MINNESOTA DEPARTMENT OF HEALTH

DISEASE CONTROL NEWSLETTER

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Annual Summary of Communicable Diseases Reported to the Minnesota Department of Health, 2012

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 report forms 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 for pathogens with 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. 26-27).

Table 2 summarizes cases of selected communicable diseases reported during 2012 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

Human anaplasmosis (formerly known as human granulocytic ehrlichiosis) is caused by *Anaplasma phagocytophilum*, a rickettsial organism transmitted to humans by bites from *Ixodes scapularis* (the blacklegged tick or deer tick). In Minnesota, the same tick vector also transmits the etiologic agents of Lyme disease, babesiosis, one form of human ehrlichiosis, and a strain of Powassan virus. *A. phagocytophilum* can also be transmitted by blood transfusion.

In 2012, 507 confirmed or probable anaplasmosis cases (9.5 cases per 100,000 population) were reported (Figure 1). The median number of 317 cases (range, 139 to 782 cases) reported from 2004 through 2012 is also considerably higher than the median number of cases reported annually from 1996 to 2003 (median, 56 cases; range, 14 to 149). Three hundred eleven (61%) cases reported in 2012 were male. The median age of cases was 56 years (range, 1 to 99 years), 17 years older

continued on page 4

Inside:

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, LaCrosse 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-zoster disease (1. Primary [chickenpox]: unusual case incidence, critical illness, or laboratory-confirmed cases. 2. Recurrent [shingles]: unusual case incidence, or critical illness.) a
Vibrio spp. a
Yellow fever
Yersiniosis, enteric (*Yersinia* spp.) a

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, 2012

Disease	Metropolitan (2,884,747)	Northwestern (157,517)	Northeastern (326,219)	Central (732,688)	West Central (235,013)	South Central (291,131)	Southeastern (496,463)	Southwestern (221,083)	Unknown Residence	Total (5,344,861)
	District (population per U.S. Census 2011 estimates)									
Anaplasmosis	133	64	72	148	43	6	38	3	0	507
Arboviral disease										
La Crosse	2	0	0	2	0	0	0	0	0	4
West Nile	15	2	2	3	13	7	1	27		70
Babesiosis	12	4	7	11	3	1	3	0	0	41
Blastomycosis	8	1	8	3	0	1	1	0	0	22
Campylobacteriosis	459	16	33	155	42	55	115	75	0	950
Cryptosporidiosis	52	6	22	79	22	21	98	46	0	346
Escherichia coli O157 infection	34	0	1	29	16	5	21	18	0	124
Hemolytic uremic syndrome	1	0	0	4	1	0	3	4	0	13
Giardiasis	347	11	32	71	20	35	45	29	43	633
Haemophilus influenzae disease	37	3	4	14	4	8	12	4	0	86
HIV (non-AIDS)	194	0	15	13	5	1	4	4	0	236
AIDS (diagnosed in 2012)	170	2	3	8	1	2	10	4	2	202
Legionellosis	29	0	8	1	0	4	7	2	0	51
Listeriosis	5	0	0	2	0	0	0	0	0	7
Lyme disease	410	49	113	202	41	8	82	7	0	912
Meningococcal disease	6	0	1	3	1	0	1	0	0	12
Pertussis	2,505	25	153	803	25	34	553	45	1	4,144
Salmonellosis	434	19	20	86	13	45	82	81	0	780
Sexually transmitted diseases										
Chlamydia trachomatis - genital infections	11,246	381	1,050	1,466	446	639	1,277	368	1,175	18,048
Gonorrhea	2,479	42	135	117	21	25	74	34	155	3,082
Syphilis, total	287	1	3	13	1	5	9	1	15	335
Primary/secondary	113	1	0	3	1	0	0	0	0	118
Early latent*	91	0	1	0	0	3	1	0	0	96
Late latent**	82	0	2	10	0	2	8	1	15	120
Congenital	1	0	0	0	0	0	0	0	0	1
Other***	0	0	0	0	0	0	0	0	0	0
Shigellosis	244	28	3	57	20	3	8	28	0	391
Streptococcus pneumoniae disease	231	20	53	73	28	24	49	25	0	503
Streptococcal invasive disease - Group A	94	8	24	20	6	5	8	4	0	169
Streptococcal invasive disease - Group B	301	15	47	62	30	23	62	24	0	564
Toxic shock syndrome (Staphylococcal)	8	0	0	0	0	0	0	0	0	8
Tuberculosis	137	2	1	7	1	2	9	3	0	162
Viral hepatitis, type A	10	1	3	7	0	3	5	0	0	29
Viral hepatitis, type B (acute infections only, not perinatal)	14	0	1	2	0	0	0	0	0	17
Viral hepatitis, type C (acute infections only)	12	1	11	4	2	0	2	0	0	32

* Duration ≤1 year

** Duration >1 year

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

County Distribution within Districts

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

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

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

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

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

South Central - Blue Earth, Brown, Faribault, LeSueur, McLeod, Martin, Meeker, Nicollet, Sibley, Waseca, Watonwan

Southeastern - Dodge, Fillmore, Freeborn, Goodhue, Houston, Mower, Olmsted, Rice, Steele, Wabasha, Winona

Southwestern - Big Stone, Chippewa, Cottonwood, Jackson, Kandiyohi, Lac Qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Redwood, Renville, Rock, Swift, Yellow Medicine

than the median age of Lyme disease cases. Onsets of illness were elevated from May through July and peaked in June (28% of cases). In 2012, 102 (20%) anaplasmosis cases were known to be hospitalized for their infection, for a median duration of 3 days (range, 1 to 76 days).

Arboviral Diseases

Mosquito-borne Arboviruses

La Crosse encephalitis and Western equine encephalitis historically have been the primary arboviral encephalitides found in Minnesota. During July 2002, West Nile virus (WNV) was identified in Minnesota for the first time; subsequently, 535 human cases (including 16 fatalities) were reported from 2002 to 2012. In 2012, WNV cases were reported from 48 states and the District of Columbia; nationwide, 5,674 human cases of WNV disease were reported, including 286 fatalities. The largest WNV case counts during 2012 occurred in Texas (1,868 cases), California (479), and Louisiana (335).

In Minnesota, 70 cases of WNV disease were reported in 2012 (the third highest annual case total to date and well above the 2002-2012 median of 45 cases [range, 2-148]). Thirty-four (49%), including 1 fatal case, had encephalitis or meningitis. The other 36 (51%) cases had West Nile (WN) fever. Median age was 55 years (range, 7 to 87 years). As in past years, most cases occurred among residents of western and central Minnesota (Table 2) with illness onsets peaking in mid to late summer (median onset August 11, range May 29 to September 17; only 5 [7%] with onsets prior to July 15, and a peak of 37 cases [53%] in August). Thirty-five WNV-positive blood donors were identified during 2012. While 33 remained asymptomatic, one donor developed WN encephalitis and another had WN fever.

WNV is maintained in a mosquito-to-bird transmission cycle. Several mosquito and bird species are involved in this cycle, and regional variation in vector and reservoir species is likely. Interpreting the effect of weather on WNV transmission is also extremely complex, leading to great difficulty in predicting how many people will become infected in a given year. WNV appears to be established throughout Minnesota; it will probably be present in the state to some extent every year. The disease risk to humans, however, will likely continue to be higher in central and western Minnesota where the primary mosquito vector, *Culex tarsalis*, is most abundant.

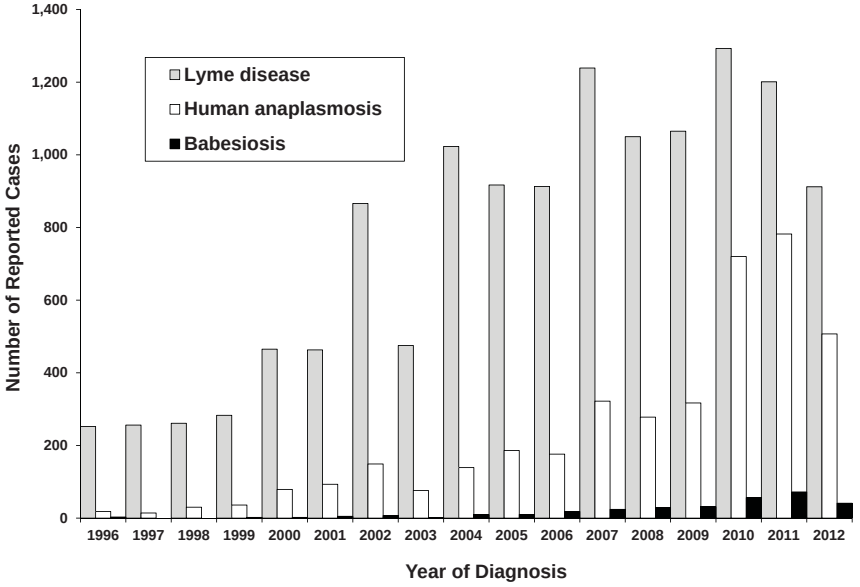
During 2008, there was a nationwide recall of a commercial WNV IgM test kit after many false-positive test results were identified in several states. All of the WNV test kits currently available are labeled for use on serum to aid in a presumptive diagnosis of WNV infection in patients with clinical symptoms of neuroinvasive disease. Positive results from these tests should be confirmed at the PHL or CDC.

During 2012, 4 cases of La Crosse encephalitis were reported to MDH. The disease, which primarily affects children, is transmitted through the bite of infected *Aedes triseriatus* (Eastern Tree Hole) mosquitoes. Persons are exposed to infected mosquitoes 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. From 1985 through 2012, 130 cases were reported from 22 southeastern Minnesota counties, with a median of 4 cases (range, 0 to 13 cases) reported annually. The median case age was 6 years. 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 in the United States.

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 *Ixodes scapularis*. The virus can cause encephalitis or meningitis, and long-term sequelae occur in approximately half of patients. Approximately 10-15% of cases are fatal. Since 2008, 21 cases (1 fatal) of POW disease have been reported in Minnesota residents. Most had neuroinvasive disease (11 encephalitis and 8 meningitis) but 2 were non-neuroinvasive POW fever cases. Sixteen (76%) cases were male. Median age was 49 years (range, 3 mos. to 74 years) and 6 (29%) were immunocompromised. Eighteen (86%) had onset of illness between May through August and 3 (14%) had October or November onsets. Eleven of 21 cases were reported in 2011 vs. 4 cases in 2012. Cases were exposed to ticks in several north-central Minnesota counties. MDH has also identified POW virus-positive ticks at sites in four of five counties that have been investigated to date (Clearwater, Cass, Pine, and Houston but not in Anoka). Thus, the virus appears to be widely distributed in the same wooded parts of the state

Figure 1. Reported Cases of Anaplasmosis, Babesiosis, and Lyme Disease, Minnesota, 1996-2012



that are endemic to other tick-borne diseases transmitted by *I. scapularis.*

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

Babesiosis

Babesiosis is a malaria-like illness caused by the protozoan *Babesia microti* or other *Babesia* organisms. *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, human anaplasmosis, one form of human ehrlichiosis, and a strain of Powassan virus. *Babesia* parasites can also be transmitted by blood transfusion.

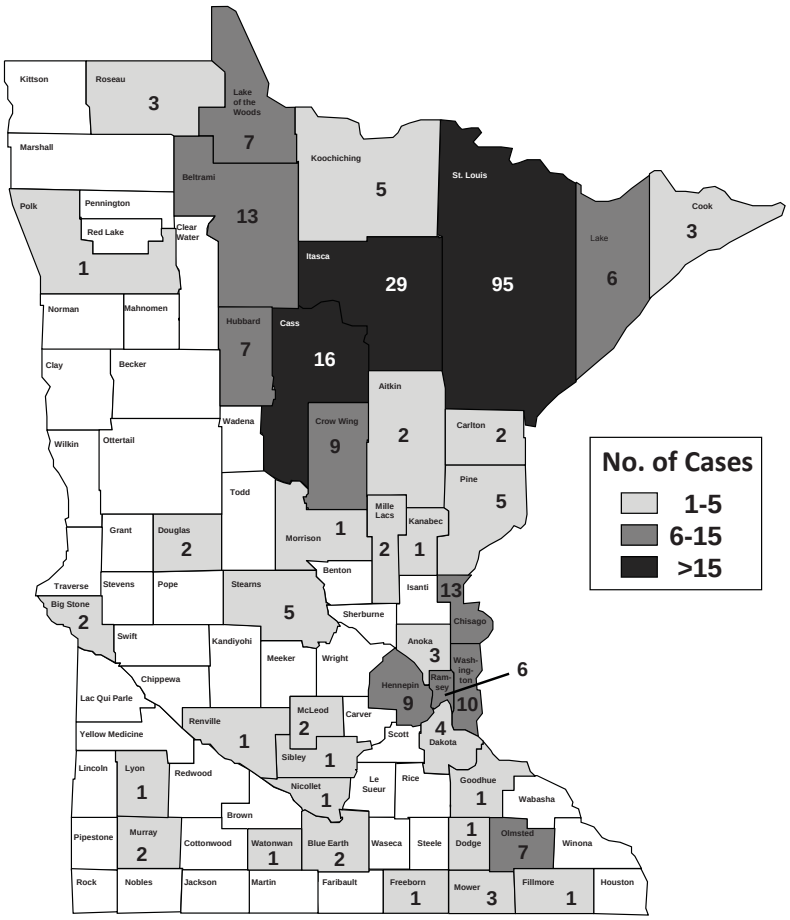
In 2012, 41 confirmed and probable babesiosis cases (0.77 per 100,000 population) were reported, a 43% decrease from the 2011 record of 72 cases. The median number of 29 cases (range, 9 to 72) reported from 2004 through 2012 is considerably higher than the median number of 2 cases (range, 0 to 7) from 1996 to 2003. Twenty-four (59%) babesiosis cases reported in 2012 were male. The median age of cases was 57 years (range, 1 to 82 years). Onsets of illness peaked in the summer months, with 22 (55%) of 40 cases with known onset occurring from June through August. In 2012, 18 (44%) cases were hospitalized for their infection, for a median duration of 5 days (range, 2 to 26 days). At least 1 reported case died from complications of babesiosis in 2012.

Blastomycosis

Blastomycosis is caused by the dimorphic fungus *Blastomyces dermatitidis* that exists as a mold in the environment and as a pathogenic yeast form in the body. The reservoir 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 airborne spores after disturbance of contaminated soil.

