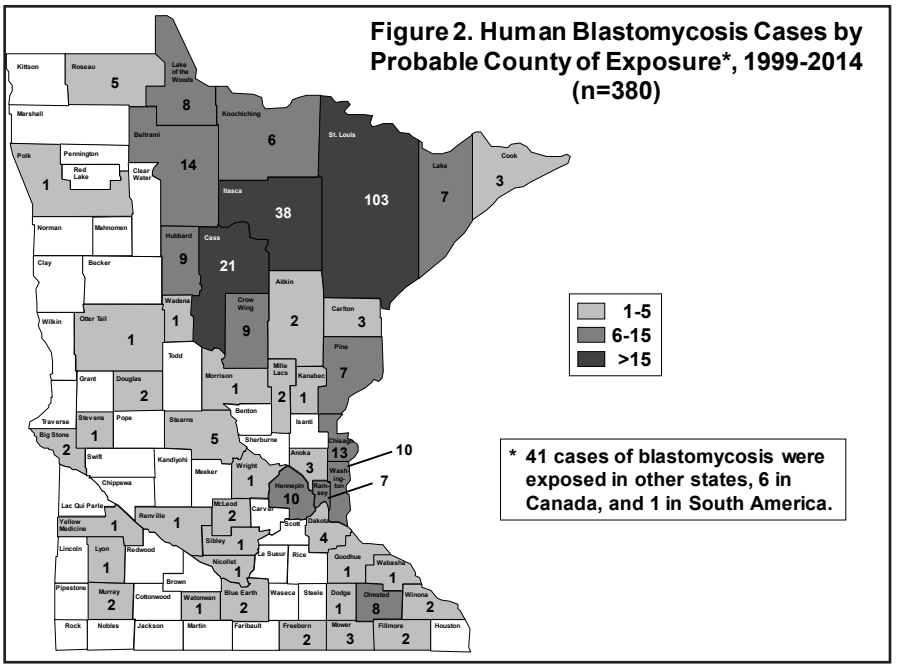
Babesiosis
Babesiosis is a malaria-like illness caused by a protozoan, typically *Babesia microti*, which infects red blood cells. *B. microti* is transmitted to humans by bites from *I. scapularis* (the blacklegged tick or deer tick), the same vector that transmits the agents of Lyme disease, anaplasmosis, one form of human ehrlichiosis, and a strain of Powassan virus. *Babesia* parasites can also be transmitted by blood transfusion. *Babesia* infections can range in severity, and while most people have asymptomatic infections, people with weak immune systems, underlying health conditions, and the elderly may become seriously ill.

In 2014, 49 confirmed and probable babesiosis cases (0.9 per 100,000 population) were reported (Figure 1), down from the 69 reported cases in 2013. Despite this decrease, yearly case totals since 2005 (range, 10 to 72) have been consistently higher than reported totals from 1996 to 2004 (range, 0 to 9). In 2014, 34 (69%) cases occurred in males. The median case age was 68 years (range, 12 to 91 years), up from 66 in 2013, and older than the median ages for both anaplasmosis (59 years) and Lyme disease (39 years). Onsets of illness peaked in the summer months; 29 (60%) of 48 patients with known onset reported first experiencing symptoms in June, July, or August. Twenty-seven (55%) cases were hospitalized for their infection in 2014 for a median duration of 5 days (range, 3 to 15 days). Although severe complications like organ failure were reported in 7 cases, there were no deaths attributable to babesiosis in 2014.

Blastomycosis
Blastomycosis is a disease caused by the dimorphic fungus *Blastomyces dermatitidis*, which exists as a mold in the environment and as a pathogenic yeast form in the body. The reservoir for *B. dermatitidis* is moist soil enriched with decomposing organic debris. The fungus is endemic in Ontario, Manitoba, and the south-central, south-eastern, and mid-western United States. Transmission occurs by inhalation of spores after disturbance of contaminated soil.

In 2014, 32 blastomycosis cases were reported, similar to the 34 cases reported in 2013. The median age of 2014 cases was 42 years (range, 13 to 78 years); 22 cases (69%) were male. Twenty-one (66%) cases were white, 2 (6%) were black, 2 (6%) were American Indian, 1 (3%) was of another race, and 6 (19%) were of unknown race. Twenty-four (75%) cases were hospitalized for a median of 7 days (range, 1 to 24 days); 1 (3%) case died as a result of their infection. Twenty-four (75%) cases had pulmonary infections, 1 (3%) case had an extrapulmonary infection, and 7 (22%) cases had disseminated infections.

Figure 2. Human Blastomycosis Cases by Probable County of Exposure*, 1999-2014 (n=380)



From 1999 to 2014, 511 blastomycosis cases were reported in Minnesota; the median number of cases annually was 33 (range, 22 to 49). During this time, 103 (27%) of the 380 cases for whom exposure information was available, were likely exposed in St. Louis County, 38 (10%) likely exposed in Itasca County, 21 (6%) cases in Cass County, 14 (4%) cases in Beltrami County, 13 (3%) cases in Chisago County, and 10 (3%) cases in Washington County; these counties are known to be endemic for blastomycosis in Minnesota (Figure 2).

Botulism
Botulinum toxin is one of the most lethal poisons known. This neurotoxin is produced by the bacteria *Clostridium botulinum* and other related Clostridial species; there are eight distinct toxin types: A, B, C, D, E, F, G, and newly recognized type 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. Botulinum spores are ubiquitous in the environment and cause three main forms of human botulism intoxication: foodborne, wound, and intestinal-toxemia form, which includes infant botulism and adult intestinal toxemia. Infant botulism, which is the most common form of botulism in the United States, results from the ingestion of botulism spores that germinate and colonize the intestinal tract producing toxin that is absorbed into the blood stream.

In 2014, 1 case of infant botulism was reported, and no foodborne or wound botulism cases were reported. The infant was an 8 week-old who presented to the hospital with symptoms including weakened cry, inability to feed, constipation, and ptosis. The infant tested positive for *C. botulinum* toxin type B; she received botulism immune globulin (BabyBIG) and made a full recovery. The infant was hospitalized for a total of 24 days.

From 2001-2014, 10 cases of infant botulism and 2 cases of foodborne botulism were reported in Minnesota. The median age of infants was 18 weeks (range 5 to 24 weeks). Seven infants' illnesses were caused by botulism toxin type B and 3 were caused by toxin type A. Eight of the 8 infants with known hospitalization status were hospitalized, for a median of 16.5 days (range 9 to 30 days). The 2 foodborne botulism cases occurred in 2009 in two men consuming home-canned asparagus. The men were both hospitalized for 6 and 16 days. Their foodborne botulism was caused by toxin type A. There were no deaths among the infant or foodborne botulism cases.

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Campylobacteriosis
Campylobacter continues to be the most commonly reported bacterial enteric pathogen in Minnesota. There were 834 culture-confirmed *Campylobacter* cases reported in 2014 (15.4 per 100,000 population). This is an 8% decrease from the 909 cases reported in 2013, and lower than any annual case total reported from 2004 to 2013 (median, 904 cases; range, 843 to 1,009). In 2014, 52% of cases occurred in people who resided outside of the metropolitan area. Of the 789 *Campylobacter* isolates confirmed and identified to species by MDH, 89% were *C. jejuni* and 8% were *C. coli*.

The median age of cases was 34 years (range, 0 days to 95 years). Forty-four percent were between 20 and 49 years of age, and 10% were ≤5 years of age. Fifty-seven percent were male. Fifteen percent of cases were hospitalized; the median length of hospitalization was 4 days. Forty-five percent occurred during June through September. Of the 732 cases for whom data were available, 155 (21%) reported travel outside the United States during the week prior to illness onset. The most common destinations were Europe (n=42), Mexico (n=34), Central or South America or the Caribbean (n=28), and Asia (n=26).

There were two confirmed outbreaks of campylobacteriosis identified in 2014. In May, an outbreak of *C. jejuni* infections was associated with raw milk from a dairy in St. Louis County; 3 culture-confirmed cases were identified. In September, an outbreak of *C. jejuni* infections was associated with a restaurant in Hennepin County; 2 culture-confirmed cases were identified. Chicken or chicken livers were suspected to be the vehicle of transmission.

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 2014, the overall proportion of quinolone resistance among *Campylobacter* isolates tested was 25%. However, 76% 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. Thirteen percent of *Campylobacter* isolates from patients who acquired the infection domestically were resistant to fluoroquinolones.

In June 2009, a culture-independent diagnostic test (CIDT) became commercially available for the qualitative detection of *Campylobacter* antigens in stool. In 2014, 395 patients were positive for *Campylobacter* by a CIDT conducted in a clinical laboratory. However, only 150 (38%) of the specimens were subsequently culture-confirmed, and therefore met the surveillance case definition for inclusion in MDH case count totals.

Chikungunya Disease
Chikungunya virus is a mosquito-borne alphavirus found in Africa, Asia, and more recently, Europe. In late 2013, locally acquired cases appeared for the first time in the Americas, on the Caribbean island of St. Martin; over 1 million suspected cases were recorded from the Caribbean by 2015. The virus is transmitted by the same *Aedes* spp. mosquitoes (*Ae. aegypti* and *Ae. albopictus*) that also transmit dengue virus, and the two often occur in concurrent outbreaks.

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

In 2014, 28 cases of chikungunya were reported in Minnesota residents. The median case age was 38 years (range, 11 to 71 years). Twenty-three cases (82%) resided in the metropolitan area, and symptom onsets occurred from early March through November. All of the cases represented imported infections acquired abroad, and all had travelled to either the Caribbean (25) or South America (3).

Nationwide, chikungunya cases were reported from 47 states and the District of Columbia. Although the majority of cases were acquired while traveling abroad, 11 locally transmitted cases were reported in Florida.

Clostridium difficile
Clostridium 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 CDI in healthcare settings is recent use of antimicrobials, particularly clindamycin, cephalosporins, and fluoroquinolones. Other risk factors for CDI are age greater than 65 years, severe underlying illness, intensive care unit admission, nasogastric intubation, and longer duration of hospital stay.

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

In 2009, in an effort to better understand the burden 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 (community-associated) have also been receiving increased attention. Community-associated (CA) CDI data from 2009 - 2011 across 10 EIP sites showed that 36% of CA CDI patients did not receive prior antibiotics and 82% had some outpatient healthcare exposure. Patients with CA CDI commonly have outpatient healthcare exposures and reduction of antibiotic use alone may not prevent over 1/3 of CDI in the community.

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 greater than 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 the initial specimen are classified as CO-HCFA, whereas CO cases without documented overnight stay in a healthcare facility in the 12 weeks prior the initial specimen

result are classified as CA. A more detailed set of case definitions is available upon request.

In 2014, 718 incident cases of CDI were reported in the five sentinel counties (183 per 100,000 population). Fifty-five percent of these cases were classified as CA, 25% as CO-HCFA, and 20% as HCFO. The median ages for CA, CO-HCFA, and HCFO cases were 54 years, 59 years, and 71 years, respectively. Fifty-eight percent of CA cases were prescribed antibiotics in the 12 weeks prior to stool specimen collection compared to 84% of HCFO cases and 86% of CO-HCFA cases. Of the 396 putative CA cases eligible for interview, 280 were interviewed and confirmed as CA cases. Forty-nine 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 (31%); skin infections (14%); dental procedures (13%); and urinary tract infections (12%).

Carbapenem-resistant *Enterobacteriaceae* (CRE)

Enterobacteriaceae are a large family of Gram-negative bacilli that cause community- and healthcare-associated infections (HAI). Carbapenem-resistant Enterobacteriaceae (CRE) infections 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 are associated with higher morbidity and mortality than those caused by carbapenem-susceptible Enterobacteriaceae.

Carbapenem resistance can be acquired through a variety of mechanisms. Some CRE carry resistance genes that produce enzymes known as carbapenemases. Certain carbapenemases (e.g., *Klebsiella pneumoniae* carbapenemase [KPC]), are encoded by transmissible genetic elements that can easily spread between bacteria of similar species. KPC is the predominant carbapenemase in the United States. Other carbapenemases have also been identified (e.g., New Delhi metallo-β-lactamase [NDM], Verona integron-encoded metallo-β-lactamase [VIM], IMP metallo-β-lactamase, and oxacillinase [OXA-48]) though they are more frequently identified in other countries. Carbapenem 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.

In recent years, CRE have been increasingly recognized as an important cause of HAI. CRE are often resistant to most available antibiotics, leaving clinicians with few treatment options.

MDH first identified a KPC-producing CRE in February 2009, and at that time began voluntary reporting of CRE, including isolate submission. In 2012, we adopted a standardized CRE definition developed by the EIP Multi-site Gram-negative Surveillance Initiative (MuGSI), and initiated active laboratory- and population-based surveillance in Hennepin and Ramsey Counties. This surveillance includes all isolates of *Escherichia coli*, *Enterobacter* spp., or *Klebsiella* spp. from normally sterile sites or urine that are non-susceptible to imipenem, meropenem, or doripenem and resistant to all tested third-generation cephalosporins using current Clinical and Laboratory Standards Institute (CLSI) breakpoints. An incident case is defined as the first eligible isolate of each species collected from a Hennepin or Ramsey County resident in 30 days. For statewide surveillance, the MuGSI definition is expanded to include isolates of any Enterobacteriaceae species from all body sites, including all isolates that are positive for carbapenemase production. The PHL tests all submitted isolates by PCR for KPC and NDM genes, and selected isolates for OXA-48.

During 2014, 141 incident CRE cases were reported in 140 patients. Of 134 isolates submitted (representing 133 patients), 21 (16%) isolates (representing 20 patients) were KPC positive (*K. pneumoniae* [8], *E. cloacae* [10], *K. oxytoca* [2], and *C. freundii* [1]); 1 patient had KPC-positive *E. cloacae* and *K. oxytoca* detected from different body sites during a single hospital stay. Of note, 2 (10%) patients were positive for the same organism in the year prior to the date of initial culture and 3 (15%) patients were positive >1 year prior. None of the tested isolates was NDM positive. Of the 20 patients with KPC-positive isolates, the median age was 62 years (range, 24 to 80); 17 (85%) were male and 12 (60%) were residents of Hennepin or Ramsey County. Fourteen (70%) patients were white, 3 (15%) were black, 1 (5%) was American Indian, 1 (5%) was multi-racial and 1 (5%) was of unknown race. Hispanic ethnicity was reported for 2 (13%) patients. Urine (8) was the most common source followed by sputum (5) and blood (3). Fifteen (75%) were hospitalized (8 hospitalized >3 days prior to culture); median length of stay was 19 days (range, 3 to 147). 9 (56%) required ICU care; in-hospital mortality was 10% with one patient having CRE isolated from a sterile site within 7 days of death. Other KPC-positive CRE isolates were collected in patients from outpatient settings (2), long-term acute care hospitals (1), or long-term care facilities (2) without subsequent hospitalization within 30 days.

A total of 43 incident cases (representing 38 patients) of CRE were reported for MuGSI during 2014. Of the 43 cases, 29 were *Enterobacter* spp., 9 were *Klebsiella* spp., and 5 were *E. coli*. KPC was identified in 23% of MuGSI CRE (*K. pneumoniae* [6/8] and *E. cloacae* [4/11]). Again, CRE was most frequently isolated from urine (40) followed by blood (3).

During 2014, 5 NDM-producing CRE (*E. coli* [2] and *K. pneumoniae* [3]) were detected, all in non-residents. To date, a total of 10 NDM-producing CRE (*E. coli* [4] and *K. pneumoniae* [6]) from 8 patients have been detected. This includes 1 Minnesota resident and 7 non-residents, all of whom received medical care outside Minnesota (1 patient) or the United States. (7 patients) prior to their initial NDM-positive culture. In 2014, the PHL identified and CDC confirmed the second OXA-48-producing CRE (*K. pneumoniae*) detected in Minnesota from a non-resident with significant healthcare exposure outside the United States prior to receiving healthcare in Minnesota.

In summary, less than one quarter of CRE isolates tested by the PHL during 2014 were KPC positive; 1 patient had KPC-positive isolates of different species cultured from the different body sites during a single hospital stay. Detection of NDM and OXA-48 serves as a reminder to clinicians that a travel history, including receipt of medical care outside the United States, is a critical component of early detection of CRE isolates with carbapenemases that are less common in the United States. CDC recommends performing rectal screening cultures to detect colonization in newly admitted patients with known hospitalization outside the United

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States. within the last 6 months. CRE bacteria can spread in healthcare facilities (e.g., on the hands of healthcare workers or contaminated equipment) and have been associated with outbreaks in these settings in other states and countries. The spread of CRE can be halted with early detection and implementation of appropriate infection prevention measures, and proper communication of CRE status upon patient transfer. Healthcare facilities should consider screening epidemiologically linked patients including roommate(s) of a patient colonized or infected with CRE who are still in-house. Screening might also be expanded to patients with the same healthcare workers, those on the same unit, and/or patients who have had similar procedures (e.g., endoscopic procedures). No outbreaks or transmission of CRE were reported to MDH in 2014.

Cryptosporidiosis
During 2014, 337 cases of cryptosporidiosis (6.2 per 100,000 population) were reported. This is 11% higher than the median number of cases reported annually from 2004 to 2013 (median, 304.5 cases; range, 147 to 389). The median age of cases in 2014 was 24 years (range, 9 months to 99 years). Children 10 years of age or younger accounted for 29% of cases. Sixty-one percent of cases occurred during July through October. The incidence of cryptosporidiosis in the West Central, Southwestern, Northeastern, Southeastern, and Northwestern districts (25.3, 12.8, 11.3, 11.2, and 10.7 cases per 100,000, respectively) was significantly higher than the statewide incidence. Only 70 (21%) cases occurred among residents of the metropolitan area (2.4 per 100,000). Forty-five (13%) cases required hospitalization, for a median of 4 days (range, 2 to 13 days).