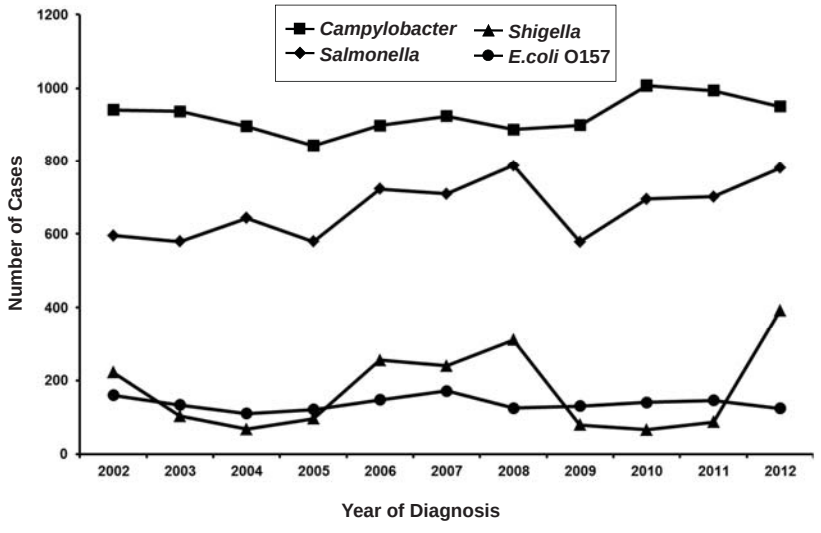
In 2012 there were 22 reported cases of blastomycosis. This is decreased from 2011 when there were 34 cases, and

Figure 2. Human Blastomycosis Cases in Minnesota by Probable County of Exposure*, 1999-2012 (n=341)



* 28 cases of blastomycosis were exposed in other states, 6 in Canada, and 1 in South America

Figure 3. Reported Cases of *Campylobacter*, *Salmonella*, *Shigella*, and *Escherichia coli* O157:H7 Infection, Minnesota, 2002-2012



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is the lowest case count since 1999. The median age of cases was 52 years (range 12 to 82 years), 73% were male. Nineteen (86%) of cases were white, 1 (5%) was black, 1 (5%) was American Indian, and 1 (5%) unknown race. Fifteen (68%) cases were hospitalized, for a median of 6 days (range 1 to 21 days); 1 (5%) case died. Nineteen (86%) cases had pulmonary infections, and 3 (14%) had disseminated infections.

From 1999 to 2012, there were 445 blastomycosis cases; the median number of cases annually is 33 (range 22 to 49). From 1999 to 2012, 95 (28%; based on total number of counties where we have this information) cases were likely exposed in St. Louis County, Itasca (29 cases, 9%), Cass (16 cases, 5%), Beltrami (13 cases, 4%), Chisago (13 cases, 4%), and Washington (10 cases, 3%) Counties, which are known to be endemic counties in Minnesota (Figure 2).

Campylobacteriosis

Campylobacter continues to be the most commonly reported bacterial enteric pathogen in Minnesota (Figure 3). There were 950 cases of culture-confirmed *Campylobacter* infection reported in 2012 (17.8 per 100,000 population). This is a 5% decrease from the 995 cases reported in 2011 but a 5% increase from the median annual number of cases reported from 2002 to 2011 (median, 903 cases; range, 843 to 1,007). In 2012, 48% of cases occurred in people who resided in the metropolitan area. Of the 880 *Campylobacter* isolates confirmed and identified to species by MDH, 88% were *C. jejuni* and 10% were *C. coli*.

The median age of cases was 38 years (range, 3 weeks to 96 years). Forty percent of cases were between 20 and 49 years of age, and 11% were 5 years of age or younger. Fifty-seven percent of cases were male. Eighteen percent of cases were hospitalized; the median length of hospitalization was 3 days. Forty-nine percent of infections occurred during June through September. Of the 887 (93%) cases for whom data were available, 148 (17%) reported travel outside of the United States during the week prior to illness onset. The most common travel destinations were Asia (n=41), Europe (n=38), Mexico (n=27), and Central or South America or the Caribbean (n=23).

There were four outbreaks of campylobacteriosis identified in Minnesota in 2012. In May, an outbreak of *C. jejuni* infections was associated with raw milk served to elementary school students following a visit to a Wisconsin farm; 2 culture-confirmed cases were identified. In July, an outbreak of *C. jejuni and C. coli* infections was associated with a private gathering in Hennepin County; 3 culture-confirmed cases were identified. In August, an outbreak of quinolone-resistant *C. jejuni* infections was associated with animal contact at a private farm in Olmsted County; 2 culture-confirmed cases were identified. In September, an outbreak of *C. jejuni* infections was associated with a restaurant in Dakota County; 2 culture-confirmed cases were identified.

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 2012, the overall proportion of quinolone resistance among *Campylobacter* isolates tested was 25%. However, 74% 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. Fifteen percent of *Campylobacter* isolates from patients who acquired the infection domestically were resistant to fluoroquinolones.

In June 2009, a culture-independent test became commercially available for the qualitative detection of *Campylobacter* antigens in stool. Three hundred seventy patients tested positive for *Campylobacter* by this test conducted in a clinical laboratory in 2012. However, only 128 (35%) of the specimens were subsequently culture-confirmed and therefore met the surveillance case definition for inclusion in MDH case count totals. Thus, this culture-independent test may give false positive findings.

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

A marked increase in the number of CDI cases and mortality due to CDI has been 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 pulsed-field gel electrophoresis type 1 (NAP1), toxinotype III.

Community-associated (CA) CDI is also receiving increased attention. Several cases of serious CDI have been reported in what have historically been considered low-risk populations, including healthy persons living in the community and peripartum women. At least 25% of these cases had no history of recent healthcare or antimicrobial exposure.

In 2009, as part of the EIP, we initiated population-based, sentinel surveillance for CDI at 10 hospital laboratories serving Stearns, Benton, Morrison, and Todd Counties. A CDI case is defined as a positive *C. difficile* toxin assay on an incident stool specimen from a resident of one of the four 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 2012, 462 incident cases of CDI were reported in the four sentinel counties (186 per 100,000 population). Sixty-two percent of these cases were classified as CA, 19% as CO-HCFA, and 19% as HCFO. The median ages for CA, CO-HCFA, and HCFO cases were 51 years, 64 years, and 75 years, respectively. Forty-nine 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 289 putative CA cases eligible for interview, 220 were interviewed and confirmed as CA cases. Fifty-four 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 (38%); urinary tract infections (14%); and dental procedures (11%).

Carbapenem-resistant Enterobacteriaceae (CRE)

Enterobacteriaceae are a large family of Gram-negative bacilli that are common causes community- and healthcare-associated infections. Carbapenem-resistant Enterobacteriaceae (CRE) are resistant to most available antibiotics. Some CRE bacteria harbor resistance genes that produce enzymes known as carbapenemases. Certain carbapenemases, such as the *Klebsiella pneumoniae* carbapenemase (KPC), are particularly concerning because they can easily spread between bacteria of similar species.

KPC continues to be the most common carbapenemase found in the United States. Since 2009, several types of metallo-β-lactamase (MBL)-producing Enterobacteriaceae have been reported in the United States, including New Delhi MBL (NDM) and Verona Integron-encoded MBL (VIM). MBL-producing bacteria are more common outside the United States.

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 with CRE are associated with higher morbidity and mortality than carbapenem-susceptible organisms.

MDH first detected a KPC-producing CRE isolate in February 2009, and began statewide voluntary reporting of CRE. As part of this surveillance, laboratories submit isolates from CRE patients to the PHL for further characterization.

In 2012, we adopted a standardized CRE case definition developed by the CDC EIP Gram-negative Surveillance Initiative, and made CRE reportable in the two most populous counties, Hennepin and Ramsey Counties. This definition includes isolates that are non-susceptible to a carbapenem (excluding ertapenem) and resistant to all tested third generation cephalosporins using current CLSI breakpoints.

During 2012, 77 isolates from 76 patients were reported and tested by PCR for the bla_{KPC} gene; 29 (38%) isolates from 28 patients were bla_{KPC} positive; 2 isolates of different species were detected in 1 patient. Of the 29 incident bla_{KPC} positive isolates, the median age of patients was 58 years (range, 7 months to 81 years); 19 (66%) were male and 12 (41%) were residents of the active surveillance area. Urine (14) was the most common source followed by sputum (4), wound (5), blood (2), peritoneal fluid (1), bone (1) and other respiratory sites (1). The most common species were *K. pneumoniae* (15) and *E. cloacae* (12). Eighteen (62%) were hospitalized (7 hospitalized >3 days prior to culture); median length of stay (LOS) was 14.5 days (range, 1 to 83). Ten (56%) required ICU care; in-hospital mortality was 22%. Other cases were from outpatient settings (5), long-term acute care hospitals (3), or long-term care facilities (2).

The PHL tests all CRE isolates by PCR for the bla_{NDM} gene; 3 isolates from two non-Minnesota residents were bla_{NDM} positive (*K. pneumoniae* [2] and *E. coli* [1]) during 2012. Both patients had significant healthcare exposure outside the United States. No bla_{NDM} positive isolates were detected in Minnesota residents. To date, 2 bla_{NDM} positive isolates (*E. coli* [1] and *K. pneumoniae* [1] from a single patient) have been detected in Minnesota residents.

CRE bacteria can spread in healthcare facilities (e.g., on the hands of healthcare workers) and have been associated with outbreaks in healthcare facilities in other states and other countries. The spread of CRE can be halted with early detection and implementation of appropriate infection prevention measures, and proper communication of CRE status when a colonized or infected patient is transferred.

In summary, over one third of CRE isolates reported were bla_{KPC} positive; one patient had 2 bla_{KPC} positive isolates of different species. Active surveillance testing should be considered when a patient with previously unrecognized CRE or hospital-onset CRE infections is identified or when a patient has been hospitalized outside the United States within the last 6 months. No outbreaks or transmission of CRE were reported among facilities that conducted active surveillance testing during 2012.

Cryptosporidiosis

During 2012, 346 cases of cryptosporidiosis (6.5 per 100,000 population) were reported. This is 45% higher than the median number of cases reported annually from 2002 to 2011 (median, 239 cases; range, 147 to 389). The median age of cases in 2012 was 27 years (range, 3 months to 92 years). Children 10 years of age or younger accounted for 30% of cases. Fifty-eight percent of cases occurred during July through October. The incidence of cryptosporidiosis in the Southwestern, Southeastern, Central, and West Central districts (20.8, 19.7, 10.8, and 9.4 cases per 100,000, respectively) was significantly higher than the statewide incidence. Only 52 (15%) reported cases occurred among residents of the metropolitan area (1.7 per 100,000). Thirty-seven (11%) cases required hospitalization, for a median of 4 days (range, 1 to 26 days).

A record 18 outbreaks of cryptosporidiosis were identified in Minnesota in 2012, accounting for 58 laboratory-confirmed cases (7 among non-Minnesota residents). Nine recreational water outbreaks of cryptosporidiosis occurred, accounting

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for 181 cases (42 laboratory-confirmed). The recreational water outbreaks included three at municipal pools/ water parks (Goodhue, Hennepin, and Lyon counties), two at hotel waterparks (Crow Wing and St. Louis counties), two at splash pads (Benton and Stearns counties), one at a lake (Crow Wing County), and one at a swim pond (Washington County). Three outbreaks of cryptosporidiosis were associated with contact with calves, accounting for 44 cases (9 laboratory-confirmed). The animal contact outbreaks occurred at a petting zoo (Goodhue County), an educational farm camp (Hennepin County), and a birthday party held at a private farm (Dakota County). Six outbreaks of cryptosporidiosis at daycares accounted for 20 cases (7 laboratory-confirmed); the daycare outbreaks occurred in Brown, Goodhue, Mower, Olmsted, Ramsey, and Stearns 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. The widespread use of rapid assays could be artificially contributing to the increased number of reported cases of cryptosporidiosis. 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 and the more clinically severe dengue hemorrhagic fever (DHF) is one of the most frequently occurring mosquito-borne diseases worldwide, with an estimated 50-100 million cases (including approximately 500,000 DHF cases and over 20,000 fatalities) each year. Four serotypes of dengue virus are transmitted to humans through the bite of certain *Aedes* genus mosquitoes (e.g., *Aedes aegypti*). 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 2012, 10 cases (0.11 per 100,000 population) of dengue fever were reported in Minnesota residents. This equaled the median of 10 cases per year (range, 6 to 20) in the 100 cases reported from 2004-2012. In 2012, the median case age was 36 years (range, 22 to 67 years). Nine cases resided within the metropolitan area. Onset of symptoms occurred from March through December. All of the cases represented imported infections acquired out of state or abroad. Cases had travelled to Latin America (6) or Asia (4).

***Escherichia coli* O157 and Other Shiga Toxin-Producing *E. coli* Infection, and Hemolytic Uremic Syndrome**

During 2012, 124 culture-confirmed cases of *Escherichia coli* O157 infection (2.3 per 100,000 population) were reported. The number of reported cases represents a 9% decrease from the median number of cases reported annually from 2002 to 2011 (median, 137 cases; range, 110 to 163). During 2012, 34 (27%) cases occurred in the metropolitan area. Sixty-seven (54%) cases occurred during May through October. The median age of the cases was 21 years (range, 1 to 72 years). Seventeen percent of the cases were 4 years of age or younger. Thirty-nine (31%) cases were hospitalized; the median hospital stay was 4 days (range, 1 to 37 days). No cases died.

In addition to the 124 culture-confirmed *E. coli* O157 cases, 115 cases of Shiga toxin-producing *E. coli* (STEC) infection were identified in 2012. Of those, culture-confirmation was not possible in 14, and therefore it is unknown if those were O157 or another serogroup. Among the remaining 101 cases of STEC other than O157, *E. coli* O26 accounted for 39 cases, *E. coli* O103 for 34, and *E. coli* O111 for 18. These three serogroups accounted for 90% of all non-O157 STEC cases.

Seven *E. coli* O157 outbreaks were identified during 2012. All seven outbreaks were due to person-to-person transmission in daycares. The seven outbreaks resulted in 38 illnesses (29 culture-confirmed), with a median of 4 cases per outbreak (range, 2 to 10 cases).

Hemolytic Uremic Syndrome (HUS)

In 2012, 13 HUS cases were reported. The number of reported cases is similar to the median number of cases reported annually from 2002 to 2011 (median, 14 cases; range, 10 to 22). In 2012, the median age of HUS cases was 4 years (range, 1 to 86 years); 11 of the 13 cases occurred in children. All 13 cases were hospitalized, with a median hospital stay of 15 days (range, 5 to 40 days). No cases died. From 1997 through 2012, the overall case fatality rate among HUS cases was 5.1%. All 13 HUS cases reported in 2012 were post-diarrheal. *E. coli* O157:H7 was cultured from the stool of 11 (85%) cases; the remaining 2 (15%) HUS cases were positive for *E. coli* O157:H7 by serology.

In 2012, there were 2 outbreak-associated HUS cases, both associated with person-to-person transmission in daycares.

Giardiasis

During 2012, 633 cases of *Giardia* infection (11.8 per 100,000) were reported. This represents a 28% decrease from the median number of cases reported annually from 2002 through 2011 (median, 878 cases; range, 678 to 1,378). Historically, a substantial proportion of *Giardia* cases have represented positive tests during routine screenings of recent immigrants and refugees.

The median age for all case-patients reported in 2012 was 26 years (range, 4 weeks to 92 years). Fifteen percent of cases were less than 5 years of age, and 22% of cases were over 50 years of age.

Haemophilus influenzae

Eighty-six cases of invasive *Haemophilus influenzae* disease (1.61 per 100,000 population) were reported in 2012. Cases ranged in age from newborn to 100 years (median, 67.5 years). Allowing for more than one syndrome per case, 44 (51%) cases had pneumonia, 21 (24%) had bacteremia without another focus of infection, 10 (12%) had meningitis, 3 (3%) each had epiglottitis and septic arthritis, 2 (2%) each had abscess, cellulitis, septic shock, and otitis media,

and 1 (1%) had endometritis. Eleven (13%) cases died.

Of 83 *H. influenzae* isolates for which typing was performed at PHL, 18 (22%) were type f, 3 (4%) type b, 2 (2%) type e, 6 (7%) type a, and 54 (65%) were untypeable. Serotype f represented on average 14% of case-isolates from 2006-2011. The increase in 2012 serotype f cases was associated with increased risk of meningitis and fatal outcome.

Three cases of type b (Hib) disease occurred in 2012, compared to 3 cases in 2011, 1 case in 2010, and 2 cases in 2009. One Hib case occurred in a 4 month-old child with meningitis who had received 1 dose of vaccine at 2 months of age and was exposed to unvaccinated children. A second 4 month-old child who was not vaccinated had otitis media and pneumonia. The third case of Hib was in an unvaccinated 4 year-old who had pneumonia and epiglottitis. No Hib cases were found in adults. All 3 cases survived.

The 11 deaths occurred in patients ranging in age from 50 to 96 years. Five cases had pneumonia (of these, 1 also had cellulitis), 2 had epiglottitis and 4 cases had bacteremia without another focus of infection. All 11 cases had *H. influenzae* isolated from blood and all had underlying medical conditions. Of the 11 cases who died, 7 case-isolates were untypeable, 2 were serotype f, and 1 was serotype e, and 1 isolate was not available for typing.

HIV Infection and AIDS

The incidence of HIV/AIDS in Minnesota remains moderately low. In 2011, state-specific HIV infection diagnosis rates ranged from 2.3 per 100,000 population in Vermont to 33.6 per 100,000 in Louisiana. Minnesota had the 17th lowest HIV infection rate (7.2 cases per 100,000 population). State-specific AIDS diagnosis rates ranged from 0.5 per 100,000 persons in Vermont to 22.8 per 100,000 population in Georgia. Minnesota had the 15th lowest AIDS rate (4.0 AIDS cases reported per 100,000 population).

As of December 31, 2012, a cumulative total of 10,112 cases of HIV infection (6,165 AIDS cases and 3,947 HIV [non-AIDS] cases) had been reported among Minnesota residents. Of the 10,112 HIV/AIDS cases, 3,459 (34%) are known to have died.

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 among AIDS cases declined sharply, primarily due to better antiretroviral therapies. In 2012, 202 new AIDS cases (Figure 4) and 80 deaths among persons living with HIV infection were reported.

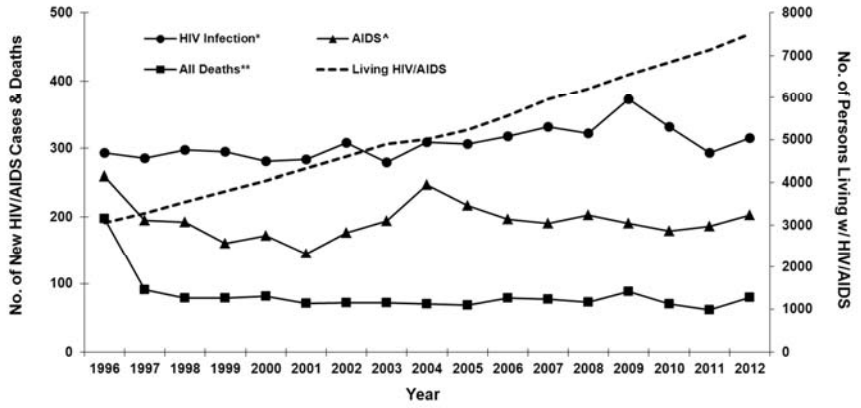
The number of HIV (non-AIDS) diagnoses has remained fairly constant over the past decade from 2003 through 2012, at approximately 230 cases per year. With a peak of 280 newly diagnosed HIV (non-AIDS) cases in 2009, 236 new HIV (non-AIDS) cases were reported in 2012 (an increase of 8% from 219 in 2011). By the end of 2012, an estimated 7,516 persons with HIV/AIDS were assumed to be living in Minnesota.

Historically, and in 2012, over 80% (261/315) of new HIV infections (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 occur among males. Trends in the annual number of new HIV infections diagnosed among males differ by race/ethnicity. New infections occurred primarily among white males in the 1980s and early 1990s. Whites still comprise the largest number of new HIV infections among males, but proportion of cases that white males account for is decreasing. In 2012 there were 128 new infections among white males. The annual number of cases among U.S.-born black peaked in 1992 at 78 and gradually decreased to 33 new infections in 2003. During the past several years the number of cases in this group has trended upwards, with a peak of 64 cases diagnosed in 2009, and 60 new HIV diagnoses in 2012. The number of HIV infections diagnosed among Hispanic males increased in 2012 to 35 from 19 in 2011. The number of new infections among African-born males increased in 2012 to 19 from 17 in 2011. This represents an increase of 84% among Hispanic males and an increase of 12% among African-born males from 2011 to 2012.

Females account for an increasing percentage of new HIV infections, from 11% of new infections in 1990 to 19% in 2012. Trends in HIV infections diagnosed annually among females

Figure 4. HIV/AIDS in Minnesota: Number of New Cases, Prevalent Cases, and Deaths by Year, 1996-2012



* Includes all new cases of HIV infection (both HIV (non-AIDS) and AIDS at first diagnosis) diagnosed within a given calendar year

** Deaths among HIV cases, regardless of cause

^ Includes all new cases of AIDS diagnosed within a given calendar year, including AIDS at first diagnosis. This includes refugees in the HIV+ Resettlement Program, as well as other refugee/immigrants diagnosed with AIDS subsequent to their arrival in the United States

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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. The annual number of new HIV infections diagnosed among U.S.-born black females had remained stable at 22 or fewer cases during 2001 to 2004, but increased to 28 new cases in both 2005 and 2006. In 2012 there were 17 new infections diagnosed among U.S.-born black females. In contrast, the number of new infections among African-born females increased greatly from 4 cases in 1996 to 39 in 2002. However, since 2002 the number of new HIV infections in African-born females has decreased, with 22 new cases diagnosed in 2012, making up 37% 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 2012, non-white men comprised approximately 17% of the male population in Minnesota and 50% of new HIV infections among men. Similarly, persons of color comprised approximately 13% of the female population and 82% 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 to 24 years of age). The number of new HIV infections among males in this age group has remained higher than new infections among females since 1999. Since 2001, Minnesota has seen a steady increase in new cases among males in this age group, with 55 cases reported in 2011. Since 2003, the number of cases among young males has increased by over 130%. The number of new HIV infections among females in this age group has remained relatively consistent over time. However, since 2009, the number of new HIV infections diagnosed among young women has decreased consistently. In 2012 there were 4 cases diagnosed among young women. From 2010 to 2012, the majority (57%) of new infections among male adolescents and young adults were among youth of color (96/169), with young African American males accounting for 71% of the cases among young males of color. During the same time period, young women of color accounted for 54% (14/26) of the cases diagnosed, with young African American women accounting for 29% of cases among young women of color. Between 2010 and 2012 after re-distributing those with unspecified risk, 93% (158/169) of new cases among young males were attributed to male-to-male sex. Among young females, all 23 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 infections were attributed to MSM (or MSM who also inject drugs); in 2012, this group accounted for 53% of new infections (167/315).

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 4% (12/315) in 2012. 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. Ninety-three percent of 196 new HIV diagnoses among women between 2010 and 2012 is attributed to heterosexual exposure after re-distributing cases with unspecified risk. Historically, race/ethnicity data for HIV/AIDS in Minnesota have grouped U.S.-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 2012, there were 41 new HIV infections reported among Africans. While African-born persons comprise less than 1% of the state’s population, they accounted for 13% of all HIV infections diagnosed in Minnesota in 2012.

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 1995 to 3% in 1996–2006. The overall rate of transmission for 2010 to 2012 was 1.7% with one HIV-positive birth from an HIV-infected mother in Minnesota in 2012.

Influenza

Several surveillance methods are employed for influenza. Surveillance 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. During the 2006-2007 season, surveillance was expanded to include adults. For the 2008-2009 season, surveillance was expanded statewide, although the collection of clinical information on hospitalized cases was limited to metropolitan area residents only. During the 2012-2013 season (September 30, 2012 – May 4, 2013), we requested clinicians collect a throat or nasopharyngeal swab, or other specimen from all patients admitted to a hospital with suspect influenza, and submit the specimen to the PHL for influenza testing.

During the 2012-2013 influenza season, 3,086 laboratory-confirmed hospitalizations for influenza (57.7 hospitalizations per 100,000 persons compared to 10.4 per 100,000 during the 2011-2012 influenza season) were reported. Since September 30, 2012, hospitalized cases of influenza included 2,527 that were influenza A (1,413 H3, 36 A[H1N1]pdm09, and 1,078 unknown A type), 532 that were influenza B, 9 that were positive for both influenza A and B, and 18 were unknown influenza types. Among hospitalized cases, 16% were 0-18 years of age, 13% were 19-49 years of age, 15% were 50-64 years of age and 57% were 65 years

of age and older. Median age was 71.7 years. Forty-nine percent of cases were residents of the metropolitan area.

Case report forms have been completed on 1,216 (80%) of 1,515 metropolitan area cases to date. Of these, 25% were diagnosed with pneumonia, 15% required admission into an intensive care unit, and 5% were placed on mechanical ventilation. Three percent of hospitalized influenza cases had an invasive bacterial co-infection. Eighty-one percent of cases received antiviral treatment. Overall, 90% of adult cases and 49% of pediatric cases had at least one chronic medical condition that would have put them at increased risk for influenza disease.

Deaths

Since the H1N1 pandemic, we have increased our efforts to identify deaths related to influenza. Influenza-associated deaths are reported through several systems including hospital surveillance, Unexplained Critical Illnesses and Deaths of Possible Infectious Etiology (UNEX) reporting, Medical Examiner Infectious Deaths (MED-X) surveillance, death certificate review, nursing home outbreak investigations, and other sources. All reported cases are investigated to determine if there was a positive influenza laboratory result and symptoms of an infectious process consistent with influenza without recovery to baseline prior to death. In a small number of cases there may not be a positive influenza laboratory result due to the lack of specimens taken, in which case the person must have influenza noted as a cause of death on the death certificate, or the person must have had direct contact with a laboratory-confirmed influenza case to be included as an influenza-related death.

For the 2012-2013 influenza season, there were 199 influenza-associated deaths (97 influenza A-type unspecified, 61 influenza A-H3, 22 influenza B, 2 influenza A & B, 1 influenza A/B non-distinguished, and 16 unknown type). The median age was 86 years; 5 (3%) 0-17 years, 5 (3%) 18-49 years, 15 (8%) 50-64 years, 40 (20%) 64-79 years, and 134 (67%) age 80 and up. Forty percent of cases were from the metropolitan area. One hundred seventy-two (86%) had underlying medical conditions, and 129 (65%) were hospitalized for their illness. One hundred fourteen (57%) were residents of a long-term care facility.

Six (3%) cases were identified through the UNEX/MED-X programs, 43 (22%) from hospital surveillance, 124 (62%) through death certificate review, 14 (7%) from long term care facility outbreaks, and 12 (6%) through other methods.

Novel Influenza Cases

In response to the identification of swine-origin H3N2 influenza in humans (H3N2v) associated with exposure to swine at county and state fairs in several states, MDH sent out a statewide health alert in August 2012. Healthcare providers and hospitals were asked to submit specimens to the PHL if they identified a patient with influenza-like illness (ILI) who had contact with swine within 7 days of onset or attended a county or agricultural fair in which swine were present, or had recent contact with someone with ILI who had recent exposure to swine or anyone hospitalized with ILI. MDH also initiated surveillance for ILI among 4H students exhibiting animals at the Minnesota State Fair. Participants were notified to see an onsite 4H nurse if they exhibited any illnesses. 4H nurses were asked to collect a specimen from anyone with ILI and submit those specimens to the PHL for testing.

Nine confirmed novel influenza cases were identified. Five were identified as H3N2v, and 4 were identified as swine-origin H1N2 variant (H1N2v). Both strains include the M gene from the influenza A(H1N1)pdm09 virus. Exposure occurred in August, September, and November. Six (4 H1N2v, 2 H3N2v) were associated with the Minnesota State Fair and 3 were associated with live animal markets in the metropolitan area. All cases had direct or indirect contact with swine. One case was hospitalized. All recovered from their illness.

Laboratory Data

The Minnesota Laboratory System (MLS) Laboratory Influenza Surveillance Program is made up of more than 310 clinic- and hospital-based laboratories, voluntarily submitting testing data on a weekly basis. These laboratories perform rapid testing for influenza and respiratory syncytial virus (RSV). Significantly fewer labs perform viral culture testing (six labs) for influenza, RSV, and other respiratory viruses. Nine laboratories perform PCR testing for influenza and three also perform PCR testing for other respiratory viruses. The PHL also provides further characterization of submitted influenza isolates to determine the hemagglutinin serotype to indicate vaccine coverage. Tracking laboratory results assists healthcare providers with patient diagnosis of influenza-like illness and provides an indicator of the progression of the influenza season as well as prevalence of disease in the community.

Between September 30, 2012 - May 11, 2013, virology laboratories reported 277 viral cultures positive for influenza. Of these, 141 (51%) were positive for influenza A and 136 (49%) were positive for influenza B. The number of positive influenza cultures peaked during the week of December 30, 2012 - January 5, 2013 at 36. Between September 30, 2012 - May 11, 2013, laboratories reported data on 18,040 influenza PCR tests, 3,830 (21%) of which were positive for influenza. Of these, 58 (2%) were positive for influenza A(H1N1)pdm09, 2,115 (55%) were positive for influenza A/(H3), 732 (19%) were positive for influenza A-not subtyped, 54 (1%) were positive for influenza A non-typeable, 869 (23%) were positive for influenza B, and 2 (0.1%) were positive for both influenza A and B. Between September 30, 2012 and May 11, 2013, 632 influenza isolates were further characterized in the PHL; 21 (3%) were characterized as influenza A(H1N1)pdm09, 279 (44%) were characterized as influenza A/(H3), 1 (0.2%) was characterized as influenza A-type unspecified, 229 (36%) were characterized as influenza B/Victoria linage, 98 (16%) were characterized as influenza B/Yamagata lineage and 4 (1%) were characterized as influenza B-lineage unspecified.