Seven outbreaks of cryptosporidiosis were identified in Minnesota in 2014, accounting for 22 laboratory-confirmed cases. One recreational water outbreak occurred at a swim school in Hennepin County, accounting for 3 cases (all laboratory-confirmed). Three outbreaks of cryptosporidiosis were associated with contact with calves, accounting for 23 cases (9 laboratory-confirmed). The animal contact outbreaks were associated with a home farm (Itasca County), a veterinary technician class farm visit (Hennepin County), and a preschool class farm visit (Olmsted County). Three outbreaks of cryptosporidiosis at daycares accounted for 20 cases (10 laboratory-confirmed); the daycare outbreaks occurred in Becker, Douglas, and Watonwan Counties.

In a paper published in *Clinical Infectious Diseases* in April 2010, we reported an evaluation of rapid assays used by Minnesota clinical laboratories for the diagnosis of cryptosporidiosis. The overall positive predictive value of the rapid assays was 56%, compared to 97% for non-rapid assays. This suggests that widespread use of rapid assays could be artificially contributing to the increased number of reported cases. In 2014, 251 (74%) patients were positive for *Cryptosporidium* by a rapid assay conducted in a clinical laboratory. However, 60 (27%) of the 219 specimens received at the PHL could not subsequently be confirmed by polymerase chain reaction or direct fluorescent antibody test. Rapid assay-positive specimens should be confirmed with other methods. It is important that health care providers are aware of the limitations and proper use of rapid assays in the diagnosis of cryptosporidiosis and that they limit testing to patients who have symptoms characteristic of the disease.

Dengue
Dengue fever is one of the most frequently occurring mosquito-borne diseases worldwide, with an estimated 50-100 million cases (including approximately 500,000 cases of severe dengue) each year. About 2.5% of those with severe dengue (also known as dengue hemorrhagic fever) die. Four serotypes of dengue virus are transmitted to humans through the bite of *Aedes aegypti* and *Ae. albopictus* mosquitoes. The risk is widespread in tropical or subtropical regions around the world, especially where water-holding containers (e.g., waste tires, buckets, or cans) provide abundant mosquito breeding habitat.

In 2014, 3 cases of dengue were reported in Minnesota residents, the fewest cases since 2006. In 2014, the median case age was 36 years (range, 26 to 57 years), and onset of symptoms occurred from February through July. All cases resided within the metropolitan area, but all infections were acquired abroad. Cases had travelled to Central America, the Caribbean, or South America.

***Escherichia coli* O157:H7 and Other Shiga Toxin-producing *E.coli* Infections, and Hemolytic Uremic Syndrome (HUS)**
During 2014, 128 culture-confirmed cases of *Escherichia coli* O157 infection (2.4 per 100,000 population) were reported. The number of reported cases represents a 6% decrease from the median number of cases reported annually from 2004 to 2013 (median, 136 cases; range, 110 to 163). During 2014, 28 (22%) cases occurred in the metropolitan area. One hundred ten (86%) cases occurred during May through October. The median age of the cases was 22 years (range, 10 months to 88 years). Twenty percent of the cases were 4 years of age or younger. Thirty-eight (30%) cases were hospitalized; the median hospital stay was 3 days (range, 1 to 68 days). One case developed HUS and died.

In addition to the 128 culture-confirmed *E. coli* O157 cases, 173 cases of Shiga toxin-producing *E. coli* (STEC) infection were identified in 2014. Of those, culture-confirmation was not possible in 23, and therefore it is unknown if those were O157 or another serogroup. Among the remaining 150 cases with STEC other than O157, *E. coli* O111 accounted for 51 (34%) cases, *E. coli* O26 for 41 (27%), and *E. coli* O103 for 34 (23%). The median age of the non-O157 STEC cases was 21 years (range, 6 months to 92 years). Twenty-eight (19%) cases were hospitalized; the median hospital stay was 2 days (range, 1 to 68 days). No cases died.

Three *E. coli* O157 outbreaks were identified during 2014. One outbreak was due to person-to-person transmission in a daycare, one outbreak was due to animal contact, and one outbreak involved foodborne transmission. The three outbreaks resulted in 74 illnesses (43 culture-confirmed), with a median of 15 cases per outbreak (range, 2 to 57 cases).

In July, an outbreak of *E. coli* O157 infections associated with animal contact at a petting zoo that had traveled to three county fairs and one community festival occurred. Fifteen cases (14 culture-confirmed) were identified, and 2 cases developed HUS. *E. coli* O157 with the same PFGE subtype as the human isolates was identified in samples collected from a goat, alpaca pen, and an animal trailer.

In July, an outbreak of *E. coli* O157 infections associated with five events catered by the same company

occurred. Fifty-seven cases were identified, including 27 that were culture-confirmed. *E. coli* O157 with the same PFGE subtype as the human isolates was isolated from potato salad served at three events. Celery from the same shipment was used in the potato salad and was served at the remaining two events at which cases ate.

In August, an outbreak of *E. coli* O157 infections associated with person-to-person transmission occurred at a daycare in Le Sueur County. Two culture-confirmed cases were identified.

Seven non-O157 STEC outbreaks were identified during 2014. Five outbreaks were due to foodborne transmission and two were due to person-to-person transmission, in daycares. The seven outbreaks resulted in 43 illnesses (34 culture-confirmed), with a median of 4 cases per outbreak (range, 2 to 14 cases).

In April, an outbreak of *E. coli* O26 infections associated with consumption of romaine lettuce resulted in 4 cases, all culture-confirmed.

In May, an outbreak of *E. coli* O103 infections associated with consumption of romaine lettuce served at multiple restaurants from the same restaurant chain resulted in 6 cases, 5 culture-confirmed.

In June, 14 cases of *E. coli* O111 infections were associated with consumption of cabbage served at a multiple restaurants from the same restaurant chain.

In July, an outbreak of *E. coli* O121 infections associated with person-to-person transmission occurred at a daycare in Todd County. Eleven cases,3 culture-confirmed, were identified.

In October, an outbreak of *E. coli* O121 infections was identified. Three cases occurred in Minnesota, and additional cases were identified in other states. Leafy greens were determined to be the most likely vehicle.

In November, an outbreak of *E. coli* O111 infections was associated with consumption of corn salsa served at a restaurant. Three cases, all culture-confirmed, were identified.

In November, an outbreak of *E. coli* O111 infections associated with person-to-person transmission occurred at a daycare in Stearns County. Two cases, both culture-confirmed, were identified.

Hemolytic Uremic Syndrome (HUS)
In 2014, 10 HUS cases were reported. The number of reported cases represents a 41% decrease from the median number of cases reported annually from 2004 to 2013 (median, 17 cases; range, 10 to 22). In 2014, the median age of HUS cases was 4.5 years (range, 0.2 to 35 years); 6 of the 10 cases occurred in children less than 7 years of age. All 10 cases were hospitalized, with a median hospital stay of 9 days (range, 4 to 69 days). One pediatric case died. From 1997 through 2014, the overall case fatality rate among HUS cases was 5.3%. All 10 HUS cases reported in 2014 were post-diarrheal. *E. coli* O157:H7 was cultured from the stool of 8 (80%) cases. In 2014, there were 2 outbreak-associated HUS cases.

Giardiasis
During 2014, 656 cases of *Giardia* infection (12.1 per 100,000) were reported. This represents a 19% decrease from the median number of cases reported annually from 2004 through 2013 (median, 805.5 cases; range, 620 to 1,398). Recent immigrants and refugees continue to represent a substantial proportion (37%) of all cases. An additional 11% of cases reported international travel in the 3 weeks prior to illness onset. The median age for all cases was 21 years (range, 10 months to 93 years). Thirty-five percent were less than 10 years of age, and 20% were over 50 years of age. Excluding cases identified through immigrant and refugee health screenings, 60% were male. Thirty-two (5%) cases required hospitalization, for a median of 5 days (range, 1 to 44 days). Four outbreaks of giardiasis were identified in Minnesota in 2014, accounting for 8 laboratory-confirmed cases. Three outbreaks occurred in a daycare, and one outbreak occurred among a group of campers who drank improperly treated surface water along a Lake Superior hiking trail.

Haemophilus influenzae
One hundred twenty-three cases of invasive *Haemophilus influenzae* disease (2.3 per 100,000 population) were reported in 2014. Invasive *H. influenzae* increased from 1.5 cases per 100,000 in 2010 to 2.4 cases per 100,000 in 2014. Cases ranged in age from newborn to 102 years (median 69 years). Allowing for more than one syndrome per case, 60 (49%) cases had pneumonia, 40 (33%) had bacteremia without another focus of infection, 8 (7%) had septic shock, 8 (7%) had meningitis, 4 (3%) had cellulitis, 2 (2%) had epiglottitis, 3 (2%) had septic arthritis, 1 (<1%) each had abscess, chorioamnionitis, osteomyelitis, otitis media, peritonitis, and septic abortion. Fifteen (12%) cases died.

Of 117 *H. influenzae* isolates for which typing was performed at PHL, 16 (14%) type a, 15 (13%) were type f, 1 (<1%) type b, 6 (5%) type e, and 79 (68%) were untypeable. One case of type b (Hib) disease occurred in 2014, compared to 4 cases in 2013, 3 cases in 2012, and 3 cases in 2011. The case was in a child < 1 year of age who had received 1 dose of Hib vaccine. The case had meningitis and survived.

The 15 deaths occurred in patients ranging in age from 2 to 93 years. Ten cases had pneumonia (of these 3 also had septic shock), and 5 had bacteremia without focus (of these 1 also had septic shock). All 15 cases had *H. influenzae* isolated from blood and 13 had underlying medical conditions. Of these 15 deaths, 11 case-isolates were untypeable; 1 each was serotype a, e, and f; and 1 was not available for serotyping.

HIV Infection and AIDS
The incidence of HIV/AIDS in Minnesota remains moderately low. In 2013, state-specific HIV infection diagnosis rates ranged from 2.5 per 100,000 population in Vermont to 43.7 per 100,000 in Maryland. Minnesota had the 17th lowest reported HIV infection rate (7.0 cases per 100,000 population). In 2013, state-specific AIDS diagnosis rates ranged from 0.7 per 100,000 persons in Vermont to 21.7 per 100,000 population in Maryland. Minnesota had the 14th lowest AIDS rate (3.2 AIDS cases reported per 100,000 population).

As of December 31, 2014, a cumulative total of 10,718 cases of HIV infection (6,497 AIDS and 4,221 HIV [non-AIDS] cases) had been reported among Minnesota residents. Of the 10,718 HIV/AIDS cases, 3,638 (34%) are known to have died. By the end of 2014, an estimated 7,988 persons with HIV/AIDS were assumed to be living in Minnesota.

The annual number of AIDS cases reported in Minnesota increased steadily from the beginning of the epidemic 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

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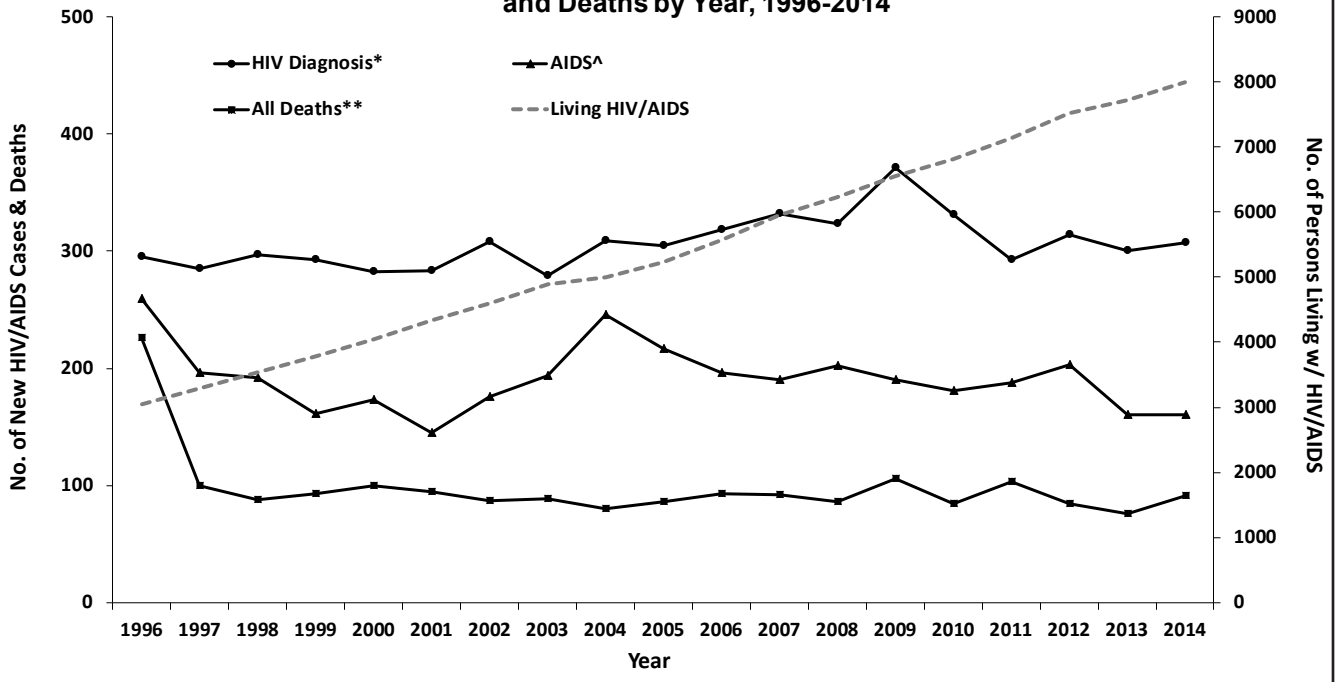
Figure 3. HIV/AIDS in Minnesota: Number of New Cases, Prevalent Cases, and Deaths by Year, 1996-2014



* Includes all new cases of HIV diagnosis (both HIV [non-AIDS] and AIDS at first diagnosis) diagnosed within a given calendar
** 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 refugees/immigrants diagnosed with AIDS subsequent to their arrival in the United States

to better antiretroviral therapies. In 2014, 160 new AIDS cases (Figure 3) and 91 deaths among persons living with HIV infection were reported.

The number of HIV (non-AIDS) diagnoses has remained fairly constant over the past decade from 2005 through 2014, at approximately 247 cases per year. With a peak of 282 newly diagnosed HIV (non-AIDS) cases in 2009, 235 new HIV (non-AIDS) cases were reported in 2014 (an increase of 9% from 216 in 2013).

Historically, and in 2014, over 80% (264/307) of new HIV diagnoses (both HIV [non-AIDS] and AIDS at first diagnosis) reported in Minnesota occurred in the metropolitan area. However, HIV or AIDS cases have been diagnosed in residents of more than 90% of counties statewide. HIV infection is most common in areas with higher population densities and greater poverty.

The majority of new HIV infections in Minnesota occurred 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 new HIV infections among males, but the proportion of cases that white males account for is decreasing. In 2014 there were 122 new infections among white males. During the past decade, the number of cases among African-American males has fluctuated from year to year, with 45 new HIV diagnoses in 2014. This represents a 22% decrease among African-American males from 2013 to 2014. The number of HIV infections diagnosed among Hispanic males increased in 2014 to 28 from 23 in 2013, a 22% increase. The number of new infections among African-born males has fluctuated greatly from year to year and in 2014 the number of cases increased to 20 compared to 9 in 2013, a 122% increase.

Females account for an increasing percentage of new HIV infections, from 11% of new infections in 1990 to 24% in 2014. 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 in women. Since 1991, the number of new infections among women of color has exceeded that of white women. Since 2005, the annual number of new infections diagnosed among African American (black) females has decreased slightly overall, although without a clear pattern from year to year. In 2014 there were 16 cases diagnosed among African American women, compared to 13 in 2013. In 2014 the number of new cases among African-born women was 32, accounting for 44% of all new diagnoses among women. The annual number of new infections diagnosed among Hispanic, American Indian, and Asian females is small, with 10 or fewer cases annually in each group.

Despite relatively small numbers of cases, persons of color are disproportionately affected by HIV/AIDS in Minnesota. In 2014, men of color comprised approximately 17% of the male population in Minnesota

and 44% of new HIV diagnoses among men. Similarly, persons of color comprised approximately 13% of the female population and 79% of new HIV infections among women. It bears noting that race is not considered a biological cause of disparities in the occurrence of HIV, but instead race can be used as a proxy for other risk factors, including lower socioeconomic status and education.

A population of concern for HIV infection is adolescents and young adults (13-24 years of age). The number of new HIV infections among males in this age group has remained higher than new diagnoses among females since 1999. Since 2001, Minnesota has seen a steady increase in new cases among males in this age group, with 49 cases reported in 2014. Since 2005, the number of cases among young males has increased by 63%. The number of new HIV infections among females in this age group has remained relatively consistent over time. In 2014 there were 8 cases reported among young women. From 2012 to 2014, the majority (59%) of new infections among male adolescents and young adults were among youth of color (85/143), with young African American males accounting for 66% of the cases among young males of color. During the same time period, young women of color accounted for 64% (14/22) of the cases diagnosed, with young African-born women accounting for 50% of cases among young women of color. Between 2012 and 2014 after re-distributing those with unspecified risk, 94% (134/143) of new cases among young males were attributed to male-to-male sex. Among young females, 94% (20/22) of new cases were attributed to heterosexual sex.

Since the beginning of the HIV epidemic, male-to-male sex has been the predominant mode of exposure to HIV reported in Minnesota, although the number and proportion of new HIV infections attributed to men who have sex with men (MSM) has declined since 1991. In 1991, 70% (318/455) of new HIV diagnoses were attributed to MSM (or MSM who also inject drugs); in 2014, this group accounted for 50% of new diagnoses (155/307).