Influenza Sentinel Surveillance

We conduct sentinel surveillance for ILI; (fever ≥100° F and cough and/or sore throat in the absence of known cause other than influenza) through outpatient medical providers including those in private practice, public health clinics, urgent care centers, emergency rooms, and university student health centers.

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For these data there are 22 sites in 18 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 23-29, 2012 at 6.7%.

Influenza Incidence Surveillance Project
MDH was one of 12 nationwide sites to participate in an Influenza Incidence Surveillance Project for the 2012-2013 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 information and clinical data were provided with each specimen.

From July 29, 2012 – May 11, 2013, these clinics saw 1,562 ILI and 8,012 ARI patients. They submitted 1,076 specimens for influenza and respiratory pathogen testing, 254 (24%) of which were positive for influenza. Of those, 3 (1%) were positive for influenza A(H1N1)pdm09, 148 (58%) were positive for influenza A/(H3), 7 (3%) were positive for influenza A-type unspecified, and 96 (38%) were positive for influenza B. In addition to influenza, the following pathogens were detected by PCR: 25 (2%) adenovirus, 45 (4%) human metapneumovirus, 50 (5%) RSV, 149 (14%) rhinovirus, 1 (0.1%) parainfluenza virus 1, 17 (2%) parainfluenza virus 2, 37 (3%) parainfluenza virus 3, 1 (0.1%) parainfluenza virus 4, 6 (1%) coronavirus C229E, 52 (5%) coronavirus OC43, 3 (0.3%) coronavirus HKU1, and 28 (3%) coronavirus NL63 (note: these coronaviruses are not SARS-CoV or MERS-CoV).

ILI Outbreaks (Schools and Long Term Care Facilities)
Between 1988 and 2009, a probable ILI outbreak in a school was defined as a doubled absence rate with all of the following primary influenza symptoms reported among students: rapid onset, fever, illness lasting 3 or more days, and at least one secondary influenza symptom (e.g., myalgia, headache, cough, coryza, sore throat, or chills). A possible ILI outbreak in a school was defined as a doubled absence rate with reported symptoms among students, including two of the primary influenza symptoms and at least one secondary influenza symptom. Prior to the 2009-2010 influenza season, the number of schools reporting probable influenza outbreaks ranged from a low of 38 schools in 20 counties in 1996-1997 to 441 schools in 71 counties in 1991-1992.

The definition of ILI outbreaks changed beginning with the 2009-2010 school year. Schools reported 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. Four hundred eighty-seven schools in 74 counties reported ILI outbreaks during the 2012-2013 school year. Since the 2009-2010 school year, the number of schools reporting ILI outbreaks has ranged from a low of 94 in 36 counties in 2011-2012 to 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. Two hundred nine facilities in 63 counties reported confirmed outbreaks during the 2012-2013 influenza season. This is the highest number of outbreaks reported since surveillance for outbreaks in LTCFs began in the 1988-1989 season. The number of LTCFs reporting outbreaks ranged from a low of three in 2008-2009 to a high of 209 in 2012-2013.

Legionellosis
During 2012, 51 confirmed cases of legionellosis (Legionnaires' disease [LD]) were reported including 26 cases (51%) among residents of the metropolitan area and 25 (49%) cases among Greater Minnesota residents. Three (6%) cases died. Older adults were more often affected, with 44 (86%) cases occurring among individuals 50 years of age and older (median, 65 years; range, 32 to 85 years). Twenty-seven (53%) cases had onset dates in June through September. Travel-associated LD accounted for 15 (29%) cases, defined as spending one of more overnight stays away from the case's residence in the 10 days before onset of illness.

The criteria for confirmation of a confirmed LD case requires a clinically compatible illness and at least one of the following: 1) isolation of any *Legionella* organism from respiratory secretions, lung tissue, pleural fluid, or other normally sterile fluid by culture, or 2) detection of *L. pneumophila* serogroup 1 antigen in urine using validated reagents, or 3) seroconversion of fourfold or greater rise in specific serum antibody titer to *L. pneumophila* serogroup 1 using validated reagents. A single antibody titer at any level is not of diagnostic value for LD. The American Thoracic Society, in collaboration with the Infectious Diseases Society of America, recommends urinary antigen assay and culture of respiratory secretions on selective media for detection of LD. Culture is particularly useful because environmental and clinical isolates can be compared by molecular typing in outbreaks and in investigations of healthcare-associated LD.

Listeriosis
Seven cases of listeriosis were reported during 2012. All 7 cases were hospitalized, and 2 (29%) died. The median age of the cases was 80 years (range, 45 to 87 years). Six (86%) cases had *Listeria monocytogenes* isolated from blood. One case had *L. monocytogenes* isolated from a wound. One case was part of a multi-state outbreak due to imported ricotta salata cheese. The 7 cases reported in 2012 is similar to the median annual number of cases reported from 1996 through 2011 (median, 7 cases; range, 3 to 19).

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. Persons at highest risk should: 1) avoid soft cheeses (e.g., feta, Brie, Camembert, blue-veined, and Mexican-style cheeses) and unpasteurized milk; 2) thoroughly heat/reheat deli meats, hot dogs, other meats, and leftovers; and 3) wash raw vegetables.

Lyme Disease
Lyme disease is 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, human anaplasmosis, one form of human ehrlichiosis, and a strain of Powassan virus.

In 2012, 912 confirmed Lyme disease cases (17.2 cases per 100,000 population) were reported (Figure 1). In addition, 604 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. The 912 confirmed cases represent a 24% decrease from the 1,203 confirmed cases reported in 2011. The median number of 1,050 cases (range, 911 to 1,293 cases) reported from 2004 through 2012 is considerably higher than the median number of cases reported annually from 1996 through 2003 (median, 373 cases; range, 252 to 866). Five hundred seventy (63%) confirmed cases in 2012 were male. The median age of cases was 39 years (range, 1 to 92 years). Physician-diagnosed erythema migrans (EM) was present in 564 (62%) cases. Three hundred sixty-eight (40%) cases had one or more late manifestations of Lyme disease (including 271 with a history of objective joint swelling, 79 with cranial neuritis, 8 with acute onset of 2nd or 3rd degree atrioventricular conduction defects, 10 with radiculoneuropathy, 6 with lymphocytic meningitis, and 1 with encephalomyelitis) and confirmation by Western immunoblot (positive IgM ≤30 days post-onset or positive IgG). Onsets of illness were elevated in the summer months and peaked in June and July (37% and 27% of EM cases, respectively), corresponding to the peak activity of nymphal *I. scapularis* ticks in mid-May through mid-July. The majority of cases in 2012 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 malarial infection 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 since that time likely have been imported infections acquired abroad.

In 2012, 58 malaria cases (1.1 per 100,000 population) were reported in Minnesota residents, above the 2000 to 2012 annual median of 41 cases (range, 29 to 58). Forty (69%) cases were identified with *P. falciparum*, 8 (14%) with *P. vivax*, 3 (5%) with *P. ovale,* 2 (3%) with *P. malariae,* and 1 (2%) with mixed *Plasmodium* species infections; infections with unidentified *Plasmodium* species were detected in 4 (7%) cases. The median age of cases was 34 years (range, 3 to 77 years). Of 41 cases of known race, 37 (90%) were black, 3 (7%) were Asian, and 1 (2%) was white. Eighty-one percent of cases resided in the metropolitan area, including 44 (76%) in Hennepin or Ramsey Counties. Of the 38 cases with known country of birth, 1 (3%) was born in the United States. Forty-eight (83%) cases in 2012 likely acquired malaria in Africa and 7 (12%) cases were likely acquired in Asia. Fifteen countries were considered possible exposure locations for malaria infections, including Liberia (19), Nigeria (5), Ethiopia (5), Kenya (5), and India (5).

Meningococcal Disease
Twelve cases of *Neisseria meningitidis* invasive disease (0.22 per 100,000 population) were reported in 2012, compared to 15 cases in 2011. There were 6 serogroup Y cases, 5 serogroup B, and 1 serogroup C. In addition, there were 3 suspect cases, all of which were fatalities including a case positive by PCR testing, and 2 cases positive from autopsy specimens that did not meet EIP inclusion criteria.

Cases ranged in age from 4 months to 73 years, with a mean of 36 years. Fifty percent of the cases occurred in the metropolitan area. Including multiple presentations in an individual case, 7 cases had meningitis, 4 had bacteremia without another focus of infection, 1 had septic arthritis, and 1 had otitis media. There was 1 fatality among confirmed cases in a 54 year old serogroup Y case. The 3 fatalities among suspect cases included a 25 year-old with serogroup B, and a 25 year-old and 86 year-old both with serogroup Y. All cases were sporadic with no epidemiologic links.

In 2012, 3 case isolates demonstrated intermediate resistance to penicillin and ampicillin. There were no 2012 case isolates with ciprofloxacin resistance. In 2008, 2 isolates from cases occurring in northwestern 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 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 2006, MDH in collaboration with the CDC and other sites nationwide,began a case-control study to examine the efficacy of MCV4 and the study continues. No cases qualified for enrollment in 2012.

Methicillin-Resistant *Staphylococcus aureus* (MRSA)
Strains of *Staphylococcus aureus* that are resistant to methicillin and beta-

continued...

lactam antibiotics are referred to as methicillin-resistant *S. aureus* (MRSA). Traditional risk factors for healthcare-associated (HA) MRSA include recent hospitalization or surgery, residence in a long-term care facility, and renal dialysis.

In 2005, as part of the EIP Active Bacterial Core surveillance (ABCs) system, we initiated population-based invasive MRSA surveillance in Ramsey County. In 2005, the incidence of invasive MRSA infection in Ramsey County was 19.8 per 100,000 and was 19.4, 18.5 and 19.9 per 100,000 in 2006, 2007, and 2008, respectively. Surveillance was expanded to include Hennepin County in 2008. The incidence rate for MRSA infection in Ramsey and Hennepin Counties was 17.0, 14.0,18.2, and 14.0 per 100,000 in 2009, 2010, 2011, and 2012, respectively (2012: Ramsey 17.6/100,000 and Hennepin 12.5/100,000). In 2012, MRSA was most frequently isolated from blood (65%), and 10% (24/233) of the cases died. The rate of invasive MRSA infection acquired in hospitals (hospital-onset or nosocomial) decreased from 5.4 per 100,000 in 2005 to 1.8 in 2011, and increased to 2.2 in 2012. Seventeen percent (39/233) of cases reported in 2012 had no reported healthcare-associated risk factors in the year prior to infection. Please refer to the MDH Antibiogram for details regarding antibiotic susceptibility testing results (pp. 26-27).

Vancomycin-intermediate (VISA) and vancomycin-resistant *S. aureus* (VRSA) are reportable in Minnesota, as detected and defined according to Clinical and Laboratory Standards Institute approved standards and recommendations: a Minimum Inhibitory Concentration (MIC)=4-8 ug/ml for VISA and MIC≥16 ug/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. We confirmed 1 VISA case in 2000, 3 cases in 2008, 3 cases in 2009, 2 cases in 2010, and 5 VISA cases in 2011. No VISA cases were reported in 2012.

Critical illnesses or deaths due to community-associated (CA) *S. aureus* infection (both methicillin-susceptible and -resistant) are reportable in Minnesota. From 2005-2012, 125 cases of critical illness or death due to community-associated *S. aureus* infection were reported: 8 (2005), 14 (2006), 16 (2007), 19 (2008), 20 (2009), 20 (2010), 13 (2011), and 15 (2012); 60 (48%) were MRSA and 65 (52%) MSSA. Twenty-eight (47%) MRSA cases were male and the median age was 35 years (12 days-88 years); 34 (52%) MSSA cases were male and the median age was 16 years (1 day-78 years). Multifocal infections occurred in 29 cases; 18 MRSA, 11 MSSA. Pneumonia was most frequent with 33 MRSA and 21 MSSA cases, and accounted for 21 (66%) deaths. Three MRSA and 18 MSSA had TSS; 4 MRSA and 11 MSSA had endocarditis (6/15 fatal); 21 MRSA and 11 MSSA had skin structure infections. Death occurred in 17 (28%) MRSA and 18 (28%) MSSA cases.

PFGE typing and toxin PCR were performed on 50 MRSA and 52 MSSA isolates. Most MRSA isolates belonged to clonal groups associated with CA USA types (78% USA300). There was no change in the number of USA300 MRSA cases over time. MSSA isolates were in clonal groups associated with CA and healthcare-associated USA types.

Mumps

During 2012, no cases of confirmed mumps were reported but there were 7 cases of probable mumps. Beginning in 2012, national case reporting criteria for mumps were revised. Confirmed cases must now be laboratory-confirmed by PCR and present with clinically compatible illness defined as acute parotitis or other salivary gland swelling lasting at least 2 days, aseptic meningitis, encephalitis, hearing loss, orchitis, oophoritis, mastitis or pancreatitis. Probable cases are now reportable and require a positive mumps IgM antibody test result and/or epidemiologic linkage to another probable or confirmed case. Additionally, probable cases must present with clinically compatible illness defined as acute parotitis or other salivary gland swelling lasting at least 2 days, orchitis or oophoritis.

Six of the 7 probable cases of mumps were confirmed by IgM serology, and 1 was epidemiologically linked to an IgM-positive household contact. The 6 IgM-positive probable cases were not epidemiologically linked, demonstrating that asymptomatic infections are occurring, and suggesting that mumps is underdiagnosed. Cases ranged from 10 to 70 years of age. Two cases were born before 1957 and had unknown vaccination and disease history, 4 were fully vaccinated (2 self-reported, 2 had documentation of vaccination), and 1 had an unknown vaccination history.

Mumps surveillance is complicated by nonspecific clinical presentation in nearly half of cases, asymptomatic infections in an estimated 20% of cases, and suboptimal sensitivity and specificity of serologic testing. Mumps should not be ruled out solely on the basis of negative laboratory results. Providers are advised to test for other causes of sporadic parotitis including parainfluenza virus types 1 and 3, Epstein-Barr virus, influenza A virus, group A coxsackievirus, echovirus, lymphocytic choriomeningitis virus, human immunodeficiency virus, and other noninfectious causes such as drugs, tumors, and immunologic diseases.