The number and percentage of HIV infections in Minnesota that are attributed to injection drug use has declined over the past decade for men and women, falling from 12% (54/455) of cases in 1991 to 2% (5/307) in 2014. 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. Seventy-three percent of 73 new HIV diagnoses among women in 2014 is attributed to heterosexual exposure.

Historically, race data for HIV/AIDS in Minnesota have grouped non-African born blacks and African-born persons together as “black.” In 2001, we began analyzing these groups separately, and a marked trend of increasing numbers of new HIV infections among African-born persons was observed. In 2014, there were 52 new HIV infections reported among Africans. While African-born persons comprise less than 1% of the state’s population, they accounted for 17% of all HIV infections diagnosed in Minnesota in 2014.

HIV perinatal transmission in the United States decreased 81% between 1995 and 1999. The trend in Minnesota has been similar but on a much smaller scale. While the number of births to HIV-infected women increased nearly 7-fold between 1990 and 2012, the rate of perinatal transmission decreased 6-fold, from 18% in 1990 to 3% in 1995. The overall rate of perinatal transmission for 2012 to 2014 was 1.1% with 1 HIV-positive birth from an HIV-infected mother in Minnesota in 2014.

Influenza

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

Hospitalized Cases

Surveillance for pediatric (<18 years of age) laboratory-confirmed hospitalized cases of influenza in the metropolitan area was established during the 2003-2004 influenza season; for the 2008-2009 season surveillance was expanded statewide. Since the 2009-2010 season, clinicians are encouraged to collect a throat or nasopharyngeal swab, or other specimen from all patients admitted to a hospital with suspect influenza, and submit the specimen to the PHL for influenza testing. For the 2014-2015 season (September 28, 2014 – May 2, 2015), influenza B subtyping was added by the PHL.

During the 2014-2015 influenza season, there were 4,211 laboratory-confirmed hospitalized cases (77.2 cases per 100,000 persons compared to 28.6 per 100,000 for 2013-2014) reported. Cases included 3,540 influenza A (2,197 H3, 1 A[H1N1] pdm09, and 1,342 unknown A type), 639 influenza B (243 of Yamagata lineage and 58 of Victoria lineage), 22 positive for both influenza A and B, and 10 of unknown influenza types. Among the cases, 11% were 0-18 years of age, 9% were 19-49 years of age, 13% were 50-64 years of age and 67% were 65 years of age and older. Median age was 76 years. Residents of the metropolitan area made up 52% of cases.

Case report forms have been completed on 57% of 2,189 metropolitan area cases to date. Of these, 25% were diagnosed with pneumonia, 12% required admission into an intensive care unit, and 6% were placed on mechanical ventilation. An invasive bacterial co-infection was present in 10% of hospitalized cases. Antiviral treatment was prescribed for 40% of cases. Overall, 91% of adult cases and 38% of pediatric cases had at least one chronic medical condition that would have put them at increased risk for influenza disease.

Pediatric Deaths

For the 2014-2015 influenza season, there were 10 pediatric influenza-associated deaths.

Laboratory Data

The Minnesota Laboratory System Laboratory Influenza Surveillance Program consists of more than 110 clinic- and hospital-based laboratories, voluntarily submitting testing data on a weekly basis. These laboratories perform rapid testing for influenza. Six labs perform viral culture testing for influenza, and other respiratory viruses. Nine laboratories perform PCR testing for influenza. The PHL provides further characterization of submitted influenza isolates to determine the hemagglutinin serotype to compare to vaccine strains. 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. During the 2014-2015 influenza season, laboratories reported data on 27,463 influenza PCR tests, 3,777 (14%) of which

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were positive for influenza. Of these, 10 (0.3%) were positive for influenza A(H1N1)pdm09, 538 (14%) were positive for influenza A/(H3), 2,406 (64%) were positive for influenza A-not subtyped, and 823 (22%) were positive for influenza B.

Influenza Sentinel Surveillance

We conduct sentinel surveillance for influenza-like illness (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 are 24 sites in 19 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 of December 21-27, 2013 at 7.9%.

Influenza Incidence Surveillance Project

MDH was one of eight nationwide sites to participate in an Influenza Incidence Surveillance Project for the 2014-2015 influenza season. Four clinic sites reported the number of ILI patients and acute respiratory illness (ARI; recent onset of at least two of the following: rhinorrhea, sore throat, cough, or fever) 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 and the first 10 patients with ARI for PCR testing at the PHL for influenza and 12 other respiratory pathogens. Minimal demographic and clinical data were provided with each specimen.

From July 27, 2014 – May 19, 2015, these clinics saw 3,094 ILI and 13,250 ARI patients. Of 715 specimens submitted for influenza and respiratory pathogen testing, 101 (14%) were positive for influenza. Of those, 60 (60%) were positive for influenza A/(H3), 4 (4%) were positive for influenza A-type unspecified, 26 (26%) were positive for influenza B/Yamagata lineage, 7 (7%) were positive for influenza B/Victoria lineage, 2 (2%) were positive for influenza B-lineage unspecified, and 7 (7%) were positive for influenza C. In addition, the following pathogens were detected by PCR: 13 (2%) adenovirus, 14 (2%) human metapneumovirus, 14 (2%) RSV, 119 (17%) rhinovirus, 21 (3%) enterovirus, 7 (1%) parainfluenza virus 2, 6 (1%) parainfluenza virus 3, 2 (0.3%) parainfluenza virus 4, 3 (0.4%) coronavirus 229E, 15 (2%) coronavirus OC43, and 9 (1%) coronavirus NL63 (note: these coronaviruses are not SARS-virus or MERS-CoV).

ILI Outbreaks (Schools and Long Term Care Facilities)

The definition of ILI outbreaks beginning with the 2009-2010 school year is when the number of students absent with ILI reached 5% of total enrollment, or when three or more students with ILI are absent from the same elementary classroom. Seven hundred five schools in 68 counties reported ILI outbreaks during the 2014-2015 school year. This is the lowest number of schools reporting ILI outbreaks since the 2009-2010 school year with the highest being 1,302 schools in 85 counties 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 ninety-three facilities in 68 counties reported confirmed outbreaks during the 2014-2015 influenza season. The number of LTCFs reporting outbreaks ranged from a low of 3 in 2008-2009 to a high of 209 in 2012-2013.

Legionellosis

In 2014, 58 confirmed cases of legionellosis (1.1 per 100,000 population) were reported in Minnesota residents. The criteria for confirmation of a legionellosis case are a clinically compatible illness and at least one of the following: 1) isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid, or other normally sterile site by culture, or 2) detection of *L. pneumophila* serogroup 1 antigen in urine using validated reagents, or 3) seroconversion of fourfold or greater rise in specific serum antibody titer to *L. pneumophila* serogroup 1 using validated reagents. Five cases were diagnosed by culture alone. A single antibody titer of any level is not considered diagnostic for legionellosis. Patients positive by polymerase chain reaction only are classified as suspected cases; in 2014, there were 5 suspected cases of legionellosis reported in Minnesota residents.

Of the 58 confirmed cases, 57 (98%) had pneumonia, 55 (95%) were hospitalized for a median duration of 5 days (range, 1 to 35 days), 25 (43%) were admitted to an intensive care unit, 16 (28%) required mechanical ventilation, and 1 (2%) died. Thirty-nine (67%) cases were male. Older adults were more often affected, with 39 (67%) cases occurring among individuals 50 years of age and older (overall median age, 56 years; range, 25 to 91 years). Twenty-seven (47%) cases had onset dates in June through September. Thirty-three (57%) cases were residents of the metropolitan area and 25 (43%) were residents of Greater Minnesota. Of the 47 cases for which information was available, 16 (34%) were classified as travel-associated, defined as spending one or more night away from their residence (excluding healthcare facilities) in the 10 days prior to onset of illness; 14 (30%) had exposure to a healthcare facility in the 10 days prior to onset of illness. There was one legionellosis outbreak detected with 2 cases (1 reported in 2013, and 1 reported in 2014) associated with exposure to a decorative water wall in a casino. An additional case was part of an outbreak in another state associated with exposure to a contaminated hotel hot tub.

The Infectious Diseases Society of America and the American Thoracic Society, in their consensus guidelines on the management of community-acquired pneumonia in adults, recommend urinary antigen assay and culture of respiratory secretions on selective media for detection of legionellosis. Culture is particularly useful because environmental and clinical isolates can be compared by molecular typing in outbreaks and in investigations of healthcare-associated legionellosis.

Listeriosis

Seventeen listeriosis cases were reported in 2014. All cases were hospitalized, and 6 (35%) died. The median age of cases was 64 years (range, 0 days to 90 years). Fifteen cases had *Listeria monocytogenes* isolated from blood, 1 from peritoneal fluid, and 1 from hip fluid. Three of the cases were pregnancy-associated: two neonates had *L. monocytogenes* cultured from blood at birth, and one pregnant woman developed headache,

muscle aches, and sweats at 32 weeks gestation and had *L. monocytogenes* isolated from blood; all 3 cases and the pregnant case's infant survived.

The source of infection was identified for 6 cases. Four cases were part of a multi-state outbreak of 35 cases from 12 states due to caramel apples made with contaminated California-packed apples. One case was linked to consumption of recalled stone fruit (peaches, plums, nectarines, pluots) that included 1 other national case. One neonatal case was linked to raw pork purchased from a live animal market.

The 17 cases reported in 2014 represent a 2.5-fold increase from the median number of cases reported from 1996 through 2013 (median, 7 cases; range, 3 to 19), and the highest number of cases reported since 1999.

Elderly persons, immunocompromised individuals, pregnant women, and neonates are at highest risk for acquiring listeriosis. Listeriosis generally manifests as meningoencephalitis and/or septicemia in neonates and adults. Pregnant women may experience a mild febrile illness, abortion, premature delivery, or stillbirth. In healthy adults and children, symptoms usually are mild or absent. *L. monocytogenes* can multiply in refrigerated foods.

Lyme disease
Lyme disease is a bacterial infection caused by *Borrelia burgdorferi*, a spirochete transmitted to humans by bites from *I. scapularis* (the blacklegged tick or deer tick) in Minnesota. In Minnesota, the same tick vector also transmits the agents of babesiosis, anaplasmosis, one form of human ehrlichiosis, and a strain of Powassan virus.

In 2014, 896 confirmed Lyme disease cases (16.5 cases per 100,000 population) were reported (Figure 1). In addition, 520 probable cases (physician-diagnosed cases that did not meet clinical evidence criteria for a confirmed case but that had laboratory evidence of infection) were reported. Despite some yearly fluctuations, the number of reported cases of Lyme disease has been increasing, as evidenced by the median number of cases from 2006 through 2014 (median, 1,065; range, 896 to 1,431) compared to the median from 1996 to 2005 (median, 464; range, 252 to 1,023).

Five hundred fifty-three (62%) confirmed cases in 2014 were male. The median age of cases was 39 years (range, <1 to 88 years). Physician-diagnosed erythema migrans (EM) was present in 582 (65%) cases. Three hundred fifty-one (39%) cases had one or more late manifestations of Lyme disease (including 267 with a history of objective joint swelling, 66 with cranial neuritis, including Bell's Palsy, 4 with lymphocytic meningitis, 12 with acute onset of 2nd or 3rd degree atrioventricular conduction defects, and 4 with radiculoneuropathy) and confirmation by Western immunoblot (positive IgM ≤30 days post-onset or positive IgG). Of the 824 cases with known onset dates, onset of symptoms peaked from June through August, with 40% of EM cases experiencing symptom onset in July. This timing corresponds with peak activity of nymphal *I. scapularis* ticks in mid-May through mid-July. The majority of cases in 2014 either resided in or traveled to endemic counties in north-central, east-central, or southeast Minnesota, or Wisconsin.

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

In 2014, 51 malaria cases (0.9 per 100,000 population) were reported. Forty-two (82%) cases were identified with *P. falciparum*, 5 (10%) with *P. vivax*, and 3 (6%) with mixed *Plasmodium* species infections; infection with unidentified *Plasmodium* species was detected in 1 case. The median age of cases was 33 years (range, 2 to 83 years). Of the 48 cases with known race, 44 (92%) were black, 3 (6%) were white, and 1 (2%) was Asian. Fifty cases were Minnesota residents at the time of their illness, 45 (90%) of which resided in the metropolitan area. One patient was a resident of a country other than the United States. Of the 39 cases with known country of birth, 4 (10%) were born in the United States. Forty-six (90%) cases in 2014 likely acquired malaria in Africa and 2 (4%) cases were likely acquired in Asia. Exposure information was not available for 3 of the cases. Fourteen countries were considered possible exposure locations for malaria infections, including Liberia (16), Nigeria (9), Kenya (5), and India (2), as well as several other countries in sub-Saharan Africa.

Measles
Two cases of measles were reported in 2014. Both were residents of the metropolitan area. One was a 19 month-old Asian, non-Hispanic child with 1 documented dose of measles-containing vaccine. The child's illness was clinically compatible with measles and confirmed by PCR and IgM antibody at the PHL. The child was febrile and developed a rash on April 17 while on an international flight from India to the United States, and then took a connecting flight from Chicago to Minneapolis. The child is assumed to have acquired measles in India.

The second case was a 46 year-old white, non-Hispanic male with unknown vaccination status. He was identified in early May when he was traveling for business in Massachusetts. His illness was clinically compatible with measles and confirmed by PCR and IgM at the Massachusetts Department of Public Health. This case is epidemiologically linked to the first case as they both utilized the same airport gate on April 17 for their respective flights. Both cases were genotyped as D8 (endemic in India) and were phylogenetically identical. Both cases were hospitalized and recovered without complications.

Meningococcal Disease
Six cases of *Neisseria meningitidis* invasive disease (0.11 per 100,000 population) were reported in 2014 compared to 12 in 2013. There were 3 serogroup B, 2 serogroup C, and 1 serogroup W135 case. All cases were sporadic.

Cases ranged in age from 8 months to 48 years. Sixty-seven percent of the cases occurred in the metropolitan area. Two cases had meningitis, 3 had bacteremia without another focus of infection (of these 2 also had septic shock), and 1 had pneumonia. One death occurred in the W135 serogroup case.

In 2014, 1 case-isolate demonstrated intermediate resistance to both ampicillin and penicillin. There were no 2014 case isolates with ciprofloxacin resistance. In 2008, 2 isolates from cases occurring in northwestern

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Minnesota had nalidixic acid MICs >8 µg/ml and ciprofloxacin MICs of 0.25 µg/ml indicative of resistance.

In 2012, meningococcal conjugate vaccine MenHibrix®, covering serogroups Y and C and *Haemophilus influenzae* b, was extended for licensed use in the United States to 6 weeks of age. Menactra® was licensed for use in the United States in January 2005 for persons aged 11 to 55 years, and was the first meningococcal polysaccharide-protein conjugate vaccine for serogroups A, C, Y, and W-135 (MCV4). In 2011, the license was approved to include 9 through 23 months. The U.S. Advisory Committee on Immunization Practices (ACIP) and American Academy of Pediatrics recommend immunization with either vaccine routinely at age 11-12 years or at high school entry and a booster dose at age 16, as well as for college freshmen living in dormitories, and other groups in the licensed age range previously determined to be at high risk. In 2015, ACIP made recommendations for the newly licensed serogroup B meningococcal vaccine.

Methicillin-Resistant *Staphylococcus aureus* (MRSA)

Strains of *Staphylococcus aureus* (SA) that are resistant to methicillin and beta-lactam antibiotics are referred to as methicillin-resistant *S. aureus* (MRSA). Invasive MRSA infections are classified into one of three categories: hospital-onset (HO-MRSA), healthcare-associated, community-onset (HACO-MRSA), and community-associated (CA-MRSA). MRSA must be isolated from a normally sterile body site 4 or more days after the date of initial hospital admission for a case to be considered HO-MRSA. HACO-MRSA 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-MRSA cases do not have any identifiable HA risk factors present in the year prior to infection.

In 2005, as part of EIP, population-based surveillance of invasive MRSA was initiated in Ramsey County; surveillance was expanded to include Hennepin County in 2008. There were 260 invasive MRSA cases in these two counties in 2014. The incidence rate increased to 15.1 per 100,000 in 2014 (Ramsey: 15.4/100,000 and Hennepin: 15.1/100,000) compared to 12.5 per 100,000 population in 2013. In 2014, MRSA was most frequently isolated from blood (73%), and 10% (26/262) of the cases died. HACO-MRSA cases comprised the majority (69%, 180/260) of invasive MRSA infections in 2014; CA-MRSA cases accounted for 22% (57/260), and 9% (23/260) of cases were HA-MRSA. The median age for all cases was 62 years (range, <1 to 93); the median age was 66 (range, 17 to 93), 62 (range, <1 to 91), and 65 (range, 8 to 91) for HO-, HACO-, and CA-MRSA cases, respectively.

Vancomycin-intermediate (VISA) and vancomycin-resistant *S. aureus* (VRSA) are reportable in Minnesota, as detected and defined according to CLSI 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. Prior to 2008, the PHL had confirmed 1 VISA case. Between 2008 and 2013, the PHL confirmed 16 VISA cases; 2008 (3), 2009 (3), 2010 (2), 2011 (5), and 2013 (3). No VISA cases were confirmed in 2014. Among all cases, 8 (47%) were male and the median age was 62 years (range, 27 to 86). Of those cases with known history (15), 80% reported recent exposure to vancomycin.

Mumps

During 2014, 22 cases of mumps were reported. Nine (41%) were classified as confirmed (tested positive by PCR) and 13 (59%) as probable (tested positive by IgM serology or were epidemiologically-linked to a probable or confirmed case).