Neonatal Sepsis

Statewide surveillance for neonatal sepsis includes reporting of any bacteria (other than coagulase-negative *Staphylococcus*) isolated from a sterile site in an infant <7 days of age, and mandatory submission of isolates.

In 2012, 40 cases of neonatal sepsis (0.58 cases per 1,000 live births) were reported compared to 56 cases (0.82 cases per 1,000 live births) in 2011. Among these cases, all were identified via blood or cerebrospinal fluid (CSF). Most cases (70%) were culture-positive within the first 2 days of life. In 2012, *Streptococcus viridians* was the most common bacteria (12) followed by group B Streptococcus (10) followed by *Escherichia coli* (7), *Enterococcus* spp. (3*), Haemophilus influenzae* (2), *Staphylococcus aureus* (2), and 1 each *Klebsiella pneumoniae*, group G Streptococcus, *Streptococcus pneumoniae,* and other *Streptococcus* spp.

Pertussis
During 2012, 4,144 cases of pertussis (75 per 100,000 population) were reported. This is the highest reported incidence of pertussis since the 1930s. Laboratory confirmation was available for 3,207 (77%) cases, 95 (3%) of which were confirmed by culture and 3,189 (99%) of which were confirmed by PCR. In addition to the laboratory-confirmed cases, 1,353 (33%) cases were epidemiologically linked to laboratory-confirmed cases, and 278 (7%) met the clinical case definition only. Two thousand five hundred three (60%) of the reported cases occurred in residents of the metropolitan area.

Paroxysmal coughing was the most commonly reported symptom. Four thousand eight (97%) cases experienced paroxysmal coughing. Nearly one fourth (917, 22%) reported whooping. Although commonly referred to as "whooping cough," very young children, older individuals, and persons previously immunized may not have the typical "whoop" associated with pertussis. Post-tussive vomiting was reported in 1,561 (38%) of the cases. Infants and young children are at the highest risk for severe disease and complications. Pneumonia was diagnosed in 60 (1%) cases, 6 (10%) of whom were <1 year of age. Fifty-eight (1%) cases were hospitalized; 25 (43%) of the hospitalized patients were <6 months of age.

Pertussis can affect persons of any age. The disease is increasingly recognized in older children and adults. During 2012, cases ranged in age from <1 week to 99 years. Nine hundred forty-two (23%) cases occurred in adolescents 13-17 years of age, 850 (21%) in adults 18 years of age and older, 1,765 (43%) in children 5-12 years of age, 463 (11%) in children 6 months through 4 years of age, and 110 (3%) in infants <6 months of age. Age was missing for 14 (≤1%) cases. The median age of cases was 12 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 2012, 176 (4%) pertussis cases were reported in infants <1 year of age. A likely source of exposure was identified for 55 (31%) of those cases; 12 (22%) were infected by adults 18 years of age and older, 9 (16%) were infected by an adolescent 13-17 years of age, 24 (44%) were infected by a child <13 years of age, and 10 (18%) were of unknown age. For the 121 (69%) infant cases with no identified source of infection, the source was likely from outside the household. ACIP recently recommended 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 years since vaccination increase. Disease in those previously immunized is usually mild. Efficacy for currently licensed vaccines is estimated to be 71 - 84% in preventing serious disease. Of the 674 (16%) cases who were 7 months to 6 years of age, 555 (82%) were known to have received at least a primary series of 3 doses of DTP/DTaP vaccine prior to onset of illness; 98 (15%) received fewer than 3 doses and were considered preventable cases. Vaccine history was unavailable for the remaining 21 (3%) cases.

MDH reporting rules require that clinical isolates of *Bordetella pertussis* be submitted to the PHL. Isolates for all 95 culture-confirmed cases were received and sub-typed by PFGE, with 16 distinct PFGE patterns identified. In 2012, no case-isolates of pertussis were tested in Minnesota for susceptibility to erythromycin, ampicillin, or trimethoprim-sulfamethoxazole. Nationally, isolates have had low minimum inhibitory concentrations, falling within the reference range for susceptibility to the antibiotics evaluated. 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 nasopharyngeal mucous 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. Cultures are necessary for molecular and epidemiologic studies and for drug susceptibility testing. Whenever possible, culture should be done in conjunction with PCR testing. Serological tests are not standardized and are not acceptable for laboratory confirmation at this time.

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 adolescents and adults. One of the main reasons for the ongoing circulation of pertussis is that vaccine-induced immunity to pertussis begins to wane 3 years after completion of the primary series.

Primary Amebic Meningoencephalitis
During 2012, 1 fatal case of primary amebic meningoencephalitis (PAM) in an elementary school aged child was reported. The disease is caused by the ameba *Naegleria fowleri*, a warm water-loving ameba found around the world, often in warm freshwater. Persons are infected when water containing the ameba enters the body through the nose. The only previously confirmed case of PAM in Minnesota was reported in 2010. These two cases are the northern most cases by several hundred miles ever reported in the United States.

Rabies
Rabies is caused by the rabies virus, 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. Vaccinating them for rabies provides a buffer between wildlife and people.

In 2012, 72 (2.9%) of 2,518 animals submitted for testing were positive for

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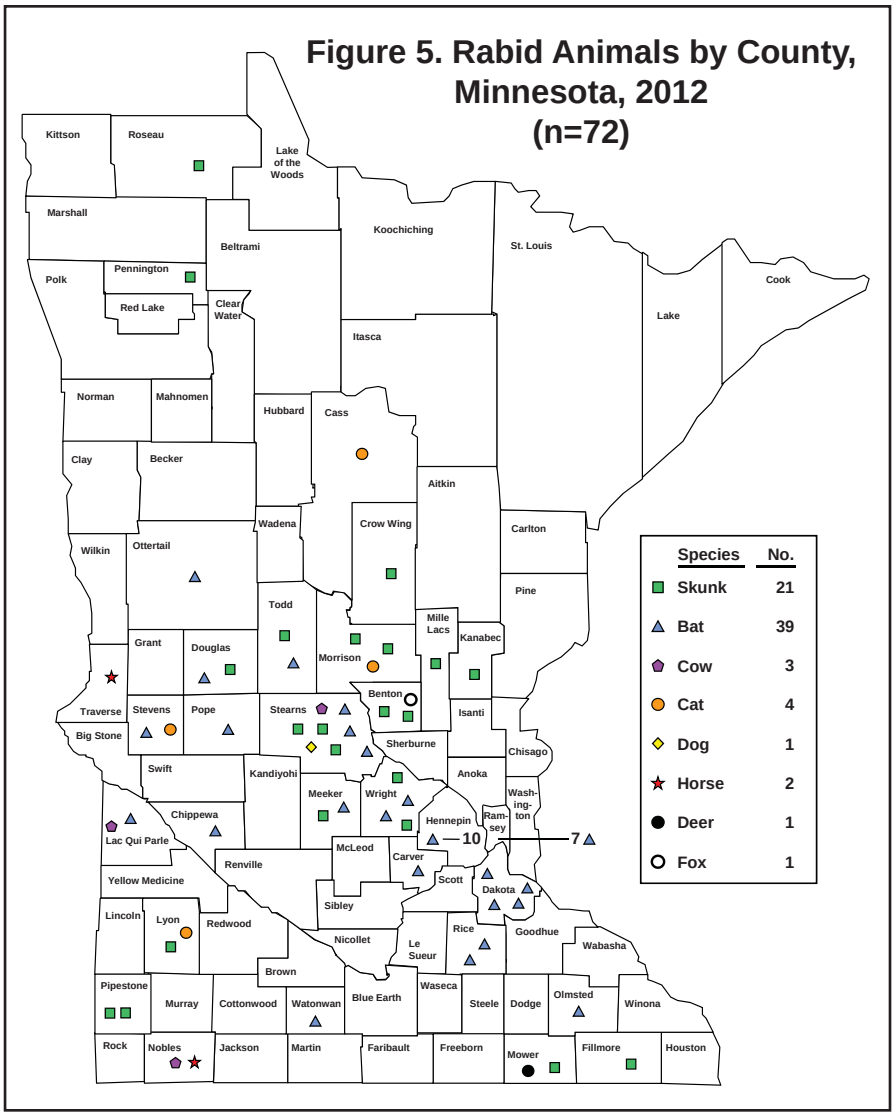

rabies (Figure 5). This is increased from 2011, when 55 (2.3%) of 2,385 animals submitted tested positive for rabies, but within the expected range. The majority of positive animals in 2012 were bats (39/72 [54%]), followed by skunks (21/72 [30%]), cats (4/72 [6%]), cattle (3/72 [4%]), horses (2/72 [3%]), dogs (1/72 [1%]), fox (1/72 [1%]) and deer (1/72 [1%]). This was the first record of a deer testing positive for rabies in Minnesota. There were no human cases of rabies.

From 2003 to 2012, 619 (2.5%) of 24,492 animals tested positive for rabies. The median number of rabies positive animals identified annually was 64 (range, 39 to 94). From 2003 to 2012, 268/554 (48%) skunks, 46/610 (8%) cattle, 228/6,497 (4%) bats, 39/7,763 (0.5%) cats, 28/6,834 (0.4%) dogs, and 0/817 (0%) raccoons that were submitted tested positive for rabies. Rabies in raccoons is rare in Minnesota: from 1988 to 2012, 3 raccoons have tested positive for rabies; these occurred in 1989, 1990, and 1993.

Salmonellosis

During 2012, 780 culture-confirmed cases of *Salmonella* infection (14.6 per 100,000 population) were reported. This represents a 17% increase from the median annual number of cases reported from 2002 to 2011 (median, 669 cases; range, 578 to 755). Of the 82 serotypes identified in 2012, 5 serotypes, *S*. Enteritidis (185), *S*. Typhimurium (110), *S*. Newport (67), *S*. I 4,[5],12:i:- (52), and *S*. Infantis (28) accounted for 57% of cases. *Salmonella* was isolated from stool in 688 (88%) cases, urine in 45 (6%) cases, and blood in 42 (5%) cases. Other specimen sources included cerebrospinal fluid, vaginal swab, tibial lesion, and wound site.

Of the 707 cases interviewed, 106 (15%) had traveled internationally during the week prior to their illness onset. There were 4 cases of *S*. Typhi infection; 1 had traveled to Pakistan, 1 to Guatemala, 1 to the Philippines, and 1 to India and the United Arab Emirates. There were 2 cases of *S*. Paratyphi A infection; 1 had traveled to India and the other to Nepal. There were 2 cases of *S*. Paratyphi B infection; 1 had traveled to the Philippines, and the travel history of the other case was unknown.

Three culture-confirmed cases of *Salmonella* infection died in 2012: a 64 year-old case died of ischemic bowel disease and atherosclerosis secondary to type 2 diabetes mellitus 2 days after *Salmonella* was isolated from a stool specimen; a 63 year-old case died of a brain tumor 3 days after *Salmonella* was isolated from a stool specimen; and a 85 year-old case died of congestive heart failure, stage three kidney disease, and bowel obstruction 8 days after *Salmonella* was isolated from a stool specimen.

One hundred eight cases were part of 24 *Salmonella* outbreaks identified in 2012. Nine outbreaks involved cases in multiple states. Fourteen of the outbreaks involved foodborne transmission, six outbreaks were due to animal contact, and four outbreaks were due to person-to-person transmission. The 24 outbreaks resulted in a median of 3 culture-confirmed cases per outbreak (range, 1 to 26 cases).

In January, 4 cases of *S*. Enteritidis infection were associated with consumption of desserts containing undercooked eggs at a restaurant. As a result of the outbreak, the restaurant discontinued the use of unpasteurized shell eggs in uncooked foods.

In February, 2 cases of *S*. Typhimurium infection were associated with person-to-person transmission at a daycare center.

In April, 5 cases of *S*. Enteritidis infection were associated with consumption of Hollandaise sauce containing unpasteurized shell eggs at a restaurant.

From May through October, 6 cases of *Salmonella* infection were part of 4 separate multi-state outbreaks associated with contact with baby poultry. The outbreak serotypes were *S*. Muenchen, *S*. Thompson, *S*. Infantis, and *S.* Braenderup.

In May, 2 cases of *S*. Montevideo infection were associated with person-to-person transmission at an in-home daycare.

In May, 6 cases of *S*. Newport infection were associated with a graduation party held at a private home. The tightly grouped illness onsets suggested a food vehicle at the event as the most likely source of illness; however, a specific food vehicle could not be identified.

In June, 5 cases of *S*. Newport infection were associated with a wedding reception; the vehicle and source of contamination were not identified.

In June, 12 cases of *S*. Montevideo infection were associated with a restaurant. No food item was implicated as the vehicle of transmission. The initial source of contamination was not identified, but some of the cases could have resulted from transmission from infected food workers.

In July, 1 case of *S*. Bredeney infection was part of a multi-state outbreak involving 42 cases in 20 states. Commercially distributed peanut products from a single company were implicated as the vehicle. The outbreak led to a national consumer alert and product recall.

In July, 1 case of *S*. Typhimurium infection was part of a multi-state outbreak involving 20 cases in 8 states. The investigation linked the outbreak to contact with pet hedgehogs purchased from multiple hedgehog breeders in different states.

In July, 2 cases of *S*. Typhimurium infection were part of a multi-state outbreak associated with cantaloupe that resulted in 228 cases in 24 states. Environmental samples collected at the suspected farm matched the outbreak strain. As a result of this investigation, there was a nationwide recall of cantaloupes originating from the implicated farm.

In July, 4 cases of *S*. Newport infection were associated with a multi-state outbreak for which commercially distributed cantaloupe was the suspected vehicle. Traceback investigations did not reveal a common source for this outbreak and the previous cantaloupe outbreak.

In July, 10 cases of *S*. Enteritidis infection were associated with a restaurant. The outbreak vehicle was not determined; however, eggs and food workers were suspected sources of illness.

In August, 5 cases of *S*. Javiana infection in Minnesota were associated with turkey jerky from a meat market. In addition, 2 cases were identified in North Dakota and 1 case in South Dakota. The Minnesota Department of Agriculture collected samples of the implicated product and found two samples of turkey jerky that tested positive for the outbreak strain. As a result of this investigation, the meat market issued a voluntary recall of all whole-muscle turkey jerky products sold on or before August 21.

In August, 26 cases of *S.* Enteritidis infection were associated with beef from a single cow purchased from a farmer. Cases reported purchasing raw beef directly from the farmer and consuming raw or undercooked ground beef at multiple private homes.

In August, 2 cases of *S.* Newport infection were probably due to person-to-person transmission in a retirement complex.

In September, 2 cases of *S.* Bareilly infection were associated with consumption of sushi at a restaurant. No specific sushi ingredient was identified as the outbreak vehicle. The outbreak PFGE pattern for this outbreak did not match the 2012 multi-state outbreak of *S.* Bareilly infections associated with tuna scrape.

In October, 4 cases of *S.* Javiana infection were part of a multi-state outbreak involving 37 cases in 9 states that was associated with lettuce or cucumber consumption. The Minnesota cases were associated with lettuce or cucumber consumption at a national sandwich restaurant chain.

In October, 3 cases of *S.* Heidelberg infection were associated with transmission at a hospital neonatal intensive care unit in South Dakota. The initial source of contamination was not determined.

In November, 2 cases of *S.* Saintpaul infection were associated with a family Thanksgiving party. The source of contamination and route of transmission were not definitively identified; however, smoked turkey was the suspected vehicle.

In December, 3 cases of *S.* Typhimurium infection were identified as part of a multi-state outbreak associated with contact with frozen feeder mice (for snakes).

Sexually Transmitted Diseases (STDs)

Active surveillance for gonorrhea and chlamydia involves cross-checking laboratory-reported cases against cases reported by clinicians. Although both laboratories and clinicians are required to report STDs independently of each other, a laboratory-reported case is not considered a case for surveillance purposes until a corresponding case report is submitted by the clinical facility. Case reports contain demographic and clinical information that is not available from laboratory reports. When a laboratory report is received but no corresponding case report is received within 45 days, we mail a reminder letter and case report form to the clinical facility. Active surveillance for syphilis 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.

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Chlamydia

Chlamydia trachomatis infection is the most commonly reported infectious disease in Minnesota. In 2012, 18,048 chlamydia cases (340 per 100,000 population) were reported, representing a 7% increase from 2011 (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 (2,010 per 100,000), with the next highest rate among 15 to 19-year-olds (1,453 per 100,000). The incidence of chlamydia among adults 25 to 29 years of age (770 per 100,000) is considerably lower but has continued to increase in recent years. The chlamydia rate among females (470 per 100,000) is more than twice the rate among males (206 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 (1,657 per 100,000) is 11 times higher than the rate among whites (154 per 100,000*).* Although blacks comprise approximately 5% of Minnesota's population, they account for 29% of reported chlamydia cases. Rates among Asian/Pacific Islanders (290 per 100,000), Hispanics (376 per 100,000), and American Indians (822 per 100,000) are over two to five times higher than the rate among whites.

Chlamydia infections occur throughout the state, with the highest reported rates in Minneapolis (927 per 100,000) and St. Paul (795 per 100,000). While there was an overall increase of 7% across the state in 2012 the greatest increase for chlamydia was seen in the Greater Minnesota area with an increase of 16%, shown in Table 3. For the first time ever, Minnesota had at least one chlamydia case in every county in the state in 2012.

Gonorrhea

Gonorrhea, caused by *Neisseria gonorrhoeae*, is the second most commonly reported STD in Minnesota. In 2012, 3,082 cases (58 per 100,000 population) were reported, representing a 35% increase from 2010. This is the largest increase in reported gonorrhea cases since 2007 (Table 3).

Table 3. Number of Cases and Rates (per 100,000 persons) of Chlamydia, Gonorrhea, Syphilis and Chancroid - Minnesota, 2007-2012

Disease	2008		2009		2010		2011		2012	
	No.	Rate	No.	Rate	No.	Rate	No.	Rate	No.	Rate
Chlamydia	14,414	275	14,369	272	15,509	292	16,898	319	18,048	340
Gonorrhea	3,054	58	2,328	44	2,149	41	2,283	43	3,082	58
Syphilis, Total	263	5.0	215		351	6.6	366	6.9	335	6.3
Primary/Secondary	116	2.2	71		150	2.8	139	2.6	118	2.2
Early latent	47	0.9	46		74	1.4	121	2.3	96	1.8
Late latent	100	1.9	97		126	2.4	106	2.0	120	2.3
Other*	0	0.0	0		0	0.0	0	0.0	0	0.0
Congenital**	0	0.0	1		1	1.5	0	0.0	1	1.5
Chancroid	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 - Minnesota, 2012

Demographic Group	Chlamydia		Gonorrhea		Syphilis	
	No.	Rate	No.	Rate	No.	Rate
Total	18,048	340	3,082	58	118	2.2
Residence*						
Minneapolis	3,546	927	1,070	280	57	14.9
St. Paul	2,265	795	523	183	19	6.7
Suburban**	5,444	250	890	41	37	1.7
Greater Minnesota	5,619	229	447	18	5	0.2
Age						
<15 years	198	19	36	3	0	0.0
15-19 years	5,344	1,453	781	212	4	1.1
20-24 years	7,147	2,010	1,030	290	16	4.5
25-29 years	2,869	770	530	142	19	5.1
30-34 years	1,251	365	272	79	19	5.5
35-44 years	881	129	264	39	30	4.4
≥45 years	304	14	160	8	30	1.4
Gender						
Male	5,429	206	1,395	53	111	4.2
Female	12,562	470	1,676	63	7	0.3
Transgender^^	3	-	2	-	-	-
Race^/Ethnicity						
White	6,988	154	882	19	57	1.3
Black	4,548	1,657	1,370	499	41	14.9
American Indian	501	822	102	167	4	6.6
Asian/PI	628	290	59	27	1	0.5
Other^^	532	-	13	-	7	-
Unknown^^	4,851	-	656	-	8	-
Hispanic^^^	942	376	88	35	10	4.0

* Residence information missing for 1176 cases of chlamydia and 91 cases of gonorrhea.

** Suburban is defined as the seven-county 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.

Adolescents and young adults are at greatest risk for gonorrhea (Table 4), with incidence rates of 212 per 100,000 among 15 to 19-year-olds, 290 per 100,000 among 20 to 24-year olds, and 142 per 100,000 among 25 to

29-year-olds. Gonorrhea rates for males (53 per 100,000) and females (63 per 100,000) are comparable. Communities of color are disproportionately affected by gonorrhea, with nearly one half of cases reported among blacks. The incidence of gonorrhea among blacks (499 per 100,000) is 26 times higher than the rate among whites (19 per 100,000). Rates among Asian/Pacific Islanders (27 per 100,000), Hispanics (35 per 100,000), and American Indians (167 per 100,000) are up to eight times higher than among whites.

Gonorrhea rates are highest in the cities of Minneapolis and St. Paul (Table 4). The incidence in Minneapolis (280 per 100,000) is nearly two times higher than the rate in St. Paul (183 per 100,000), seven times higher than the rate in the suburban metropolitan area (41 per 100,000), and 15 times higher than the rate in Greater Minnesota (18 per 100,000). Geographically in 2012, St. Paul saw the largest increase in cases at 39% and Minneapolis saw an 32% increase in cases.

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 one 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.

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 MSM. In 2012, there were 118 cases of primary/secondary syphilis in Minnesota (2.2 cases per 100,000 persons). This represents a decrease of 15% compared to the 139 cases (2.6 per 100,000 population) reported in 2011.

Early Syphilis

In 2012, the number of early syphilis cases decreased by 18%, with 214 cases occurring compared to 260 cases in 2011. The incidence remains highly concentrated among MSM. Of the early syphilis cases in 2012, 196 (92%) occurred among men; 158 (81%) of these men reported having sex with other men; 59% of the MSM diagnosed with early syphilis were co-infected with HIV.

Congenital Syphilis

One case of congenital syphilis was reported in Minnesota in 2012.

Chancroid

Chancroid continues to be very rare in Minnesota. No cases were reported in 2012. The last case was reported in 1999.

Shigellosis

During 2012, 391 culture-confirmed cases of *Shigella* infection (7.3 per 100,000 population) were reported. This represents a 349% increase from the 87 cases reported in 2011, and is higher than the annual number of cases reported during 2002-2011 (median, 99.5 per year; range, 66 to 311). *S. sonnei* accounted for 366 (94%) cases, *S. flexneri* for 20 (5%) cases, *S. boydii* for 2 (1%) cases and *S. dysenteriae* for 2 (1%) cases. Cases ranged in age from 9 months to 82 years (median, 9 years). Thirty-seven percent of cases were ≤5 years of age. Fifty-six (14%) cases were hospitalized, including 20 (36%) hospitalizations in children <18 years of age. One 82 year-old case died of coronary artery disease secondary to cardiomyopathy 3 days after *S. sonnei* was cultured from a stool specimen. Fifty-one percent of cases reported either non-White race (161 of 362 cases) or Hispanic ethnicity (48 of 350 cases). Of the 347 cases for which travel information was available, 19 (5%) travelled internationally (10 of 324 [3%] *S. sonnei*, 7 of 18 [39%] *S. flexneri*, 2 of 2 *S. dysenteriae*, and 0 of 2 *S. boydii*.) Sixty-two percent of cases resided in the metropolitan area, including 31% in Ramsey County and 20% in Hennepin County.

Ninety-one (23%) cases were part of 23 *S. sonnei* outbreaks identified in 2012 (median, 2 cases per outbreak; range 1 to 16). Twenty-two outbreaks were due to person-to-person transmission in daycare settings (childcare centers and family childcare homes) and one was a person-to-person outbreak at a private party.

Every tenth *Shigella* isolate received at MDH is tested for antimicrobial resistance. Thirty-nine isolates were tested in 2012; 67% (26 isolates) were resistant to trimethoprim-sulfamethoxazole and 15% (6 isolates) were resistant to ampicillin.

***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 2012, 503 (9.4 per 100,000) cases of invasive pneumococcal disease were reported. By age group, annual incidence rates per 100,000 were 9.4 cases among children aged 0-4 years, 2.1 cases among children and adults aged 5-39 years, 11.9 cases among adults 40-64 years, and 28.9 cases among adults aged 65 years and older.

In 2012, pneumonia occurred most frequently (56% of infections), followed by bacteremia without another focus of infection (25%), and pneumococcal meningitis (5%). Forty-three (9%) cases died. Health histories were available for 40 of the 43 cases who died. Of these, 39 had an underlying health condition reported. The conditions most frequently reported were atherosclerotic cardiovascular disease (13), chronic obstructive pulmonary disease (10), diabetes (9), heart failure/congestive heart failure (7), and solid organ malignancy (7).

In 1999, the year before the pediatric pneumococcal conjugate vaccine (Prevnar [PCV-7]) was licensed; the rate of invasive pneumococcal disease among children <5 years of age in the metropolitan area

continued...

was 111.7 cases/100,000. Over the years 2000-2002 there was a major downward trend in incidence in this age group (Figure 6). Rates in each of the subsequent 8 years were level or somewhat higher, although there has not been a continuing upward trend (Figure 6). Based on the distribution of serotypes among isolates from these cases, this increase was limited to disease caused by non-vaccine serotypes (i.e. serotypes other than the 7 included in PCV-7) (Figure 6).

In March 2010, the U.S. Food and Drug Administration approved a new 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 6). 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 6). In 2012, 26% of cases occurring among Minnesotans of all ages, with isolates available for testing, were caused by 3 of the new PCV-13-included serotypes: 19A (7%), 3 (10%), and 7F (8%).

Of the 478 isolates submitted for 2012 cases, 95 (20%) isolates were resistant to penicillin using meningitis breakpoints. Using non-meningitis breakpoints, 7 (1%) of 478 isolates were resistant to penicillin and 16 (3%) exhibited intermediate level resistance (Note: CLSI penicillin breakpoints changed in 2008; refer to the MDH Antibiogram on pages 26-27). Multi-drug resistance (i.e., high-level resistance to two or more antibiotic classes) was exhibited in 83 (17%) isolates.

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 usual sterile site such as blood, cerebral spinal fluid, or from a wound when accompanied with necrotizing fasciitis or streptococcal toxic shock syndrome (STSS).

One hundred sixty-nine cases of invasive GAS disease (3.2 cases per 100,000 population), including 18 deaths, were reported in 2012, compared to 231 cases and 17 deaths in 2011. Ages of cases ranged from 0 to 101 years (median, 51 years). Fifty-six percent of cases were residents of the metropolitan area. Forty-five (27%) cases had bacteremia without another focus of infection, 59 (35%) cases had cellulitis, and 13 (8%) cases had an abscess, 18 (11%) cases had septic arthritis and/or osteomyelitis. There were 14 (8%) cases of pneumonia and 11 (7%) cases of necrotizing fasciitis. Twelve (7%) cases were residents of 11 different long-term care facilities.

The 18 deaths included 7 cases of bacteremia without another focus of infection, 4 cases of pneumonia, 2 cases of septic shock, and 1 case with cellulitis. The remaining 4 cases had multiple syndromes including 1 case with necrotizing fasciitis and septic shock; 1 case of necrotizing fasciitis and cellulitis; 1 case of cellulitis and septic shock, and 1 case of pneumonia and septic shock. The deaths occurred in persons ranging in age from less than 1 year to 101 years. Two fatal cases had no underlying medical conditions reported. Of the 15 cases where underlying medical condition was known the most frequently reported were congestive heart failure (6), atherosclerotic cardiovascular disease (6), and diabetes (5).

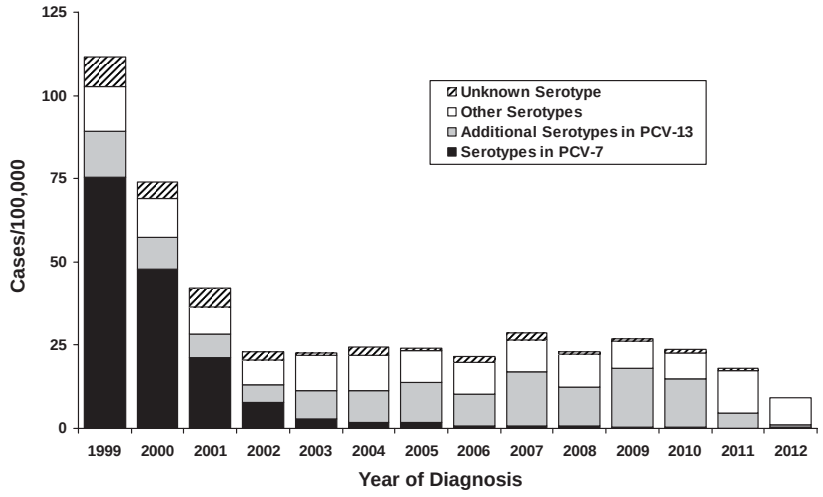
Streptococcal Invasive Disease - Group B (GBS)

Five hundred sixty-four cases of invasive group B streptococcal disease (10.6 per 100,000 population), including 35 deaths, were reported in 2012. 2012 had the largest number of GBS cases reported since surveillance was initiated in 1995, the second largest was 535, reported in 2011.

By age group, annual incidence was highest among infants <1 year of age (39.5 per 100,000 population) and cases aged 70 years or older (37.6 per 100,000). Seventeen (49%) of the 35 deaths were among cases age 65 years and older. Fifty-three percent of cases were residents of the metropolitan area. Bacteremia without a focus of infection occurred most frequently (25% of infections), followed by cellulitis (22%), osteomyelitis (13%), septic arthritis (8%), pneumonia (5%), and meningitis (1%). The majority (67%) of cases had GBS isolated from blood; other isolate sites included bone (17%) and joint fluid (12%).