Seven (32%) cases were students returning to Minnesota from colleges where mumps outbreaks were occurring. After they returned, no transmission was reported within Minnesota. Another 7 cases were related to an outbreak occurring among multiple National Hockey League teams including the Minnesota Wild. Five Minnesota Wild players contracted mumps in addition to two healthcare workers who had face-to-face contact with the players. Two (9%) cases acquired mumps while travelling internationally, and the remaining 6 (27%) cases were classified as probable and were not epidemiologically linked or associated with outbreaks occurring elsewhere.

Cases ranged in age from 1 to 53 years. Three cases occurred in persons under 18 years of age; 13 cases occurred in persons 19 through 33 years of age; 5 cases occurred in persons 34 through 49 years of age; and 1 case occurred in a person 50 years and older. Five cases had a documented history of 2 doses of mumps-containing vaccine; 3 cases had a documented history of 1 dose. Nine cases reported a history of receiving at least 1 dose of mumps-containing vaccine but had no documentation of those doses. Five cases reported never having received any doses of mumps-containing vaccine. No cases reported a previous history of mumps disease.

Mumps surveillance was complicated this year by a large number of individuals with parotitis tested negative for mumps by PCR but positive for influenza A in viral culture. While parotitis is a known symptom of influenza, it is uncommon.

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 2014, 60 cases of neonatal sepsis (0.9 cases per 1,000 live births) were reported compared to 36 cases (0.5 cases per 1,000 live births) in 2013. Among these cases, all were identified via blood or cerebrospinal fluid (CSF). Most cases (87%) were culture-positive within the first 2 days of life. In 2014, *Escherichia coli* was the most common bacteria (20) followed by group B Streptococcus (16), *Streptococcus viridians* (8), *Haemophilus influenzae* (4), *Enterococcus* spp. (2), *Streptococcus pneumoniae* (2), *Listeria monocytogenes* (2), and 1 each *Campylobacter* spp., *Citrobacter* spp., *Globicatella* spp., *Neisseria* spp., *Pseudomonas* spp., and *Staphylococcus aureus*.

Pertussis

During 2014, 950 cases of pertussis (18 per 100,000 population) were reported. Laboratory confirmation was available for 717 (75%) cases, 26 (4%) of which were confirmed by culture and 691 (96%) of which were confirmed by PCR. In addition to the laboratory-confirmed cases, 164 (17%) cases met

the clinical case definition and were epidemiologically linked to laboratory-confirmed cases, and 69 (7%) met the clinical case definition only. Four hundred sixty-three (49%) of the reported cases occurred in residents of the metropolitan area.

Paroxysmal coughing was the most commonly reported symptom which 863 (91%) cases experienced. Approximately one fourth (274, 29%) 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 415 (44%) of the cases. Infants and young children are at the highest risk for severe disease and complications. Pneumonia was diagnosed in 22 (2%) cases, only 1 of which was in an infant; 15 (68%) were between the ages of 2 and 16 years, 6 (27%) were between the ages of 20 and 81 years. Nineteen (2%) cases were hospitalized; 9 (47%) of the hospitalized patients were <6 months of age. No deaths occurred (note, the lab findings in an UNEX case [p. 23] did not count as a confirmed or probable pertussis case).

Pertussis can affect persons of any age. The disease is increasingly recognized in older children and adults. During 2014, cases ranged in age from <1 month to 92 years. Two hundred fifty-four (27%) cases occurred in adolescents 13-17 years of age, 168 (18%) in adults 18 years of age and older, 346 (37%) in children 5-12 years of age, 148 (16%) in children 6 months through 4 years of age, and 30 (3%) in infants <6 months of age. Age was missing for 4 (<1%) cases. The median age of cases was 11 years.

Infection in older children and adults may result in exposure of unprotected infants who are at risk for the most severe consequences of infection. During 2014, 52 (5%) pertussis cases were reported in infants <1 year of age. A likely source of exposure was identified for 17 (33%) of those cases; 2 (12%) were infected by adults 18 years of age and older, 3 (18%) were infected by an adolescent 13-17 years of age, 10 (59%) were infected by a child <13 years of age, and 2 (12%) had an unknown age. For the 35 (67%) infant cases with no identified source of infection, the source was likely from outside the household. 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 the 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 202 (21%) cases who were 7 months to 6 years of age, 135 (67%) were known to have received at least a primary series of 3 doses of DTP/DTaP vaccine prior to onset of illness; 67 (33%) 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 26 culture-confirmed cases were received and sub-typed, with 5 distinct PFGE patterns identified. In 2014, no case-isolates of pertussis were tested in Minnesota for antimicrobial susceptibility. 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 to date.

Laboratory tests should be performed on all suspected cases of pertussis. Culture of *B. pertussis* requires inoculation of a specimen of nasopharyngeal mucus on special media and incubation for 7 to 10 days. 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 coughs >2 weeks.

Pertussis remains endemic in Minnesota 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 the bacterium *Coxiella burnetti*. Cattle, sheep, and goats are the primary reservoirs for *C. burnetti*. Transmission can occur through tick bites, inhalation of aerosolized bacteria, contact with infected animal tissue, and ingestion of unpasteurized dairy products.

In 2014, 2 confirmed cases of acute Q fever were reported. There were no chronic cases. The cases were 14 and 76 years old, both male. Neither were hospitalized and both survived. One case was likely exposed through drinking unpasteurized cow's milk, and the other had an undetermined exposure.

From 1997 to 2014, there were 18 confirmed acute cases and 4 confirmed chronic cases of Q fever reported. The median number of cases reported annually was 1 (range, 0 to 3). The median age of acute cases was 59 years (range, 11 to 76 years); the median age of chronic cases was 32 years (range, 33 to 75 years). Four cases for which both race and ethnicity were known were white, non-Hispanic, 1 was black, non-Hispanic, and 1 was mixed race, non-Hispanic. During this time, 11 of the 14 cases for whom exposure information was available were likely exposed through contact with infected animals, 2 were likely exposed through ingestion of unpasteurized dairy products, and 1 through a tick bite. Five of the 12 cases with known occupations were employed in an agriculture-related job.

Rabies

Rabies is caused by an enveloped RNA virus from the Rhabdoviridae family and *Lyssavirus* genus. In Minnesota, the reservoir species are skunks and multiple bat species. Dogs, cats, and horses are generally exposed to rabies through encounters with skunks.

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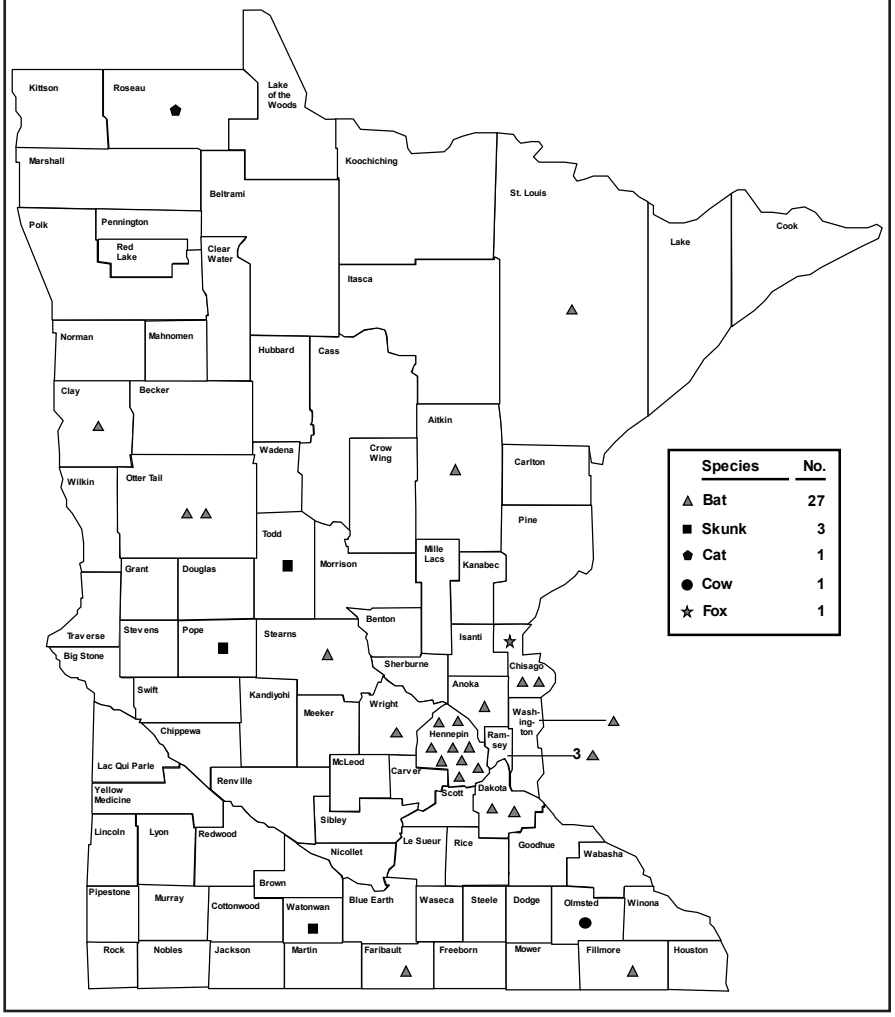
Vaccinating them for rabies provides a buffer between wildlife and people.

In 2014, 33 (1.4%) of 2,312 animals submitted for testing were positive for rabies (Figure 4). This is decreased from 2013, when 63 (2.6%) of 2,398 animals submitted tested positive for rabies, but within the expected range. The majority of positive animals in 2014 were bats (27/33 [82%]), followed by skunks (3/33 [9%]), cattle (1/33 [3%]), cats (1/33 [3%]) and foxes (1/33 [3%]). There were no human cases of rabies.

From 2003 to 2014, 715 (2.5%) of 29,202 animals tested positive for rabies. The median number of rabies positive animals identified annually was 61 (range, 33 to 94). From 2003 to 2014, 291/618 (47%) skunks, 50/696 (7%) cattle, 291/8,139 (4%) bats, 41/9,072 (0.5%) cats, 28/8,066 (0.4%) dogs, and 0/921 (0%) raccoons that were submitted tested positive for rabies. Rabies in raccoons is rare in Minnesota. From 1988 to 2014, 3 raccoons have tested positive for rabies; these occurred in 1989, 1990, and 1993. Two human cases have occurred in Minnesota in the last 20 years.

Figure 4. Rabid Animals by County, Minnesota, 2014 (n=33)



Salmonellosis

During 2014, 722 culture-confirmed cases of *Salmonella* infection (13.3 per 100,000 population) were reported. This is similar to the median annual number of cases reported from 2004 to 2013 (median, 706; range, 578 to 810). Of the 69 serotypes identified in 2014, 6 serotypes, *S.* Enteritidis (211), *S.* Typhimurium (91), *S.* I 4,[5],12:i:- (53), *S.* Newport (34), *S.* Infantis (22), and *S.* Heidelberg (20) accounted for 60% of cases. *Salmonella* was isolated from stool in 618 (86%), urine in 49 (7%), and blood in 43 (6%) cases. Other specimen sources included cerebrospinal fluid, pleural fluid, abdominal fluid, gallbladder fluid, knee aspirate, tracheostomy tube, tissue, and wound.

One hundred ninety-three (27%) cases were hospitalized. Three culture-confirmed cases of *Salmonella* infection died in 2014: a 68 year-old case died of "natural causes" 16 days after *Salmonella* was isolated from a urine specimen; a 51 year-old case died of cardiac arrest, ascites, liver failure, and metastatic pancreatic adenocarcinoma 12 days after *Salmonella* was isolated from a wound; and, a 60 year-old case died of respiratory failure, end stage renal disease, liver cirrhosis, and encephalopathy 4 months after *Salmonella* was isolated from abdominal fluid during a continuous hospitalization.

Of the 623 cases asked about travel, 86 (14%) had traveled internationally during the week prior to their illness onset. There were 6 cases of *S.* Typhi infection in 2014; 3 had traveled to India, 1 to Vietnam and Laos, 1 to China and the Philippines, and 1 did not travel in the 30 days prior to illness onset but had travelled to Kenya shortly before that. There were 3 cases of *S.* Paratyphi A infection; 1 had traveled to India, 1 to India and the United Arab Emirates, and 1 had unknown travel history.

Sixty-eight cases were part of 14 *Salmonella* outbreaks identified in 2014, including 3 cases that were part of 2 outbreaks in other states. Seven of the outbreaks involved foodborne transmission, four outbreaks were due to animal contact, and the mode of transmission was not conclusive for three outbreaks. Five of the outbreaks, including the two outbreaks in other states, involved cases in multiple states. The 14 outbreaks resulted in a median of 4 culture-confirmed cases per outbreak (range, 1 to 15 cases).

During January - February, 36 cases of *S.* Enteritidis infection, including 15 laboratory-confirmed cases, were part of an outbreak at a buffet restaurant. Dinner rolls that were brushed with an artificial butter product after baking were the implicated outbreak vehicle, and the suspected source of contamination was raw chicken that was also brushed with butter product at the restaurant.

In January, *S.* I 4,[5],12:i:- was isolated from one Minnesota traveler who was part of an outbreak at a restaurant in Hawaii.

In April, 1 *S.* Typhimurium case was included in a multi-state outbreak that was associated with frozen feeder rodents purchased at a chain pet store. The Minnesota case's isolate was indistinguishable from the outbreak strain by PFGE, but the case denied contact with feeder rodents or reptiles.

From May through November, 11 *S.* Adelaide cases were likely associated with consumption of pork. Ninety-one percent of the cases were Asian or Hispanic, and 64% were <5 years old. Most had purchased the pork at a local ethnic store or a live animal market. Cases in other states, including California, were identified during the same time period, but a common source of pork was not identified.

In June, 6 *S.* Typhimurium cases were associated with an outbreak in central Minnesota that was likely associated with a graduation party or a chain restaurant, but the vehicle was not determined. Reported onset dates were more consistent with the chain restaurant as the source of illness. All of the cases also shopped at the same grocery store chain, and an unidentified food item from the grocery chain was also a possible vehicle.

In May and June, 2 *S.* Enteritidis cases were part of an outbreak associated with live feeder mice. The outbreak was identified by whole genome sequencing (WGS); the PFGE patterns of the 2 case isolates were one band different by both enzymes but had no single nucleotide polymorphism (SNP) differences by hqSNP analysis. Feeder mice purchased by both cases were sourced from the same distributor in Illinois.

In June, 2 cases of *S.* I 4,5,12:i:- infection in Minnesota travelers were part of an outbreak associated with a North Dakota pig roast.

From July through September, 2 *S.* Infantis cases and 1 *S.* Hadar case were part of a multi-state outbreak of 363 total cases infected with *S.* Infantis, *S.* Hadar, or *S.* Newport from 43 states and Puerto Rico. Transmission was through contact with live poultry sourced from a single hatchery that had also been implicated in national outbreaks in 2012 and 2013.

In July and August, 7 cases of *S.* Miami infection were part of an outbreak at two locations of a Mexican-style chain restaurant. The outbreak vehicle was not confirmed, but a small focal contamination event affecting lettuce in the field was the most plausible explanation for the outbreak.

In July, 20 cases of *S.* Javiana infection, including 4 laboratory-confirmed cases, were associated with cooked, shredded turkey prepared by a meat market for a catered event. In 2012, the meat market had been implicated in a *S.* Javiana outbreak associated with turkey jerky, and the market ceased processing turkeys after the 2014 outbreak.

From August through October, 4 laboratory-confirmed *S.* I 4,5,12:i:- cases and 8 additional cases were associated with an outbreak among employees of a turkey hatchery. Handling turkey poults and exposure to an environment contaminated by turkey poults were associated with illness.

In August, 8 cases of *S.* Enteritidis infection were associated with consumption of frozen commercial Chicken Kiev. WGS allowed rapid differentiation of isolates and focus of the investigation. A press release and recall were issued, and positive products were found at retail and in consumers' homes.

In August, 2 cases of *S.* Enteritidis infection were associated with a family reunion. The case isolates also had no SNP differences by WGS. The cases had contact with a live goat at the reunion and consumed potluck-style food. The vehicle and route of transmission were not determined.

In August - September, 2 *S.* Infantis cases were linked to chickens purchased from a live animal market.

Isolates from the January Hawaii outbreak, June North Dakota outbreak, and August-October turkey hatchery outbreak were all serotype 4,5,12:i:- with PFGE pattern TM918 (CDC pattern designation JPXX01.1314). This pattern has undergone a clonal expansion in the last several years, and has been increasingly identified among sporadic case isolates and outbreaks.

Sexually Transmitted Diseases

Surveillance for gonorrhea and chlamydia in Minnesota are monitored through a mostly passive surveillance system. The process involves collecting both case reports and laboratory reports to document a case of gonorrhea and/or chlamydia. Syphilis is monitored through active surveillance, which involves immediate follow-up with the clinician upon receipt of a positive laboratory report. Cases of chancroid are monitored through a mostly passive surveillance system. Herpes simplex virus and human papillomavirus infections are not reportable.

Although overall incidence rates for STDs in Minnesota are lower than those in many other areas of the United States, certain population subgroups in Minnesota 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 2014, 19,897 chlamydia cases (375 per 100,000 population) were reported, representing a 6% increase from 2013 (Table 3).

Adolescents and young adults are at highest risk for acquiring chlamydia infection (Table 4). The chlamydia rate is highest among 20 to 24-year-olds (2,244 per 100,000), followed by the 15 to 19-year-old age group (1,402 per 100,000). The incidence of chlamydia among adults 25 to 29 years of age (932 per 100,000) is considerably lower but has continued to increase in recent years. The chlamydia rate among females (504 per 100,000) is more than twice the rate among males (244 per 100,000), a difference most likely due to more frequent screening among women.

The incidence of chlamydia infection is highest in communities of color (Table 4). The rate among blacks (1,625 per 100,000) is nine times higher than the rate among whites (182 per 100,000*).* Rates among Asian/Pacific Islanders (318 per 100,000), Hispanics (440 per 100,000), and American Indians (862 per 100,000) are over two to four times higher than the rate among whites.

Chlamydia infections occur throughout the state, with the highest reported rates in Minneapolis (999 per 100,000) and St. Paul (818 per 100,000). While there was an overall increase of 6% across the state in 2014 the greatest increase for chlamydia was seen in the suburban metropolitan area of the Twin Cities. This area displayed an increase of 19%, as shown in Table 4. Every county in Minnesota had at least 2 chlamydia cases in 2014.

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Gonorrhea

Gonorrhea, caused by *Neisseria gonorrhoeae*, is the second most commonly reported STD in Minnesota. In 2014, 4,073 cases (77 per 100,000 population) were reported, representing a 5% increase from 2013. This is the highest reported rate of gonorrhea in the last decade (Table 3).

Adolescents and young adults are at greatest risk for gonorrhea (Table 4), with incidence rates of 218 per 100,000 among 15 to 19-year-olds, 362 per 100,000 among 20 to 24-year olds, and 218 per 100,000 among 25 to 29-year-olds. Gonorrhea rates for males (86 per 100,000) were higher than females (67 per 100,000) for the first time since 1993. Communities of color are disproportionately affected by gonorrhea. The incidence of gonorrhea among blacks (556 per 100,000) is 18 times higher than the rate among whites (31 per 100,000). Rates among Asian/Pacific Islanders (40 per 100,000), Hispanics (75 per 100,000), and American Indians (240 per 100,000) are up to seven times higher than among whites.

Gonorrhea rates are highest in the cities of Minneapolis and St. Paul (Table 4). The incidence in Minneapolis (377 per 100,000) is over 1.5 times higher than the rate in St. Paul (238 per 100,000), seven times higher than the rate in the suburban metropolitan area (51 per 100,000), and 13 times higher than the rate in Greater Minnesota (28 per 100,000). In 2014, Greater Minnesota saw the largest increase in cases at 21%.

The emergence of quinolone-resistant *N. gonorrhoeae* (QRNG) in recent years has become a particular concern. Due to the high prevalence of QRNG in Minnesota as well as nationwide, quinolones are no longer recommended for the treatment of gonococcal infections. Additionally, the CDC changed the treatment guidelines for gonococcal infections in August of 2012. CDC no longer recommends cefixime at any dose as a first-line regimen for treatment of gonococcal infections. If cefixime is used as an alternative agent, then the patient should return in 1 week for a test-of-cure at the site of infection.

Syphilis

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

Table 3. Number of Cases and Rates (per 100,000 persons) of Chlamydia, Gonorrhea, Syphilis and Chancroid, 2010-2014

Disease	2010		2011		2012		2013		2014	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Chlamydia	15,509	292	16,898	319	18,048	340	18,724	353	19,897	375
Gonorrhea	2,149	41	2,283	43	3,082	58	3,872	73	4,073	77
Syphilis, Total	351	6.6	366	6.9	335	6.3	537	10.1	629	11.9
Primary/Secondary	150	2.8	139	2.6	118	2.2	193	3.6	257	4.8
Early latent	74	1.4	121	2.3	96	1.8	139	2.6	159	3.0
Late latent	126	2.4	106	2.0	120	2.3	205	3.9	213	4.0
Other*	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Congenital**	1	1.5	0	0.0	1	1.5	0	0.0	0	0.0
Chancroid	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

* Includes unstaged neurosyphilis, latent syphilis of unknown duration, and late syphilis with clinical manifestations.

** 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, 2014

Demographic Group	Chlamydia		Gonorrhea		P&S Syphilis	
	No.	Rate	No.	Rate	No.	Rate
Total	19,897	375	4,073	77	257	4.8
Residence*						
Minneapolis	3,823	999	1,442	377	130	34.0
St. Paul	2,332	818	678	238	35	12.3
Suburban**	6,350	291	1,117	51	73	3.3
Greater Minnesota	6,404	261	687	28	19	0.8
Age						
<15 years	140	13	26	2	0	0.0
15-19 years	5,157	1,402	801	218	10	2.7
20-24 years	7,980	2,244	1,289	362	53	14.9
25-29 years	3,472	932	812	218	50	13.4
30-34 years	1,617	472	441	129	36	10.5
35-44 years	1,807	160	427	63	47	6.9
≥45 years	444	21	277	13	61	2.9
Gender						
Male	6,411	244	2,260	86	235	8.9
Female	13,477	504	1,803	67	21	0.8
Transgender^^	9	-	11	-	2	-
Race^/Ethnicity						
White	8,216	182	1,416	31	166	3.7
Black	4,458	1,625	1,525	556	67	24.4
American Indian	525	862	146	240	2	3.3
Asian/PI	688	318	86	40	15	6.9
Other^^	524	-	80	-	1	-
Unknown^^	5,485	-	820	-	6	-
Hispanic^^^	1,100	440	187	75	22	8.8

* Residence information missing for 988 cases of chlamydia and 149 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.

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 2014, there were 257 cases of primary/secondary syphilis in Minnesota (4.8 cases per 100,000 persons). This represents an increase of 33% compared to the 193 cases (3.6 per 100,000) reported in 2013.

Early Syphilis
In 2014, the number of early syphilis cases increased by 25%, with 416 cases, compared to 332 cases in 2013. The incidence remains highly concentrated among MSM. Of the early syphilis cases in 2014, 374 (90%) occurred among men; 283 (76%) of these men reported having sex with other men; 50% of the MSM diagnosed with early syphilis were co-infected with HIV.

Congenital Syphilis
There were no cases of congenital syphilis reported in Minnesota in 2014.

Chancroid
Chancroid continues to be very rare in Minnesota. No cases were reported in 2014. The last case was reported in 1999.

Shigellosis
During 2014, 93 culture-confirmed cases of shigellosis (1.7 per 100,000 population) were reported. This represents a 31% decrease from the 134 cases reported in 2013, and is 19% lower than the annual number of cases reported during 2004-2013 (median, 115 per year; range, 66 to 391). *S. sonnei* accounted for 62 (67%) cases, *S. flexneri* for 27 (29%) cases, and *S. boydii* for 1 (1%) case. The species was not identified in 3 (3%) cases. There were no *S. dysenteriae* infections reported in 2014. Cases ranged in age from 10 months to 87 years (median, 37 years). Eight percent of cases were ≤5 years of age; 83% of cases were over 18 years of age. Sixty-two percent of cases were male. Twenty (22%) cases were hospitalized. No cases died. Twenty percent of cases reported either non-White race (13 of 86 cases) or Hispanic ethnicity (5 of 84 cases). Of the 80 cases for which travel information was available, 23 (29%) travelled internationally (17 of 56 [30%] *S. sonnei*, 5 of 20 [25%] *S. flexneri*, and 1 of 3 [33%] unknown *Shigella* species). Seventy-six percent of cases resided in the metropolitan area, including 41% in Hennepin County and 16% in Ramsey County.

Three (3%) cases were part of two *Shigella* outbreaks identified in 2014 (median, 1.5 cases per outbreak; range 1 to 2). One person-to-person outbreak in a childcare center was caused by *S. sonnei*. One clinical laboratory-associated outbreak of *S. flexneri* infections was detected in Minneapolis.

In 2014, 78 of the 80 *Shigella* isolates received at MDH were tested for antimicrobial resistance. Of the 78 isolates, 68% (53 isolates) were resistant to trimethoprim-sulfamethoxazole, 49% (38 isolates) were resistant to ampicillin, and 26% (20 isolates) had decreased susceptibility to azithromycin (DSA). All of the DSA isolates were collected from adult cases, 18 (90%) were men. Eight of the 9 cases with available information reported male-to-male sexual contact during the week before illness onset.

Streptococcal Invasive Disease – Group A
MDH has been conducting active surveillance for invasive disease caused by group A Streptococcus (GAS), also known as *Streptococcus pyogenes*, since 1995. Invasive GAS is defined as GAS isolated from a normally sterile site such as blood, cerebrospinal fluid, or from a wound when accompanied with necrotizing fasciitis or streptococcal toxic shock syndrome (STSS).

Two hundred fifty-nine cases of invasive GAS disease (4.8 cases per 100,000 population), including 27 deaths, were reported in 2014, compared to 209 cases and 14 deaths in 2013. Ages of cases ranged from 0 to 98 years (median, 58 years). Fifty-eight percent of cases were residents of the metropolitan area. One hundred (39%) cases had cellulitis, 55 (21%) had bacteremia without another focus of infection, 49 (19%) had septic arthritis and/or osteomyelitis, 21 (8%) cases had an abscess, 32 (12%) cases had septic shock, and 15 (6%) had necrotizing fasciitis. Seventeen (7%) cases were residents of long-term care facilities. Sixteen facilities had only 1 case, and one facility had 2 invasive GAS cases.

The 27 deaths included 3 cases of bacteremia without another focus of infection, 14 cases septic shock, 4 cases of necrotizing fasciitis, 7 cases of cellulitis, and 6 cases of pneumonia. One case had multiple syndromes including necrotizing fasciitis, septic shock, cellulitis, and septic arthritis. The deaths occurred in persons ranging in age from 40 to 89 years. One fatal case had no underlying medical conditions reported. Of the 23 cases where underlying medical condition was known the most frequently reported were diabetes (7), heart failure (6), obesity (6), COPD (5), asthma (5), and current smoking (5).

Streptococcal Invasive Disease – Group B
Five hundred forty-eight cases of invasive group B streptococcal (GBS) disease (10.1 per 100,000 population), including 16 deaths, were reported in 2014. In 2013, 595 cases were reported, the largest number of GBS cases reported since surveillance was initiated in 1995.

Annual incidence was highest among infants <1 year of age (52.4 per 100,000 population) and cases aged 70 years or older (36.9 per 100,000). Seven (44%) of the 16 deaths were among cases age 65 years and older. Fifty-six percent of cases were residents of the metropolitan area. Bacteremia without a focus of infection occurred most frequently (26% of infections), followed by cellulitis (18%), septic arthritis (12%), osteomyelitis (9%), abscess (8%), and meningitis (3%). The majority (68%) of cases had GBS isolated from blood; other isolate sites included joint fluid (13%) and bone (6%).

Forty-eight cases were infants or pregnant women (maternal cases), compared to 29 cases in 2013. Sixteen infants developed early-onset disease (occurred within 6 days of birth [0.2 cases per 1,000 live births]), and 17 infants developed late-onset disease (occurred at 7 to 89 days of age [0.2 cases per 1,000 live births]). Twelve stillbirth/spontaneous abortions were associated with the 15 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 2013. Overall, 12 of 16 women who delivered GBS-positive infants underwent prenatal screening for GBS. Of these, 3 were positive, and 9 negative. Two of the four women who did not receive prenatal screening were screened upon admission to the hospital and prior to delivery. Among the 16 women who delivered GBS-positive infants, 7 received intrapartum antimicrobial prophylaxis (IAP). Both of the women with a positive GBS screen after hospital admission received IAP.

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Streptococcus pneumoniae Invasive Disease

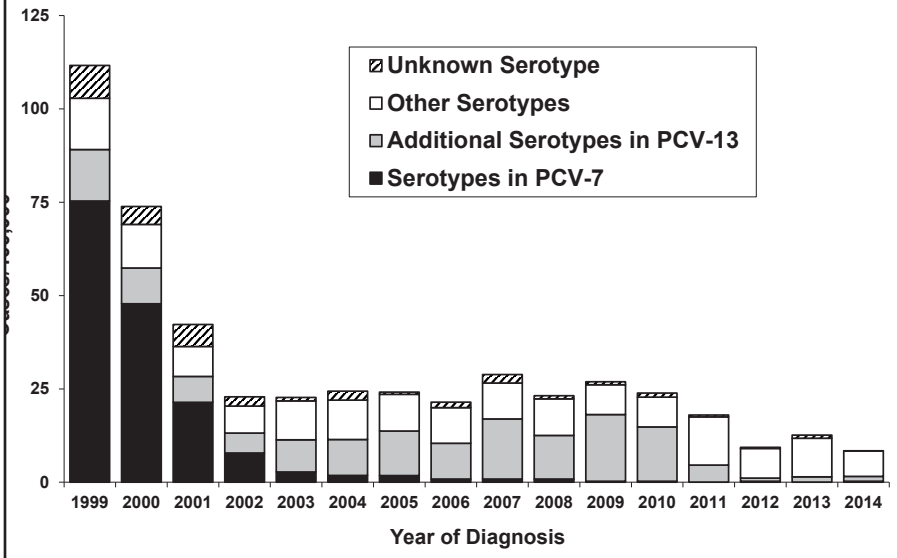
Statewide active surveillance for invasive *Streptococcus pneumoniae* (pneumococcal) disease began in 2002, expanded from the metropolitan area, where active surveillance was ongoing since 1995. In 2014, 476 (8.8 per 100,000) cases of invasive pneumococcal disease were reported. By age group, annual incidence rates per 100,000 were 11.8 cases among children aged 0-4 years, 2.8 cases among children and adults aged 5-39 years, 8.5 cases among adults 40-64 years, and 27.9 cases among adults aged 65 years and older.

In 2014, pneumonia occurred most frequently (52% of infections), followed by bacteremia without another focus of infection (28%), and pneumococcal meningitis (5%). Thirty-seven (8%) cases died. Health histories were available for all of the 37 cases who died. Of these, 36 had an underlying health condition reported. The conditions most frequently reported were heart failure/congestive heart failure (7), current smoker (7), atherosclerotic cardiovascular disease (6), chronic obstructive pulmonary disease (6), and alcohol abuse (5).

In 1999, the year before the pediatric pneumococcal conjugate vaccine (Prevnar [PCV-7]) was licensed; the rate of invasive pneumococcal disease among children 0-4 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 5). Rates in each of the subsequent 8 years were level or somewhat higher, although there has not been a continuing upward trend (Figure 5). 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. The new 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 invasive pneumococcal disease cases among children <5 years of age have been caused by the 6 new serotypes included in PCV-13 (Figure 5). Since 2011, the majority of invasive pneumococcal disease cases among children <5 years of age have been caused by serotypes not included in PCV-13 (Figure 5).

Figure 5. Invasive Pneumococcal Disease Incidence Among Children <5 Years of Age, by Year and Serotype Group, Metropolitan Area, 1999 – 2001; Minnesota, 2002 – 2014



PCV-13 contains the 7 serotypes in PCV-7 (4,6B,9V,14,18C,19F, and 23F) plus 6 additional serotypes (1,3,5,6A,7F, and 19A)

In 2014, 16% of cases occurring among Minnesotans of all ages, with isolates available for testing, were caused by 3 of the new PCV-13-included serotypes: 3 (9%), 19A (5%), 7F (3%). In August 2014, ACIP recommended that all adults 65 years of age or older receive a dose of PCV-13 followed by a dose of 23-valent pneumococcal polysaccharide vaccine (PPSV-23) 6 to 12 months later. Among adults 65 years and older 18% of cases were caused by PCV-13 serotypes in 2014.

Of the 453 isolates submitted for 2014 cases, 89 (20%) isolates were resistant to penicillin using meningitis breakpoints. Using non-meningitis breakpoints, 6 (1%) of 453 isolates were resistant to penicillin and 14 (3%) exhibited intermediate level resistance See the MDH Antibiogram on pages 28-29). Multi-drug resistance (i.e., high-level resistance to two or more antibiotic classes) was exhibited in 80 (18%) isolates.

Tetanus

Two cases of tetanus were reported in 2014. One occurred in a vaccinated, white non-Hispanic 29 year-old male. He sustained a linear laceration, less than 1 cm deep, to his hand while cutting sheet metal. He presented with back and neck stiffness 5 days after the injury and was hospitalized. He did not require mechanical ventilation. He received tetanus immune globulin (TIG) within 1-4 days of symptom onset. He was discharged after 2 days and fully recovered.

The second case was fatal, and occurred in a vaccinated white non-Hispanic previously healthy 76 year-old female. She fell while gardening and lacerated both shins. She presented to a clinic twice. On the first visit she presented with cellulitis and received antibiotic therapy. On the second visit, 6 days after her injury, she received Td. Eight days after injury, she had severe muscle spasms and was in respiratory distress. She was then intubated upon admission to the hospital for symptoms related to generalized tetanus. She received TIG shortly after admission (within 1-4 days of symptom onset); however, she remained ventilated in the ICU until her death 30 days after admission.

Although both case-patients had received Td within the previous 10 years, it is unclear whether each had completed a primary series. If not, TIG would have been indicated at the time of the case-fatality's injury.

Toxic Shock Syndrome

In 2014, 13 cases of suspect, probable, or confirmed staphylococcal toxic shock syndrome (TSS) were reported. Eight cases were female; the median age was 15 years (range, 9 to 72 years). Five cases were associated with tampon use. Two cases were

associated with pneumonia, 1 of which was also menstrual associated. Three cases were fatal.