Thirty-two cases were infants or pregnant women (maternal cases), compared to 35 cases in 2011. Ten infants developed early-onset disease

Figure 6. Invasive Pneumococcal Disease Incidence Among Children <5 Years of Age, by Year and Serotype Group, Metropolitan Area, 1999-2001; Minnesota, 2002-2012



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)

(occurred within 6 days of birth [0.1 cases per 1,000 live births]), and 13 infants developed late-onset disease (occurred at 7 to 89 days of age [0.2 cases per 1,000 live births]). Nine stillbirth/spontaneous abortions were associated with the 9 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 2012. Overall, 8 of 10 women who delivered GBS-positive infants underwent prenatal screening for GBS. Of these, 1 was positive, and 7 negative. One of the two women who did not receive prenatal screening was screened upon admission to the hospital and prior to delivery. Among the 10 women who delivered GBS-positive infants, 3 received intrapartum antimicrobial prophylaxis (IAP). The one woman with a positive GBS screen received IAP.

Tetanus

Two cases of tetanus were reported during 2012. The first case occurred in a fully vaccinated 20 year-old white, non-Hispanic male with an underlying immunodeficiency. He presented with neck stiffness and limb spasms 21 days after sustaining a laceration-type wound while doing yard work at home. He received tetanus immune globulin (TIG) between 1-4 days after symptom onset. He was admitted to an intensive care unit for 2 days and remained hospitalized for an additional 12 days. The case fully recovered.

The second case occurred in a 36 year-old white non-Hispanic male with history of 1 dose of tetanus-containing vaccine more than 10 years prior to illness onset. He presented with jaw stiffness 3 days after sustaining a puncture wound to the hand from a rusty nail. He received TIG within 1-4 days after symptom onset, was hospitalized for 1 day, and fully recovered.

Toxic Shock Syndrome

In 2012, 8 cases of suspect or probable staphylococcal toxic shock syndrome (TSS) were reported. Of the reported cases, all were female and the median age was 14 years (range, 13 to 16 years). One case was associated with a wound infection, 6 were menstrual-associated with tampon use, and 1 was unknown.

Staphylococcal toxic shock syndrome with isolate submission (if isolated) is reportable to MDH within 1 working day. We use the 2011 CDC case definition which includes 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 creatine 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).

Tuberculosis

In 2012, 162 cases of tuberculosis (TB) disease (3.0 cases per 100,000 population) were reported in Minnesota, compared to 137 cases in 2011. Although this represents an 18% increase in the number of cases and a 15% increase in the incidence rate compared to 2011, the number of cases reported annually has decreased 32% since 2007, when 238 cases (the highest number in the past decade) were reported. Furthermore, although Minnesota's TB incidence rate in 2012 was higher than in 2011, it was still below the national rate of 3.2 cases per 100,000 population. Four (2%) of the TB cases reported in Minnesota in 2012 have died due to TB or TB-related causes.

Twenty (23%) of the state's 87 counties reported at least 1 case of TB disease in 2012. The large majority (85%) of cases occurred in the metropolitan area, primarily in Hennepin (44%) and Ramsey (24%) counties. Seventeen percent of TB cases in 2012 were reported from the other five metropolitan counties (i.e., Anoka, Carver, Dakota, Scott, and Washington). The remaining 15% of cases were reported from outside the metropolitan area. Among the metro area counties, the highest TB incidence rate in 2012 was reported in Ramsey County (7.6 cases per 100,000 population), followed by Scott County (6.8 cases per 100,000 population) and Hennepin County (6.1 cases per 100,000 population). The TB incidence rate for all Greater Minnesota counties combined was 1.0 per 100,000 population.

The majority (79%) of TB cases reported in Minnesota during 2012 were identified as a result of individuals seeking medical care due to symptoms of TB disease. Various targeted public health interventions identified the remaining 21% of cases. Such methods of case identification traditionally are considered high priority, core TB prevention and control activities; they include TB contact investigations (6%), domestic refugee health assessments (6%), and follow-up evaluations subsequent to abnormal findings on pre-immigration exams performed overseas (2%). Notably, however, an additional 7% of TB cases were identified through a variety of other means (e.g., occupational screening) that typically are considered lower priority activities.

The incidence of TB disease is disproportionately high in racial minorities in the United States and in Minnesota. In 2012, 12 TB cases occurred among non-Hispanic whites (incidence rate: 0.3/100,000 population). In contrast, 90 TB cases occurred among blacks (incidence rate: 28.2/100,000), 42 among Asians (incidence rate: 17.5/100,000), and 3 among American Indians (incidence rate: 3.8/100,000). The majority (86%) of black TB cases reported in Minnesota in 2012 were foreign-born.

The most distinguishing characteristic of the epidemiology of TB disease in

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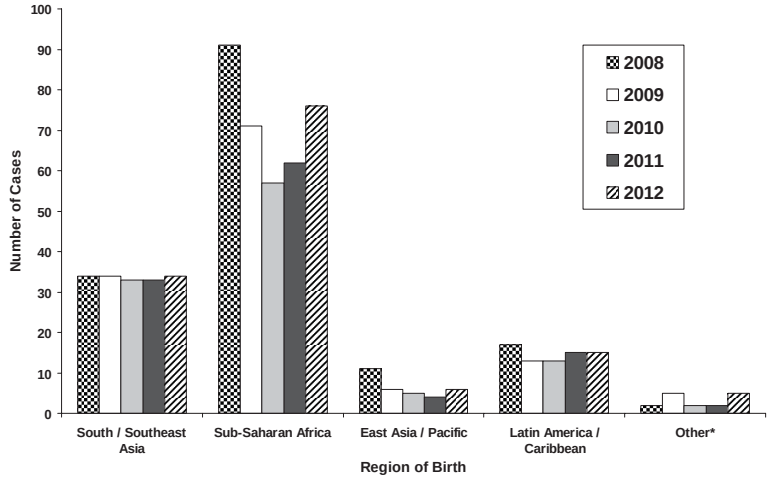
Figure 7. Foreign-Born Tuberculosis Cases by Region of Birth and Year of Report, Minnesota, 2008-2012



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

Minnesota continues to be the large proportion of cases occurring among persons born outside the United States. Eighty-four percent of cases reported in 2012 occurred among foreign-born persons. In contrast, 63% of TB cases reported nationwide in 2012 were foreign-born. The 136 foreign-born TB cases reported in Minnesota during 2012 represented 33 different countries of birth; the most common region of birth among these patients was sub-Saharan Africa (56% of foreign-born cases), followed by South/Southeast Asia (25%), and Latin America (including the Caribbean) (11%) (Figure 7). Among U.S.-born pediatric TB cases (less than 15 years of age at TB diagnosis), 90% (9/10) had at least one foreign-born parent. 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 reported in Minnesota during 2012, 22% were diagnosed with TB disease less than 12 months after arriving in the United States, and an additional 11% were diagnosed 1 to 2 years after their arrival. Many of these cases likely represent persons who acquired TB infection prior to immigrating and began progressing to active TB disease shortly after arrival. Of the 21 TB cases 15 years of age or older who arrived as immigrants or refugees and were diagnosed in Minnesota within 12 months of arriving in the United States, only two 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.

Over half (54%) of foreign-born and 23% of U.S.-born TB cases reported in Minnesota in 2012 had an extrapulmonary site of disease, or TB found outside the lungs. Among extrapulmonary TB cases, by far the most common site of TB disease was lymphatic (59%), followed by pleural (13%), and bone/joint (9%).

Aside from foreign-born persons, individuals with other risk factors comprise a much smaller proportion of the TB cases in Minnesota. Among cases reported in 2012, 12% 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, etc.). Following the presence of these underlying medical conditions, the next most common risk factor was substance abuse (including alcohol abuse and/or illicit drug use), with 4% of TB cases reported in 2012 having a history of substance abuse during the 12 months prior to their TB diagnosis. Six (4%) were infected with HIV. The percentage of new TB cases with HIV co-infection in Minnesota remains less than that among TB cases reported nationwide in 2012 (nationally, 7.7% of those with an HIV test result were co-infected). Other high risk groups, such as homeless persons and residents of nursing homes, each represented around 1% of the TB cases reported in Minnesota during 2012.

In 2012, of 123 culture-confirmed TB cases with drug susceptibility results available, 23 (19%) were resistant to at least one first-line anti-TB drug (i.e., INH, rifampin, pyrazinamide, or ethambutol), including 12 (10%) cases that were resistant to INH. There was one case (0.8%) of multidrug-resistant TB (MDR-TB, or resistance to at least INH and rifampin) reported in 2012. The proportion of drug resistance among TB cases decreased from 2011, when 22% of culture-confirmed cases with susceptibility results available were resistant to at least one first-line anti-TB drug, and 3 (3%) 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 (IDPB). Cases are excluded from UNEX if they are determined to be explained by providers, are not critically ill, or have no infectious disease hallmarks.

There were 82 cases that met criteria for UNEX surveillance (71 deaths and 11 critical illnesses) in 2012, compared to 137 cases in 2011. Of the 82, 59 (72%) were reported by providers, 20 (24%) were found by death certificate review, and 3 (4%) were found through other reporting methods. Forty-nine (60%) cases presented with respiratory symptoms; 10 (12%) with neurologic symptoms; 9 (11%) with cardiac symptoms; 5 (6%) with sudden unexpected death; 3 (4%) with shock/sepsis; 3 (4%) with an illness that did not fit a defined syndrome; 2 (2%) with gastrointestinal illness; and 1 with a genitourinary illness. The age of cases ranged from newborn to 89 years. The median age was 16 years among 59 reported cases, and 57 years among 20 non-reported cases found through active surveillance. Forty-seven percent resided in the metropolitan area and 47% were male.

There were 284 MED-X cases in 2012; 69 of these also met UNEX criteria. The median age of the cases was 46 years, and 58% were male. There were 158 (56%) cases found through death certificate review. MEs reported 126 (44%) cases. The most common syndrome was pneumonia/upper respiratory infection (n=130 [46%]). Of the 284 cases, 54 (19%) were confirmed to have had an infectious cause, 170 (60%) had possible infectious causes, and 60 (21%) were non-infectious or unknown cause.

There were 135 cases that had specimens tested at the PHL and/or the IDPB. Thirty-three cases had pathogens identified as confirmed, probable, or possible cause of illness, including 20 UNEX cases (Table 5). Among 40 unexplained deaths occurring in those <50 years of age without any immunocompromising conditions, UNEX helped to identify the pathogen(s) involved in 13 (37%) cases. ME surveillance detected an additional 12 cases with pathogens identified by MEs as the cause of death (Table 5). Cases with pathogens of public health importance detected included a 25 year-old male with a 2-3 day history of fever, cough, and body aches who presented with altered mental status and leukocytosis. During a brief hospitalization he died. CSF PCR testing done at the PHL identified *Neisseria meningitidis* serogroup B. A contact investigation was conducted to recommend prophylaxis to all close contacts. Three *Haemophilus influenzae* serotype f cases were identified through ME surveillance, these cases were part of a cluster of *Haemophilus influenzae* serotype f identified during the first quarter of 2012.

Table 5. UNEX/MED-X Pathogens Identified as Confirmed, Probable, or Possible Cause of Illness, 2012*

Pathogen Identified	UNEX(n=20)	MED-X (n=13)**
Adenovirus	2	
Clostridium sordellii	1	
Cytomegalovirus	1	
Group A Streptococcus		2
Group B Streptococcus	1	1
Haemophilus influenzae	3	1
Influenza A virus	5	1
Influenza A-H3	1	
Klebsiella pneumoniae		1
Neisseria meningitidis	1	1
Parainfluenza virus 1	1	
Parainfluenza virus 3		1
Respiratory syncytial virus	1	1
Staphylococcus aureus		2
Staphylococcus aureus-MRSA	1	
Staphylococcus spp.	2	1
Streptococcus pneumoniae		1

* 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.

Varicella - Zoster Virus

Since 2006, unusual case incidence, individual critical cases, and deaths due to varicella have been reportable. A sentinel school surveillance system was used to monitor varicella incidence. Because of the declining incidence of varicella disease, the sentinel system no longer provided adequate data for epidemiological purposes and was discontinued at the end of the 2011-2012 school year. Case-based surveillance was implemented for all Minnesota schools beginning in September 2012 and for all other reporting entities beginning January 1, 2013. Case-based reporting of varicella in all childcare settings was initiated in February 2010. A case of varicella is defined as an illness with acute onset of diffuse (generalized) maculopapulovesicular rash without other apparent cause; however, reporting entities have been requested to also report possible breakthrough infection that may present atypically.

From case-based school surveillance for varicella conducted September 1 - December 31, 2012, we received 188 case reports from 117 schools in 35 counties. One hundred fifty-five were

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sporadic cases and 33 were outbreak-associated cases. From case-based childcare surveillance conducted throughout 2012, we received reports of 65 cases from 47 facilities. Fifty were sporadic cases and 15 were outbreak-associated cases. Sixty-two (95%) of childcare cases were <6 years of age. By comparison, 56 cases were reported by childcare facilities in 2011. Varicella is often identified by childcare personnel or parents, as opposed to provider-diagnosed.

An outbreak of varicella in a school or a childcare facility is defined as 5 or more cases within a 2-month period in persons <13 years of age, or 3 or more cases within a 2-month period in persons 13 years of age and older. An outbreak is considered over when no new cases occur within 2 months after the last case is no longer infectious. Two Minnesota schools reported outbreaks between September 1 - December 31, 2012. An outbreak in a school with grades pre-K to 12 included 30 students and one staff member. Prior to the outbreak, 8% of the students were unvaccinated for varicella and had no reported varicella disease history. Among students with no previous history of disease, the attack rate was 70% for unvaccinated students, 18% for students with 1 dose of varicella vaccine, and 2% for students with 2 doses of varicella vaccine. Of the 15 unvaccinated cases, 8 had moderate disease (250-499 lesions) or severe disease (>500 lesions). In contrast, of the 14 vaccinated cases, 13 had mild disease (<50 lesions), and 1 had moderate disease. In addition, three childcare facilities reported outbreaks in 2012. The source case for one of the outbreaks also attended pre-school at the school with the larger outbreak described above.