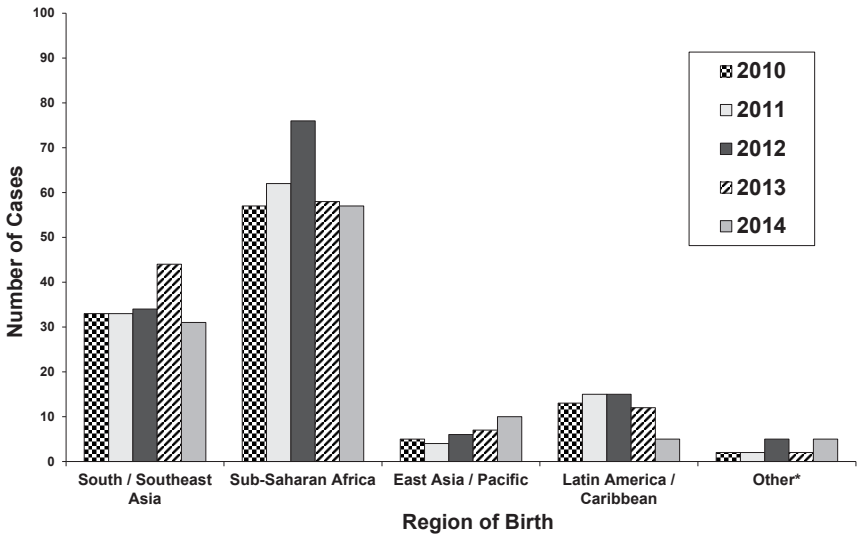
Staphylococcal toxic shock syndrome is reportable within 1 working day and includes submission of clinical isolates. The 2011 CDC case definition is used to classify cases. This definition encompasses the following clinical and laboratory findings: fever (temperature ≥102.0°F or 38.9°C), rash (diffuse macular erythroderma), desquamation (within 1-2 weeks after onset of illness), hypotension (SBP ≤ 90 mm Hg for adults or less than fifth percentile by age for children aged <16 years), multisystem involvement (>3 of the following: vomiting or diarrhea at onset of illness; severe myalgia or creatinine phosphokinase level at least twice the upper limit of normal; vaginal, oropharyngeal, or conjunctival hyperemia; blood urea nitrogen or creatinine at least twice the upper limit of normal for laboratory or urinary sediment with pyuria (>5 leukocytes per high-power field) in the absence of urinary tract infection; total bilirubin, alanine aminotransferase enzyme, or aspartate aminotransferase enzyme levels at least twice the upper limit of normal for laboratory; platelets less than 100,000/mm^3; disorientation or alterations in consciousness without focal neurologic signs when fever and hypotension are absent); negative results for blood or cerebrospinal fluid cultures (blood culture may be positive for *Staphylococcus aureus*) or negative serologies for Rocky Mountain spotted fever, leptospirosis, or measles (if done).

Toxoplasmosis

Toxoplasmosis is an illness caused by the coccidian protozoan *Toxoplasma gondii*. Cats are the primary reservoir for *T. gondii*. *T. gondii* transmission in the United States is primarily foodborne, through the consumption of undercooked meat, or food or water that has been contaminated with cat feces; people also can be infected through direct contact with cat feces that contain the parasite.

MDH conducts passive physician and laboratory-based surveillance for toxoplasmosis. In 2014, 7 confirmed cases of toxoplasmosis were reported, similar to the 8 cases reported in 2013. Four of the 7 cases had immunosuppressing conditions. Three cases were diagnosed with cerebral toxoplasmosis, 2 with ocular toxoplasmosis, and 2 with generalized toxoplasmosis. One case was a pregnant woman which resulted in a second trimester stillbirth. The median age of cases was 34 years (range, 25 to 78 years). Four (57%) cases were male. Of the 5 cases for whom race and ethnicity information were available, 3 were white, 1 was black, and 1 was Asian; all 5 cases were non-Hispanic.

Figure 6. Foreign-Born Tuberculosis Cases by Region of Birth and Year of Report, Minnesota, 2010 – 2014



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

Tuberculosis

In 2014, 147 cases of active tuberculosis (TB) disease (2.7 cases per 100,000 population) were reported. This represents a 3% decrease compared to 2013 (151), and a 38% decrease since 2007, when the highest number (238) in the past decade was reported. As seen in most years, Minnesota's TB incidence rate in 2014 was lower than the national rate of 3.0 cases per 100,000 population. Three (2%) of the TB cases reported in Minnesota in 2014 died due to TB-related causes.

Twenty-five (29%) of the state's 87 counties had at least 1 case of TB in 2014. The majority (69%) of cases occurred in the metropolitan area, primarily in Hennepin (35%) and Ramsey (18%) Counties. Sixteen percent (24) of TB cases in 2014 were reported in the other five metropolitan counties (i.e., Anoka, Carver, Dakota, Scott, and Washington). The remaining 31% were reported from outside the metropolitan area, which is higher than in previous years. Among metropolitan area counties, the highest TB incidence rate in 2014 was reported in Ramsey County (4.9 cases per 100,000 population), followed by Hennepin County (4.3 cases per 100,000), and Dakota County (3.7 cases per 100,000 population). The TB incidence rate for all Greater Minnesota counties combined was 1.9 cases per 100,000 population.

The majority (76%) of cases were identified as a result of individuals seeking medical care for symptoms of TB disease. Various targeted public health interventions identified a portion of the remaining 24% of cases. Such methods of case identification are considered high priority, core TB prevention and control activities; they included TB contact investigations (6%), follow-up evaluations resulting from abnormal findings on pre-immigration exams performed overseas (5%), and domestic refugee health assessments (3%). An additional 7% of TB cases were identified through a variety of other means (e.g., occupational screening or other targeted testing for TB). Four (3%) cases were diagnosed incidentally while being evaluated for another medical condition.

The incidence of TB disease is disproportionately high in racial minorities in Minnesota as well as nationally. In 2014, 22 TB cases occurred among whites in Minnesota (0.5 cases per 100,000 population). In contrast, 61 TB cases occurred among blacks (17.7 cases per 100,000), 47 among Asians (18.0 cases per 100,000), 4 among American Indians or Alaska Natives (4.9 cases per 100,000), and 12 among Hispanics or Latinos (4.4 cases per 100,000). The

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vast majority of black TB cases (90%) and Asian TB cases (89%) reported in Minnesota in 2014 were foreign-born.

The most distinguishing characteristic of the epidemiology of TB disease in Minnesota continues to be the large proportion of cases occurring among persons born outside the United States. In 2014, the percentage of TB cases in Minnesota occurring in foreign-born persons was 73%, which was lower than the 5-year average of 81% from 2010-2014. In comparison, 67% of TB cases reported nationally in 2014 were foreign-born. The 108 foreign-born TB cases reported in Minnesota represented 26 different countries of birth; the most common region of birth among these patients was Sub-Saharan Africa (53% of foreign-born cases), followed by South/Southeast Asia (29%), East Asia/Pacific (9%), and Latin America (including the Caribbean) (5%) (Figure 6). Among the 18 U.S.-born pediatric TB cases (<15 years of age at TB diagnosis), 15 (83%) had at least one foreign-born parent or guardian. These second-generation children appear to experience an increased risk of TB disease that more closely resembles that of foreign-born persons. The ethnic diversity among foreign-born TB cases in Minnesota reflects the unique and constantly changing demographics of immigrants and other foreign-born populations arriving in the state.

Among the foreign-born TB cases, 20% were diagnosed with TB disease within the first 12 months after arriving in the United States, and an additional 18% were diagnosed 1 to 2 years after their arrival. These cases most likely acquired TB infection prior to immigrating and started progressing to active TB disease shortly after arrival. Of the 13 TB cases 15 years of age or older who arrived as immigrants or refugees and diagnosed in Minnesota within 12 months of arriving in the U.S., only 7 had any TB-related condition noted in their pre-immigration medical examination reports. These findings highlight the need for clinicians to have a high index of suspicion for TB among newly arrived foreign-born persons, regardless of the results of medical exams performed overseas.

Fifty-nine percent of cases had TB disease exclusively in the lungs, or pulmonary TB. Another 10% had both pulmonary and extrapulmonary sites of disease. Over half (52%) of foreign-born and only 13% of U.S.-born TB cases had at least one extrapulmonary site of disease (including those who also had pulmonary disease). Among cases with an extrapulmonary site of disease, the most common sites by far were lymphatic (61%), followed by musculoskeletal (11%), and pleural (8%).

Aside from foreign-born persons, individuals in other high risk groups comprise a smaller proportion of the TB cases in Minnesota. Among cases reported in 2014, 25% occurred among persons with certain medical conditions (excluding HIV infection) that increase the risk for progression from latent TB infection (LTBI) to active TB disease (e.g., diabetes, prolonged corticosteroid or other immunosuppressive therapy, end stage renal disease). Following the presence of these underlying medical conditions, the next most common risk factor was substance abuse (including alcohol abuse and/or injection and non-injection drug use), with 5% of TB cases having a history of substance abuse during the 12 months prior to their TB diagnosis. Five percent of cases also reported being homeless during the 12 months prior to diagnosis. Four (3%) were co-infected with HIV. Another high risk group accounting for 1% of cases reported in Minnesota included correctional facility residents at time of diagnosis.

In 2014, of 105 culture-confirmed TB cases with drug susceptibility results available, 25 (24%) were resistant to at least one first-line anti-TB drug (i.e., isoniazid (INH), rifampin, pyrazinamide, or ethambutol), including 19 (18%) cases resistant to INH. There was 1 case of multidrug-resistant TB (MDR-TB, or resistance to at least INH and rifampin). In comparison, 21% of culture-confirmed cases in 2013 with susceptibility results available were resistant to at least one first-line anti-TB drug, 12% were resistant to INH, and no cases had MDR-TB.

Unexplained Critical Illnesses and Deaths of Possible Infectious Etiology (UNEX) and Medical Examiner Infectious Deaths Surveillance (MED-X)

Surveillance for unexplained critical illnesses and deaths of possible infectious etiology (UNEX) began September 1995. 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. In addition to provider reporting, death certificates are reviewed for any deaths in persons <50 years of age with no apparent significant underlying conditions for possible unexplained infectious syndromes.

In 2006, MDH began Medical Examiner (ME) Infectious Deaths Surveillance (known as MED-X) to evaluate all ME cases for infectious-related deaths. MEs report explained and unexplained cases. Unexplained deaths in previously healthy individuals <50 years of age are included regardless of infectious hallmarks; this is predominantly represented by Sudden Unexplained Infant Deaths. In addition, we review death certificates for any case in which an autopsy was performed by an ME with a potential infectious cause of death. Cases found through death certificate review are also considered for UNEX surveillance if they are <50 years of age and have no immunocompromising conditions.

Testing of pre-mortem and post-mortem specimens is conducted at the PHL and the CDC Infectious Diseases Pathology Branch. Cases are excluded from UNEX if they are determined to be explained by providers, are not critically ill, or have no infectious disease hallmarks.

Eighty-nine cases met criteria for UNEX surveillance (81 deaths and 8 critical illnesses) in 2014, compared to 70 cases in 2013. Of these, 74 (83%) were reported by providers and 15 (17%) were found by death certificate review. Thirty-nine (43%) cases presented with respiratory symptoms; 31 (34%) with sudden unexpected death; 6 (7%) with neurologic symptoms; 6 (7%) with shock/sepsis; 6 (7%) with gastrointestinal illness, and 1 (1%) with cardiac symptoms. The age of cases ranged from newborn to 72 years. The median age was 8 years among 74 reported cases, and 46 years among 15 non-reported cases found through active surveillance. Fifty-two percent resided in the metropolitan area and 53% were male.

There were 261 MED-X cases in 2014; 55 of these also met UNEX criteria. The median age of the cases was 35 years, and 54% were male. There were 145 (56%) cases found through death certificate review. MEs reported 106 (41%) cases. The most common syndrome was pneumonia/upper respiratory infection (n=91 [35%]). Of the 261 cases, 82 (31%) were confirmed to have had an infectious cause, 135 (52%) had possible infectious causes,

Table 5. UNEX/MED-X Pathogens Identified as Confirmed, Probably, or Possible Cause of Illness, 2014*		
Pathogen Identified	**UNEX (n=47)**	**MED-X (n=39)****
Adenovirus	4	0
Adenovirus type 1	1	0
Adenovirus type 5	1	0
Bordetella pertussis	1	0
Citrobacter koseri	1	0
Coxsackievirus B5	1	0
Echovirus 11	3	0
Enterovirus D68	1	0
Escherichia coli	0	3
Enterococcus spp.	0	2
Enterococcus faecalis	0	1
Group A Streptococcus	0	3
Group B Streptococcus	2	3
Group C Streptococcus	1	1
Haemophilus influenzae	2	0
Haemophilus influenzae type B	1	0
Human immunodeficiency virus	0	1
Influenza A virus (no hemagglutinin typing information available)	0	7
Influenza A-H3	5	0
Influenza A-H1	2	0
Influenza B	1	0
Klebsiella pneumoniae	0	1
La Crosse encephalitis virus	1	0
Lactobacillus gasseri	1	0
Metapneumovirus	1	0
Moraxella spp.	1	0
Mycoplasma pneumoniae	2	0
Norovirus	3	0
Parechovirus	1	0
Plasmodium falciparum	1	0
Respiratory syncytial virus	5	0
Rhinovirus	5	0
Staphylococcus aureus	2	12
Staphylococcus aureus-MRSA	1	1
Staphylococcus lugdunensis	1	0
Streptococcus spp.	0	1
Streptococcus milleri	0	1
Streptococcus pneumoniae	11	6
Streptococcus viridans	0	2

*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 UNEX column.

and 44 (17%) were non-infectious or unknown cause.

One hundred thirty-nine cases had specimens tested at the PHL and/or the CDC. Fifty-nine cases had pathogens identified as confirmed, probable, or possible cause of illness, including 47 UNEX cases (Table 5). Among 51 unexplained deaths occurring in those <50 years of age without any immunocompromising conditions, UNEX helped to identify the pathogen(s) involved in 20 (39%) cases. ME surveillance detected an additional 39 cases with pathogens identified by MEs as the cause of death (Table 5).

Cases with pathogens of public health importance detected included a 7 year-old male who presented with headache, fever, vomiting, and agitation. Testing for IgM antibodies to arboviruses by immunofluorescent assay was positive at PHL, and testing by antigen capture EIA and plaque reduction neutralization test at CDC detected antibodies to La Crosse encephalitis virus. A subsequent visit to the patient's home identified multiple *Aedes triseriatus* breeding sites including large numbers of discarded tires that were then removed and properly destroyed. The first documented death of enterovirus D68 virus in Minnesota was detected in a 12 year-old male with an underlying medical condition who had a fever and cough prior to death and evidence of pneumonia on autopsy. PCR testing at PHL and CDC detected enterovirus D68 RNA on nasopharyngeal swab and autopsied lung tissue. Finally, UNEX surveillance was able to help determine the etiologic agent in the death of a 56 year-old female with history of travel to West Africa who presented to an emergency room with confusion and loss of consciousness. Testing at PHL detected *Plasmodium falciparum* by PCR and direct blood smear, and infection with Ebola virus was ruled out.

Varicella

Case-based surveillance for varicella was implemented for January 1, 2013. Due to declining varicella incidence in the post-vaccination era, the sentinel school program in place from 2006 through 2012 was no longer an effective surveillance tool and was discontinued.

During 2014, 297 cases (6 per 100,000 population) were reported compared to 483 in 2013. One hundred eighty-seven cases (63%) were reported from the metropolitan area. Cases ranged from 6 weeks to 52 years of age. Thirty-six (12%) cases were <1 year of age; 96 (32%) were 1-5 years of age; 97 (33%) were 6-12 years of age; 25 (8%) were 13-17 years of age; and 43 (14%) were 18 years of age and older.

For the first time since school outbreak surveillance began in 2005, no school outbreaks were reported. Two small outbreaks were associated with child care. One occurred in a home childcare and included 2 cases who were unvaccinated for varicella due to parental refusal, 2 cases who were underage for the vaccine, and 1 case with 1 dose of varicella vaccine. The other childcare outbreak occurred in a center with a separate infant room; all 5 cases were underage for vaccination.

During 2014, 12 cases were hospitalized, but no deaths were reported. Of the hospitalized cases, 3 (25%) were <1 year of age, 5 (42%) were 1-12 years of age, and 4 (33%) were ≥13 years of age. Seven had complications including bacterial superinfection, high fever, seizures, dehydration, and tachypnea with fatigue. Only 3 of the cases had predisposing conditions for severe disease; 1 was immunosuppressed due to chemotherapy, 1 was on an immunosuppressive drug following organ transplant, and 1 had an underlying condition of eczema. Eight of the cases had never received varicella-containing vaccine; 3 were underage for the vaccine, 2 were adults who were never offered the vaccine, and 2 were unvaccinated due to parental refusal. Three cases had been vaccinated with at least 1 dose of varicella vaccine; all 3 were hospitalized for observation rather than for severe varicella rash or complications. Vaccination history was unknown for the remaining case.

continued...

Varicella is sometimes identified by parents/guardians reporting to schools and child care facilities, rather than diagnosed by a health care provider. Of the 290 cases for which information is available, 213 (73%) had visited a health care provider, 15 (5%) had consulted a provider or clinic by telephone, 2 (1%) had been identified by school health personnel, and 60 (21%) had not consulted a provider. Laboratory confirmation of varicella by PCR is recommended for confirmation when rash presents atypically and for confirmation of outbreaks. Of the 258 cases for which information regarding testing was available, 74 (29%) had some type of testing performed.

Since 2006, ACIP has recommended 2 doses of varicella vaccine for children. The Minnesota school immunization law has required 2 doses of vaccine for students entering kindergarten and grade 7 since 2010. Beginning with the 2014-15 school year, all students in grades K-12 are required to have 2 doses. Children 15 months or older who are enrolled in childcare or preschool are required to have 1 dose. Young adults should be evaluated for varicella immunity (history of varicella disease or 2 doses of varicella vaccine at least 4 weeks apart) and offered vaccine if indicated. Varicella is often more severe in adolescents and adults and poses special risks to pregnant women and newborn infants.

All zoster cases in children <18 years of age are reportable. Cases may be reported by school health personnel, childcare facilities, or healthcare providers. During 2014, 69 zoster cases were reported. Ages ranged from 1 to17 years (median, 11 years). Sixty-four (94%) of the 68 cases for which information about diagnosis was available had been seen by a health care provider. Among the 53 cases for whom both varicella disease history and vaccination history were available, 17 (32%) had a history of disease but had not received vaccine, 23 (43%) had no history of disease but had received 1-2 doses of vaccine, and 13 (25%) had a history of disease and had received 1-2 doses of vaccine.

Zoster with dissemination or complications (other than post-herpetic neuralgia) in persons of any age is also reportable. During 2014, 73 zoster cases with dissemination or complications were reported; 70 were hospitalized. Thirty-six cases were $\geq$ 60 years of age, 25 were 30 to 59 years of age, and 12 were <30 years of age. Forty-one (56%) had underlying conditions or were being treated with immunosuppressive drugs. Twenty-nine cases had disseminated disease, 23 had meningitis, 11 had encephalitis or meningoencephalitis, 8 had cellulitis or other bacterial superinfection, 7 had pneumonia, 2 had Ramsay-Hunt Syndrome, 2 had myelitis, and 1 had dehydration. The presence of underlying conditions or treatment with immunosuppressive drugs was more common among cases with disseminated disease (93%) than among those with meningitis without disseminated rash (22%). Three cases with encephalitis subsequently died; one of these was immunocompromised.

Viral Hepatitis A

In 2014, 19 cases of hepatitis A (HAV) (0.4 per 100,000 population) were reported. Six cases were residents of the metropolitan area, including 4 residents of Hennepin or Ramsey Counties. Ten of the cases were male. Cases ranged in age from 12 to 91 years (median, 44 years). Race was known for 14 cases; of those 9 were white, 3 were black, 1 was Asian, and 1 was American Indian. Hispanic ethnicity was reported for 1 case (0.4 per 100,000).

One case was associated with travel. No risk factor was identified for the other 18 cases. No outbreaks of hepatitis A occurred in 2014.

Viral Hepatitis B

In 2014, 16 cases of acute hepatitis B virus (HBV) infection (0.3 per 100,000 population) were reported. In 2012, the case definition for acute hepatitis B was revised to include laboratory confirmed asymptomatic acute cases. Three of the 16 cases of acute hepatitis B were asymptomatic, laboratory-confirmed infections.

Acute cases ranged in age from 23 to 66 years (median, 46 years). Thirteen cases were residents of the metropolitan area, including 8 in Hennepin County and 1 in Ramsey County. Twelve cases were male and 6 were adolescents or young adults between 13 - 39 years of age. Race was known for 13 cases. Of those, 8 were white, 4 were black, and 1 was Asian. No cases were known to be of Hispanic ethnicity. Incidence rates were higher among Asians (0.4 per 100,000) and blacks (1.2 per 100,000), than among non-Hispanic whites (0.2 per 100,000).

We also received 197 reports of newly identified cases of confirmed chronic HBV infection in 2014. A total of 22,967 persons are estimated to be alive and living in Minnesota with chronic HBV. The median age of chronic HBV cases in Minnesota is 44 years.

No perinatal infections were identified in 2014. Infants born to HBV-infected women are followed in the Perinatal Hepatitis B Prevention Program and receive hepatitis B immune globulin, 3 doses of the hepatitis B vaccine, and post-vaccination serologic testing. The success of the Perinatal Hepatitis B Program is demonstrated by the fact that 322 infants born to HBV-infected women during 2013 had post-serologic testing demonstrating no infection.

Viral Hepatitis C

In 2014, 40 cases of acute hepatitis C virus (HCV) infection (0.7 per 100,000) were reported. In 2012, the case definition for acute hepatitis C changed to include documented asymptomatic seroconversion. Of the 40 acute cases, 1 (3%) was an asymptomatic, laboratory-confirmed acute HCV infection.

Twenty-two (55%) cases resided in Greater Minnesota. The median age of all cases was 33 years (range, 18 to 62 years). Twenty-five (63%) cases were female. Race was known for 32 cases; of those 23 (72%) were white, 7 (22%) were American Indian, 1 (3%) was black, and 1 (3%) was Native Hawaiian or Pacific Islander. Hispanic ethnicity was reported for 2 (5%) cases.

We received 2,237 reports of newly identified anti-HCV antibody-positive or HCV PCR-positive persons in 2014, the vast majority of whom are chronically infected. A total of 43,543 persons are estimated to be alive and living in Minnesota with past or present HCV infection. The median age of these cases is 56 years. Because most cases are asymptomatic, medical providers are encouraged to consider each patient's risk for HCV infection to determine the need for testing. Patients for whom testing is indicated include: persons born between 1945 and 1965; persons with past or present injection drug use; recipients of transfusions or organ transplants before July 1992; recipients of clotting factor concentrates produced before 1987; persons on chronic hemodialysis; persons with persistently abnormal alanine aminotransferase levels; healthcare, emergency medical, and public safety workers after needle sticks, sharps, or mucosal exposures to HCV-positive blood; and children born to HCV-positive women. Infants born to HCV-infected mothers should be tested at 12 to 18 months of age, as earlier testing tends to reflect maternal antibody status. Persons who test positive for HCV should be screened for susceptibility to hepatitis A and B virus infections and immunized appropriately.

International Travel and Patient Evaluation

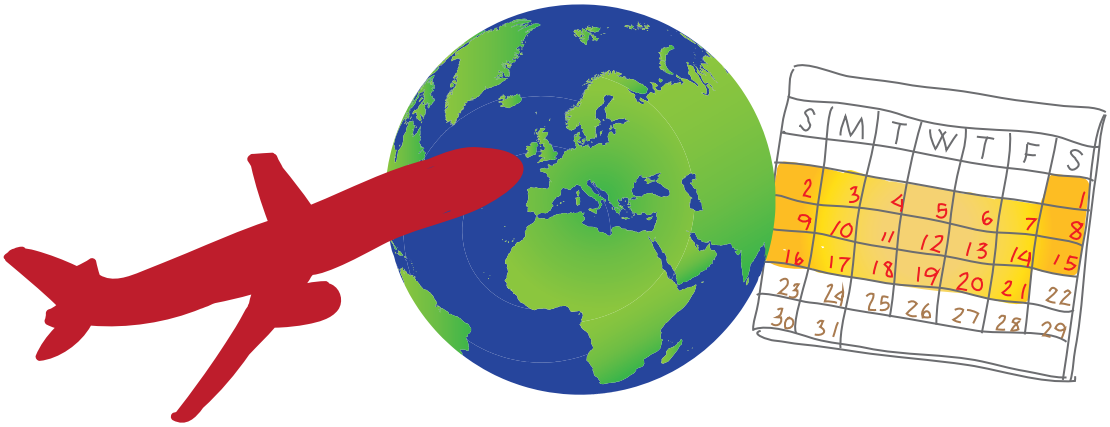
Travel is always an important consideration in evaluating patients. MDH recommends that all patients being seen for acute illness are asked if they have traveled internationally within the past 21 days and if yes, whether they visited a healthcare facility. Ill patients who have traveled should be placed in a private room pending clinical evaluation. Infection prevention precautions should be based on symptoms per routine protocols. Adhering to routine practices based on symptom presentation and possible travel history will help facilities respond to any infectious disease situation that arises.

Travel Health Notice

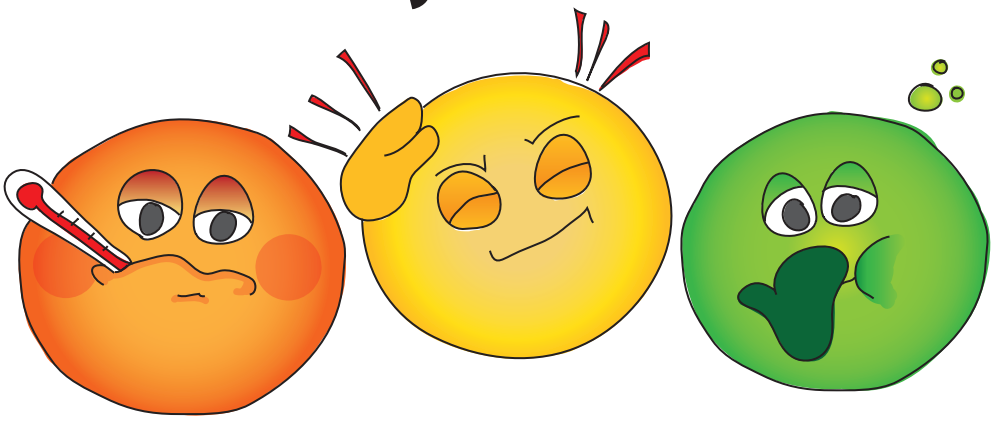
If you have

traveled outside the U.S.

within the last 3 weeks



and you feel ill



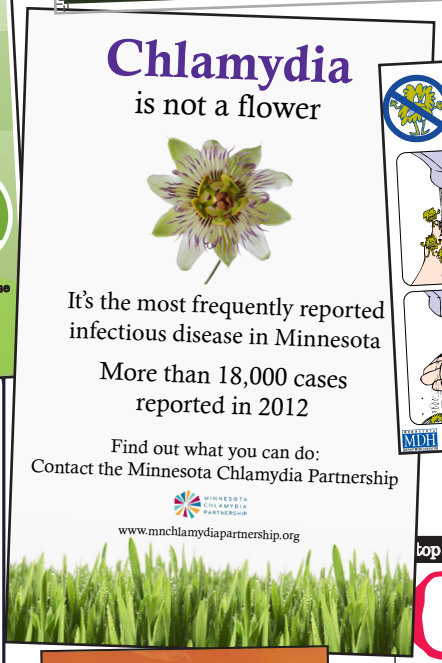
please tell staff right away

MINNESOTA MDH DEPARTMENT OF HEALTH

Minnesota Department of Health
651-201-5414 or 1-877-676-5414
www.health.state.mn.us
6/26/2015

Posters and Other Materials

The Minnesota Department of Health has a variety of posters and other print materials for your facilities and clinics, visit www.health.state.mn.us/divs/idepc to find all of these and many more.



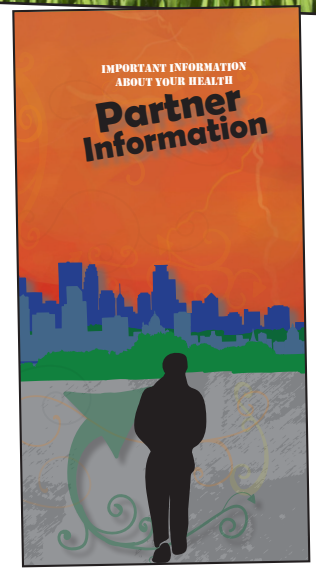
Pregnancy and Vaccination

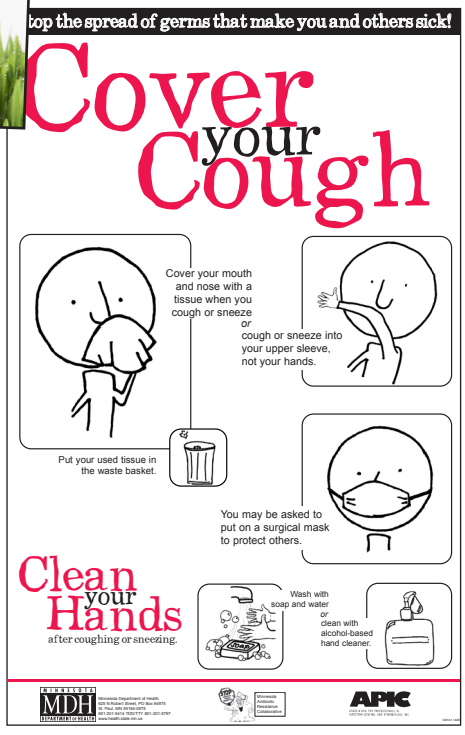
Pregnant women may be at risk for infectious diseases and their complications. Consider vaccination - even during pregnancy - to protect the woman and the fetus.

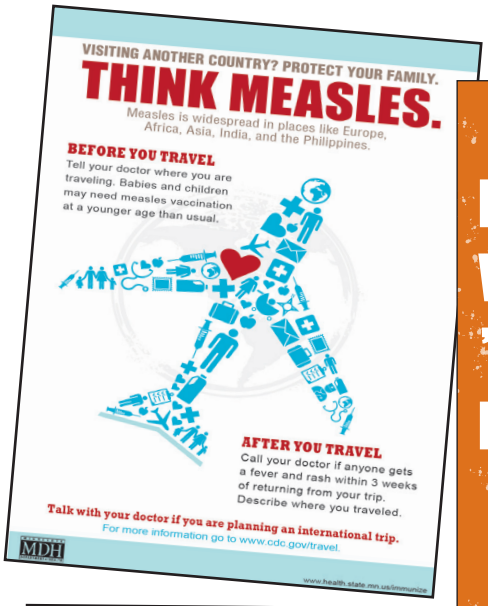
Recommended Contraindicated If indicated

Vaccine	Before pregnancy	During pregnancy	After pregnancy
Hepatitis A (HepA)	If indicated		
Hepatitis B (HepB)	If indicated		
Human Papillomavirus (HPV)	Age 9 through 26 years	Not recommended	Age 9 through 26 years
Influenza (IIV)	1 dose annually		
Influenza (LAIV)	Avoid conception for 4 weeks	Contraindicated	Avoid conception for 4 weeks
Measles, Mumps, Rubella (MMR)	Avoid conception for 4 weeks	Contraindicated	Give immediately postpartum if susceptible to rubella
Meningococcal (MCV4)	If indicated		
Pneumococcal (PPSV / PCV)	If indicated		
Tetanus, Diphtheria, Pertussis (Tdap)	If never given previously	During each pregnancy between 27 and 36 weeks	Give immediately postpartum if not given during pregnancy
Tetanus, Diphtheria (Td)	If indicated		
Varicella (VAR)	Avoid conception for 4 weeks	Contraindicated	Give immediately postpartum if susceptible

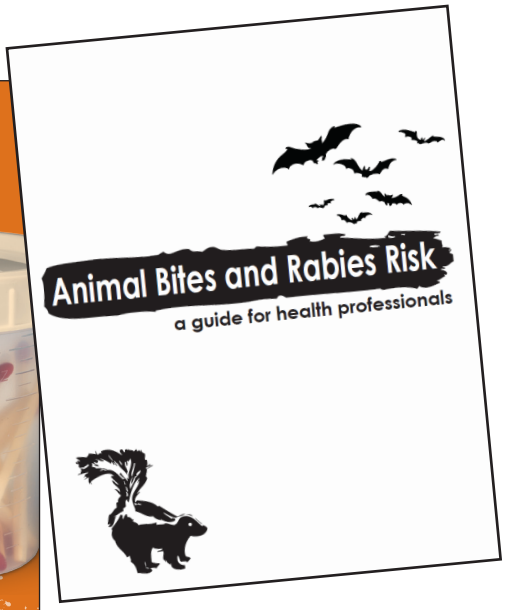
MDH Immunization Program 1-800-657-3970



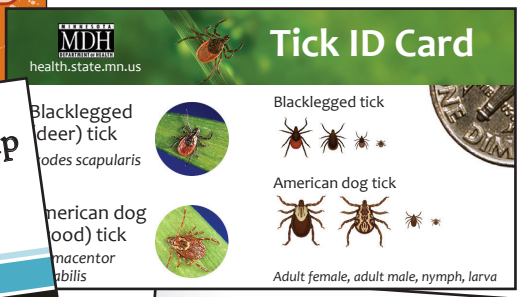


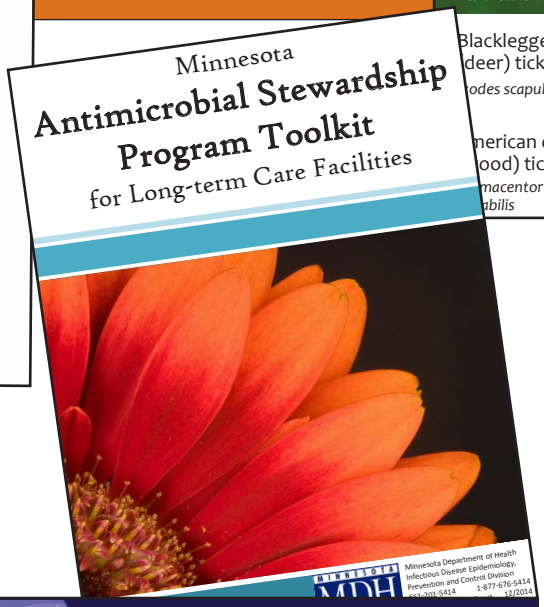

VISITING ANOTHER COUNTRY? PROTECT YOUR FAMILY.
THINK MEASLES.
Measles is widespread in places like Europe, Africa, Asia, India, and the Philippines.
BEFORE YOU TRAVEL
Tell your doctor where you are traveling. Babies and children may need measles vaccination at a younger age than usual.
AFTER YOU TRAVEL
Call your doctor if anyone gets a fever and rash within 3 weeks of returning from your trip. Describe where you traveled.
Talk with your doctor if you are planning an international trip.
For more information go to www.cdc.gov/travel.
MDH
www.health.state.mn.us/immunize


DON'T WAIT 'TIL IT HURTS.
Urine Sample
Patient Number: 15493
CHLAMYDIA
GONORRHEA
TESTING AND TREATMENT ARE QUICK AND PAINLESS.
PEE IN A CUP. GET IT CLEARED UP.
800.78FACTS VOICE/TTY WrapTestTreat.com
wrap it / test it / treat it

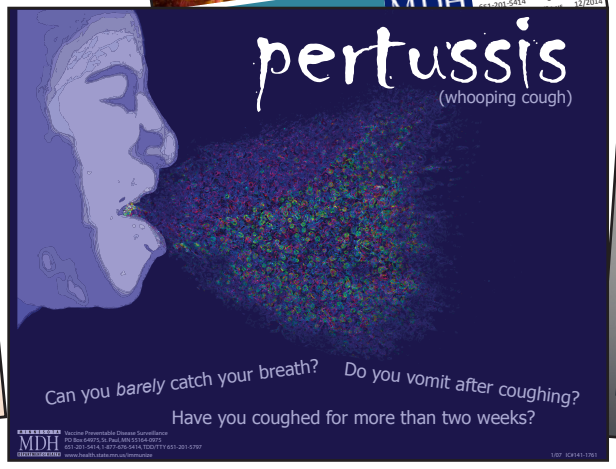

Animal Bites and Rabies Risk
a guide for health professionals


Combata la gripe
¡Tápese al toser!
Lávese las manos.
Quédese en su casa si está enfermo.
Vacúnese.
Encuentre una clínica de vacunas contra la influenza cerca a usted en
www.mdhflu.com
MDH


MDH
health.state.mn.us
Tick ID Card
Blacklegged tick
American dog tick
Adult female, adult male, nymph, larva


Minnesota
Antimicrobial Stewardship Program Toolkit
for Long-term Care Facilities
Minnesota Department of Health
Infectious Disease Epidemiology, Prevention and Control Division
1-877-676-5414


KEEP THEM SAFE!
Vaccinate
Resources you can trust
GOT YOUR baby FACTS?


pertussis
(whooping cough)
Can you barely catch your breath?
Do you vomit after coughing?
Have you coughed for more than two weeks?
MDH


Refugee Health
Working to promote and enhance the health and well-being of refugees.
MDH
health.state.mn.us/refugee

Antimicrobial Susceptibilities of Selected Pathogens, 2014

On the following pages is the *Antimicrobial Susceptibilities of Selected Pathogens, 2014*, a compilation of antimicrobial susceptibilities of selected pathogens submitted to MDH during 2013 in accordance with Minnesota Rule 4605.7040. Because a select group of isolates is submitted to MDH, it is important to read the notes entitled "Sampling Methodology" and "Trends, Comments, and Other Pathogens."

The MDH Antibiogram is available on the MDH Web site at:
www.health.state.mn.us/divs/idepc/dtopics/antibioticresistance/antibiogram.html

Laminated copies can be ordered from: Antibiogram, Minnesota Department of Health, IDEPC, PO Box 64975, St. Paul, MN 55164 or by calling 651-201-5414.

Antimicrobial Susceptibilities of Selected Pathogens, 2014

MINNESOTA MDH DEPARTMENT OF HEALTH

Sampling Methodology
* all isolates tested
† ~20% sample of statewide isolates received at MDH
‖ isolates from a normally sterile site

		Campylobacter spp. [1†]	*Salmonella enterica* (non-typhoidal) [2†]	*Shigella* spp. [3*]	*Neisseria gonorrhoeae* [4]	*Neisseria meningitidis* [5*‖]	Group A *Streptococcus* [6*‖]	Group B *Streptococcus* [7*‖]	*Streptococcus pneumoniae* [8*‖]	*Mycobacterium tuberculosis* complex [10*]
Number of Isolates Tested		142	71	78	102	6	239	506	453	105
		% Susceptible								
ß-lactam antibiotics	amoxicillin								93	
	ampicillin		89	51		84	100	100		
	penicillin				0	84	100	100	80[#]/96[¶]	
	cefixime				100					
	cefpodoxime									
	cefuroxime sodium								87	
	cefotaxime						100	100	91[#]/96[¶]	
	ceftriaxone		99	99	100	100			91[#]/96[¶]	
	meropenem					100			92	
Other antibiotics	ciprofloxacin	75[1]	99	90	76	100				
	levofloxacin					100	100	99	99	
	azithromycin	99		74[3]	77	100				
	erythromycin	99					84	46	65	
	clindamycin						95/84[6]	66/55[7]	89	
	chloramphenicol		97	78					99	
	gentamicin	100								
	spectinomycin				100					
	tetracycline	39			14		88		87	
	trimethoprim/sulfamethoxazole (TMP/SMX)		100	23					82	
	vancomycin						100	100	100	
TB antibiotics	ethambutol									99
	isoniazid									82
	pyrazinamide									92
	rifampin					100				99

Trends, Comments, and Other Pathogens	
[1] *Campylobacter* spp.	Quinolone susceptibility was determined for all (799) isolates; isolates that were nalidixic acid-susceptible were assumed to be ciprofloxacin susceptible. Only 24% of isolates from patients returning from foreign travel (n=154) were susceptible to quinolones. *Campylobacter* susceptiblities were determined using CDC NARMS report standards (http://www.cdc.gov/narms).
[2] *Salmonella enterica* (non-typhoidal)	Antimicrobial treatment for uncomplicated gastroenteritis due to *Salmonella* is not generally recommended.
[3] *Shigella* spp.	For cases in which treatment is required and susceptibility is unknown or an ampicillin and TMP/SMX-resistant strain is isolated, azithromycin for 3 days, ceftriaxone for 2 to 5 days, or a fluoroquinolone (such as ciprofloxacin) for 3 days is recommended. For susceptible strains, ampicillin or TMP/SMX is effective; amoxicillin is less effective because of rapid absorption from the gastrointestinal tract (2015 *Red Book*). National susceptibility criteria for azithromycin are under development. In Minnesota, bacterial isolates with no zone of inhibition of bacterial growth using 15µg of azithromycin were considered "resistant" for this table. 18 (90%) of azithromycin-resistant infections were in adult males with no travel history. The other 2 were adult women who reported foreign travel.
[4] *Neisseria gonorrhoeae*	Routine resistance testing for *Neisseria gonorrhoeae* by the MDH PHL was discontinued in 2008. Susceptibility results were obtained from the CDC contracted laboratory at John's Hopkins, and are for isolates obtained through the Gonococcal Isolate Surveillance Program. Isolates (n=102) were received from the Red Door Clinic in Minneapolis. One isolate did not have results reported. Resistance criteria for the following antibiotics have not been established; therefore, the data reflect reduced susceptibility using provisional MIC breakpoints for cefixime ≥0.5 µg/ml, ceftriaxone ≥0.5 µg/ml, and azithromycin ≥2.0 µg/ml. Also, the number of isolates submitted for testing increased from 98 in 2013 to 102 in 2014. CDC issued new treatment guidelines in 2015.
[5] *Neisseria meningitidis*	In 2014, 1 case-isolate was intermediate to both penicillin and ampicillin. There were no case-isolates with ciprofloxacin resistance. In 2008, 2 isolates from cases occurring in northwestern MN had nalidixic acid MICs >8 µg/ml and ciprofloxacin MICs of 0.25 µg/ml indicative of resistance. The MIC interpretive criteria for azithromycin, ciprofloxacin, levofloxacin, and rifampin apply to prophylactic therapy and do not apply to therapy of patients with invasive meningococcal disease.
[6] Group A *Streptococcus*	The 239 isolates tested represent 92% of 259 total cases. Among 27 erythromycin resistant - clindamycin susceptible or intermediate isolates, 26 (92%) had inducible clindamyin resistance for a total of 84% that were susceptible to clindamycin and did not exhibit inducible clindamycin resistance.
[7] Group B *Streptococcus*	100% (16/16) of early-onset infant, 100% (17/17) late-onset infants, 87% (13/15) of maternal, and 92% (460/500) of other invasive GBS cases were tested. Among 107 erythromycin resistant-clindamycin susceptible or intermediate isolates, 58 (54%) had inducible resistance to clindamycin for a total of 55%(276/506) that were susceptible to clindamycin and did not exhibit inducible clindamycin resistance. 73% (35/48) of infant and maternal cases were susceptible to clindamycin and did not exhibit inducible clindamycin resistance.
[8] *Streptococcus pneumoniae*	The 453 isolates tested represent 95% of 476 total cases. #Case-isolates susceptible by meningitis breakpoints for cefotaxime and ceftriaxone (intermediate =1.0 µg/ml, resistant ≥2.0 µg/ml) and penicillin (resistant ≥0.12 µg/ml). ¶Case-isolates susceptible by nonmeningitis breakpoints for cefotaxime and ceftriaxone (intermediate =2.0 µg/ml, resistant ≥4.0 µg/ml), and penicillin (intermediate =4.0 µg/ml, resistant ≥8.0 µg/ml). Isolates were screened for high-level resistance to rifampin at a single MIC; >99% (452/453) were ≤2 µg/ml. Using meningitis breakpoints, 18% (80/453) of isolates were resistant to two or more antibiotic classes and 12% (54/453) were resistant to three or more antibiotic classes. (Please refer to CLSI oral penicillin V breakpoints, not shown above.)
[10] *Mycobacterium tuberculosis* (TB) complex	National guidelines recommend initial four-drug therapy for TB disease, at least until first-line drug susceptibility results are known. Of the 25 TB cases reported in 2014 resistant to at least one first-line drug, 19 (76%) were foreign-born. There was 1 case of multidrug-resistant TB (MDR-TB) (i.e., resistant to at least isoniazid and rifampin) but no cases of extensively drug-resistant TB (XDR-TB) (i.e., resistance to isoniazid and rifampin, plus one fluoroquinolone, and at least one injectable second-line drug).
Invasive methicillin-resistant *Staphylococcus aureus* (MRSA)	260 cases of invasive MRSA infection were reported in 2014 in Ramsey and Hennepin Counties, of which 190 (73%) were from blood. 86% (224/260) had an isolate submitted and antimicrobial susceptibility testing conducted. Of cases with an isolate, 76% (171/224) were epidemiologically classified as healthcare-associated (hospital and community onset) . Susceptibilities were as follows: 100% to daptomycin, linezolid, telavancin, and vancomycin, and 99% to gentamicin and TMP/SMX; 98% to rifampin; 96% to doxycycline and tetracycline; 22% to levofloxacin; and 11% to erythromycin. Isolates were screened for mupirocin resistance with 8% exhibiting high-level resistance (MIC >256 ug/ml). 42% (71/171) were susceptible or intermediate to clindamycin by broth microdilution; however among 52 erythromycin resistant-clindamycin susceptible or intermediate isolates, 20 had inducible clindamycin resistance for a total of 30% (51/171) that were susceptible to clindamycin and did not exhibit inducible clindamycin resistance. For community-associated (CA) cases (53/57 with isolates), susceptibilities were as follows: 100% to daptomycin, doxycycline, gentamicin, linezolid, rifampin, telavancin, tetracycline, TMP/ SMX, vancomycin; 60% to levofloxacin; 21% to erythromycin. No CA isolates screened for mupirocin resistance exhibited high-level resistance. 83% (44/53) were susceptible to clindamycin by broth microdilution; however among 33 erythromycin resistant-clindamycin susceptible or intermediate isolates 12% (4/33) had inducible clindamycin resistance for a total of 75% (40/53) that were susceptible to clindamycin and did not exhibit inducible clindamycin resistance. There were no isolates confirmed as vancomycin resistant or intermediate in 2014.
Bordetella pertussis	In 2014, no cases of pertussis were tested for susceptibility in Minnesota. Nationally, only 11 erythromycin-resistant *B. pertussis* cases have been identified to date.
Carbapenem-resistant Enterobacteriaceae (CRE)	Of 134 CRE isolates submitted from 133 patients, 21 (16%) isolates (representing 20 patients) were bla_{KPC} positive by PCR including 10 (48%) *Enterobacter cloacae*, 8 (38%) *Klebsiella pneumoniae*, 2 (9%) *K. oxytoca*, 1 (5%) *Citrobacter freundii*; none were bla_{NDM} positive. 70% (14/20) were residents of the 7-county metro area. Additionally, 1 isolate (*K. pneumoniae*) from a non-MN resident was positive for bla_{OXA-48}, and 5 isolates (2 *E. coli* and 2 *K. pneumoniae*) were positive for bla_{NDM} from non- MN residents. The CRE definition is based on current CLSI breakpoints and includes Enterobacteriaceae that are nonsusceptible to a carbapenem (excluding ertapenem) and resistant to all tested third generation cephalosporins, or are positive for carbapenemase production. Due to their intrinsic resistance to imipenem, additional criteria apply for all species of *Proteus, Providencia,* and *Morganella*.
Escherichia coli O157:H7	Antimicrobial treatment for *E. coli* O157:H7 infection is not recommended.

Emerging Infections in Clinical Practice & Public Health
Advancing the Prevention of Emerging Infections

November 20, 2015

Radisson Blu-Mall of America
Bloomington, MN

Faculty and Curriculum Subject to Change

7:00	*Registration and Continental Breakfast*
7:30	**Welcome and Introductions**
7:40	**Impact of Vaccine Hesitancy on Community Susceptibility to Vaccine Preventable Diseases**
8:10	**Questions and Discussion**
	Saad Omer, MBBS, MPH, PhD, Emory University
8:20	**How Should We Address Vaccine Hesistancy with Parents and the Public?**
8:50	**Questions and Discussion**
	K. Vish Viswanath, PhD, Harvard University
9:00	**What is the Future of Vaccinology?**
9:30	**Questions and Discussion**
	Michael Barry, PhD, Mayo Clinic
9:40	**Reprocessing Endoscopes and Other Related Devices**
10:10	**Questions and Discussion**
	Bret Petersen, MD, Mayo Clinic
10:20	*Refreshment Break*
10:35	**Antimicrobial Stewardship and Antimicrobial Resistance: The National Perspective**
11:05	**Questions and Discussion**
	Arjun Srinivasan, MD Centers for Disease Control and Prevention
11:15	**Ebola – Notes From The Field**
11:45	**Questions and Discussion**
	Mary Choi, MD, MPH, Centers for Disease Control and Prevention
12:00 pm	*Lunch*
1:10	**Hot Topics**
1:40	**Questions and Discussion**
	Richard Danila, PhD, MPH, Minnesota Department of Health
1:50	**Chikungunya and Dengue**
2:20	**Questions and Discussion**
	Harold Margolis, MD, Centers for Disease Control, Puerto Rico
2:30	**Highly Pathogenic Avian Influenza- A Visitor or a Resident of Lake Wobegon**
3:00	**Questions and Discussion**
	Amanda Beaudoin, DVM, PhD, University of Minnesota
3:10	*Refreshment Break*
3:25	**Cases from the Travel Desk**
3:50	**Questions and Discussion**
	Abinash Virk, MD, Mayo Clinic
4:00	**Panel: Interesting and Unusual Case Presentations of Public Health Importance**
	Moderator: *Phillip K. Peterson, MD – University of Minnesota*
5:00	*Evaluations & Adjourn*

UNIVERSITY OF MINNESOTA

Emerging Infections in Clinical Practice & Public Health
Advancing the Prevention of Emerging Infections
Registration Form

November 20, 2015

Radisson Blu – Mall of America
Bloomington, MN

Please type or print clearly. A name badge and Statement of Participation are generated from this document. MM-3581

Name _____

Affiliation _____ **Department** _____

Address _____ ☐ HOME ☐ OFFICE

City _____ **State** _____ **Zip** _____

Telephone _____ **E-mail** _____

Receipts, confirmations and driving directions are e-mailed from our office. Please provide your e-mail address and print clearly.

DEGREE

☐ **MD** ☐ **DO** ☐ **PhD** ☐ **PharmD** ☐ **RPh** ☐ **MPH**
☐ **APRN (NP, CNS, CRNA, CNM)** ☐ **RN** ☐ **PA** ☐ **Other** _____

SPECIALTY

☐ **Family Medicine/Subspecialty** _____ ☐ **Internal Medicine/Subspecialty** _____
☐ **Pediatrics/Subspecialty** _____ ☐ **Infection Prevention** _____
☐ **Public Health** _____ ☐ **Other** _____
☐ **Laboratorian** _____

REGISTRATION FEES	**Early Rate On or Before October 23**	**Regular Rate After October 23**
☐ Physician	$225	$275
☐ Other Healthcare Professionals	$195	$245
☐ Retired Physicians	$180	$225
University of Minnesota, Mayo, MDH (must have UMN ID to qualify for these rates)		
☐ Full-time Faculty	$195	$245
☐ Other Healthcare Professionals	$145	$195
☐ Adjunct Faculty	$145	$195
☐ Resident / Fellow / Student	$80	$100

SPECIAL REQUESTS *Special needs, such as dietary restrictions, lactation room, etc., should be **requested in advance**. These requests cannot always be honored on site.*

Dietary: _____ Other: _____

TO REGISTER

Mail this registration form and your check, payable to **Regents of the University of Minnesota**, to:

Office of Continuing Professional Development, University of Minnesota Medical School
MMC 293, Mayo Memorial Bldg.
Room G-254, 420 Delaware Street SE
Minneapolis, MN 55455
For credit card payment, register online at www.cme.umn.edu/emerginginfections

CANCELLATION POLICY

In the event you need to cancel your registration, the registration fee, less a $50 administrative fee, will be refunded if you notify us by 4:30 p.m. CST on **November 6, 2015**. No refunds will be made after this date. If you have any questions, please contact our office at (612) 626-7600 or (800) 776-8636, or e-mail us at cme@umn.edu.

UNIVERSITY OF MINNESOTA
Continuing Professional Development

MINNESOTA MDH DEPARTMENT OF HEALTH
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Saint Paul, Minnesota 55164-0975

The Disease Control Newsletter is available on the MDH IDEPC web site:

http://www.health.state.mn.us/divs/idepc/newsletters/dcn/index.html