During 2012, 7 cases of critical illness due to varicella, but no deaths, were reported. All 7 were hospitalized for a range of 4 to 9 days. Complications included cerebellitis with ataxia, bacterial cellulitis, dehydration, anorexia, and myoclonus. One case had an underlying medical condition and recent history of treatment with immunosuppressive drugs. The other cases had no or unknown underlying conditions and were not known to be immunosuppressed. Five cases had not received varicella-containing vaccine; 2 were not vaccinated due to conscientiously held beliefs, 1 had a reported history of varicella disease, and 2 were adults. One of the adults, 93 years of age, had apparent recurrent varicella disease. Serologic testing performed at CDC detected high avidity for the virus, indicating past infection. One case had received 1 dose of vaccine prior to diagnosis of a condition requiring immunosuppressive therapy. Vaccination history for the remaining case, 22 years of age, was unknown.

Since 2006, the U.S. Advisory Committee on Immunization Practices 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. Students who will be in grades 4-6 and grades 11-12 during the 2013-2014 school year were beyond kindergarten or beyond grade 7 when the law was implemented and therefore were not included in the requirement. Children in these grades should be evaluated to determine whether they have had a second dose of varicella vaccine, particularly given the increased severity of varicella in older children and adults. Older adolescents and adults should also be evaluated for varicella immunity (history of varicella disease or 2 doses of varicella vaccine at least 4 weeks apart) and offered varicella vaccine if indicated, as varicella is more severe in adolescents and adults.

In the event of a school outbreak, children and staff who are susceptible to varicella because of incomplete vaccination or no history of disease are advised to be excluded from school from the 10th to 21st day after exposure.

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 the spring and fall semesters of 2012, zoster cases in students were reported from 62 schools in 32 counties. Ages ranged from 3 to17 years (median, 13 years). Sixty-four (94%) of the 68 zoster cases were provider-diagnosed. Additional cases in children <18 years old were reported during 2012 by childcare sites (4 cases) and by providers (39 cases). Overall, among the 90 cases for whom both varicella disease history and vaccination history were available, 49 (54%) had a history of disease but had not received vaccine, 28 (31%) had no history of disease but had received 1-2 doses of vaccine, and 13 (14%) 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 2012, 41 zoster cases with dissemination or complications were reported; 33 were hospitalized. Twenty-four cases were 60 years of age or older; 12 were 30 to 59 years of age; and 5 were <30 years of age. Eighteen (4%) had underlying conditions or were being treated with immunosuppressive drugs. Seventeen cases had disseminated disease, 9 had meningitis, 8 had severe ocular involvement, 7 had encephalitis or meningoencephalitis, 3 had pneumonia, 2 had Ramsay-Hunt Syndrome, 2 had bacterial cellulitis, and 1 had Bell's palsy. One case with encephalitis subsequently died.

Zoster vaccine is licensed for adults 50 years of age and older, and is recommended for all adults 60 years of age and older regardless of whether they report a prior episode of herpes zoster.

Viral Hepatitis A

In 2012, 29 cases of hepatitis A (HAV) (0.5 per 100,000 population) were reported. Ten (34%) cases were residents of the metropolitan area, including seven residents of Hennepin or Ramsey Counties. Seventeen (59%) of the cases were male. Cases ranged in age from 1 to 88 years (median, 52 years). Twenty-three (79%) were white, 3 (10%) were multi-racial, 1 (3%) was Asian, and 1 (3%) was American Indian; race was unknown for 1 (3%) case. Hispanic ethnicity was reported for 4 cases (1.6 per 100,000).

A risk factor was identified for 17 (59%) of the cases, 1 of whom had known exposure to a confirmed hepatitis A case, representing missed opportunities to administer immune globulin or HAV vaccine. Of the remaining 16 cases with a risk factor identified, 5 were associated with travel. Of these 5 cases, 3 traveled to Mexico, Central,

or South America. No outbreaks of hepatitis A occurred in 2012.

Viral Hepatitis B

In 2012, 17 cases of acute hepatitis B virus (HBV) infection (0.3 per 100,000 population) were reported, with 1 death. In 2012, the case definition for acute hepatitis B was revised to include laboratory confirmed asymptomatic acute cases. Three (18%) of the 17 cases of acute hepatitis B were asymptomatic infections.

We also received 540 reports of newly identified cases of confirmed chronic HBV infection in 2012. Prior to 2009, confirmed and probable chronic cases were reported in the year in which they were first reported. Beginning in 2009, only confirmed cases are reported, and cases are reported in the year in which case-confirming data are available. A total of 21,064 persons are estimated to be alive and living in Minnesota with chronic HBV. The median age of chronic HBV cases in Minnesota is 42 years.

Acute cases ranged in age from 27 to 62 years (median, 47 years). Fourteen (82%) cases were residents of the metropolitan area, including 6 (35%) in Hennepin County and 3 (18%) in Ramsey County. Thirteen (76%) cases were male and 4 (24%) were adolescents or young adults between 13 - 39 years of age. Nine (53%) were white, 5 (29%) were black, 1 (6%) was Asian, and 1 (6%) was Pacific Islander; race was unknown for 1 (6%) case. One (6%) case was known to be of Hispanic ethnicity. Incidence rates were higher among Pacific Islanders (131.1 per 100,000), blacks (1.8 per 100,000), Asians (0.5 per 100,000) and those with Hispanic ethnicity (0.4 per 100,000) than among non-Hispanic whites (0.2 per 100,000).

In addition to the 17 hepatitis B cases, 1 perinatal infection was identified in an infant who tested positive for HBsAg during post-vaccination screening performed between 9 and 15 months of age. The perinatal case was born in 2011. The perinatal infection occurred in an infant identified through a public health program that works to ensure appropriate prophylactic treatment of infants born to HBV-infected mothers. The infected infant was born in the United States and had received hepatitis B immune globulin and 3 doses of hepatitis B vaccine in accordance with the recommended schedule and was therefore considered a treatment failure. Despite this failure, the success of the public health prevention program is demonstrated by the fact that an additional 252 infants born to HBV-infected women during 2011 had post-serologic testing demonstrating no infection.

Viral Hepatitis C

In 2012, 32 cases of acute hepatitis C virus (HCV) infection (0.6 per 100,000) were reported. In 2012, the case definition for acute hepatitis C changed to include documented asymptomatic seroconversion. Of the 32 acute cases, 9 were asymptomatic, laboratory-confirmed acute HCV infections.

Twenty (63%) cases resided in Greater Minnesota. The median age of all cases was 33 years (range, 18 to 55 years). Seventeen (53%) cases were male. Twenty-three (72%) were white, 3 (9%) were American Indian, 1 (3%) was Asian, and 1 (3%) was black; race was unknown for 4 (13%) cases.
We received 2,037 reports of newly identified anti-HCV antibody-positive persons in 2012, the vast majority of whom are chronically infected. A total of 39,303 persons are estimated to be alive and living in Minnesota with past or present HCV infection. The median age of these cases is 55 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 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.

Handwashing Saves Lives

Keeping hands clean through improved hand hygiene is one of the most important steps to take to avoid getting sick and spreading germs to others. Many infections are spread by not washing hands with soap and clean, running water. If clean, running water is not accessible, as is common in many parts of the world, use soap and available water. If soap and water are unavailable, use an alcohol-based hand sanitizer that contains at least 60% alcohol to clean hands.

- When should you wash your hands?
  - Before, during, and after preparing food
  - Before and after caring for someone who is sick
  - Before and after treating a cut or wound
  - After using the toilet
  - After changing diapers or cleaning up a child who has used the toilet
  - After blowing your nose, coughing, or sneezing
  - After touching an animal or animal waste
  - After handling pet food or pet treats
- What is the right way to wash your hands?
  - Use clean, running water (warm or cold)
  - Rub your hands together to make a lather and scrub them well; be sure to scrub between your fingers, and under your nails
  - Continue rubbing your hands for at least 20 seconds. Need a timer? Hum the "Happy Birthday" song from beginning to end twice
  - Rinse your hands well under running water
  - Dry your hands using a clean towel or air dry them
- If soap and water are not available, use an alcohol-based hand sanitizer that contains at least 60% alcohol. Alcohol-based hand sanitizers can quickly reduce the number of germs on hands in some situations, but sanitizers do not eliminate all types of germs.
  - Hand sanitizers are not as effective when hands are visibly dirty
  - Apply the product to the palm of one hand
  - Rub the product over all surfaces of your hands and fingers until your hands are dry

Antimicrobial Susceptibilities of Selected Pathogens, 2012

On the following pages is the *Antimicrobial Susceptibilities of Selected Pathogens, 2012*, a compilation of antimicrobial susceptibilities of selected pathogens submitted to MDH during 2012 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, Acute Disease Investigation and Control Section, PO Box 64975, St. Paul, MN 55164 or by calling 651-201-5414.

Antimicrobial Susceptibilities of Selected Pathogens, 2012 (MDH)		*Campylobacter* spp. [1‡]	*Salmonella* Typhimurium [2†]	Other *Salmonella enterica* serotypes (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* [10†]
Sampling Methodology † all isolates tested ‡ ~10% sample of statewide isolates received at MDH § isolates from a normally sterile site											
Number of Isolates Tested		92	106	63	39	79	12	159	512	478	123
		% Susceptible									
ß-lactam antibiotics	amoxicillin									92	
	ampicillin		68	94	85		75	100	100		
	penicillin					0	75	100	100	80	
	cefixime					100					
	cefpodoxime					100					
	cefuroxime sodium									89	
	cefotaxime							100	100	90	
	ceftriaxone		100	97	100	100	100			90	
	meropenem						100			89	
Other antibiotics	ciprofloxacin	75[1]	99	100	100	88	100				
	levofloxacin						100	99	99	100	
	azithromycin	100				99	100				
	erythromycin	100						92	46	66	
	clindamycin							98/93[6]	66/55[7]	93	
	chloramphenicol		75	100	95					99	
	gentamicin	84									
	spectinomycin					100					
	tetracycline	42				17		94		91	
	trimethoprim/sulfamethoxazole (TMP/SMX)		97	100	33					84	
	vancomycin							100	100	100	
TB antibiotics	ethambutol										98
	isoniazid										90
	pyrazinamide										91
	rifampin						100				98

Trends, Comments, and Other Pathogens	
[1] *Campylobacter* spp.	Quinolone susceptibility was determined for all isolates (n=889); isolates that were screened as nalidixic acid-susceptible were assumed to be ciprofloxacin susceptible. Only 25% of isolates from patients returning from foreign travel (n=144) were susceptible to quinolones. *Campylobacter* susceptibilities were determined using CDC NARMS 2010 Report Standards (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, parenteral ceftriaxone for 5 days, or a fluoroquinolone (such as ciprofloxacin) for 3 days should be administered. For susceptible strains, ampicillin or TMP/SMX is effective; amoxicillin is less effective because of rapid absorption from the gastrointestinal tract. (2012 *Red Book*)
[4] *Neisseria gonorrhoeae*	Routine resistance testing for *Neisseria gonorrhoeae* by MDH PHL was discontinued in 2008. Susceptibility results were obtained from the CDC Regional Laboratory in Cleveland, OH, and are for isolates obtained through the Gonococcal Isolate Surveillance Program. Isolates (n = 79) were received from the Red Door Clinic in Minneapolis. Resistance criteria for cefixime, ceftriaxone, cefpodoxime, and azithromycin have not been established; data reflect reduced susceptibility using provisional breakpoints (minimum inhibitory concentration ≥0.5 µg/ml, ≥0.5 µg/ml, ≥1.0 µg/ml, and ≥2.0 µg/ml, respectively). Also, the number of *Neisseria gonorrhoeae* isolates submitted for testing increased from 47 in 2011 to 79 in 2012
[5] *Neisseria meningitidis*	In 2012, 3 case-isolates were intermediate to 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 159 isolates tested represent 94% of 169 total cases. Among 10 erythromycin-resistant, clindamycin-susceptible or intermediate isolates 8 (80%) had inducible resistance to clindamycin for a total of 93% that were susceptible to clindamycin and did not exhibit inducible clindamycin resistance.
[7] Group B *Streptococcus*	90% (9/10) of early-onset infant, 100% (13/13) of late-onset infant, 89% (8/9) of maternal, and 91% (482/532) of other invasive GBS cases were tested. Among 101 erythromycin-resistant, clindamycin susceptible or intermediate isolates 57 (56%) had inducible resistance to clindamycin for a total of 55% (283/512) that were susceptible to clindamycin and did not exhibit inducible clindamycin resistance. 70% (21/30) of infant and maternal cases were susceptible to clindamycin and did not exhibit inducible clindamycin resistance.
[8] *Streptococcus pneumoniae*	The 478 isolates tested represent 95% of 503 total cases. Reported above are the proportions of case-isolates susceptible by meningitis breakpoints for cefotaxime, ceftriaxone (intermediate = 1.0 µg/ml, resistant > 2.0 µg/ml) and penicillin (resistant > 0.12 µg/ml). By nonmeningitis breakpoints (intermediate = 2.0 µg/ml, resistant > 4.0 µg/ml), 96% (458/478) of isolates were susceptible to cefotaxime and ceftriaxone. By nonmeningitis breakpoints (intermediate = 4.0 µg/ml, resistant > 8.0 µg/ml), 95% (455/478) of isolates were susceptible to penicillin. Isolates were screened for high-level resistance to rifampin at a single MIC; all were < 2 µg/ml. Using meningitis breakpoints, 17% (83/478) of isolates were resistant to two or more antibiotic classes and 9% (42/478) were resistant to three or more antibiotic classes. (CLSI also has breakpoints for oral penicillin V; refer to the most recent CLSI recommendations for information).
[10] *Mycobacterium tuberculosis* (TB)	National guidelines recommend initial four-drug therapy for TB disease, at least until first-line drug susceptibility results are known. Of the 23 TB cases reported in 2012 resistant to at least one first-line drug, 21 (91%) were in foreign-born, including the 1 multidrug-resistant (MDR-TB) case (i.e., resistant to at least isoniazid and rifampin) reported. There were no cases of extensively drug-resistant TB (XDR-TB) (i.e., resistance to at least isoniazid, rifampin, any fluoroquinolone, and at least one injectable second-line drug).
Invasive methicillin-resistant *Staphylococcus aureus* (MRSA)	233 cases of invasive MRSA infection were reported in 2012 in Ramsey and Hennepin Counties, of which 152 (65%) were from blood. 79% (184/233) had an isolate submitted and antimicrobial susceptibility testing conducted. Of cases with an isolate, 83% (153/184) were epidemiologically classified as healthcare-associated. Susceptibilities were as follows: 100% to linezolid, televancin, and vancomycin; 99% to daptomycin, doxycycline, and rifampin; 98% gentamicin, tetracycline, and TMP/SMX; 22% to levofloxacin; 11% to erythromycin. Isolates were screened for mupirocin resistance with 3% exhibiting high-level resistance (MIC >256 ug/ml). 42% (64/153) were susceptible to clindamycin by broth microdilution; however, 23/47 isolates that were clindamycin susceptible or intermediate and erythromycin resistant were found to have inducible resistance to clindamycin (27% susceptible and negative for inducible clindamycin resistance). For community-associated (CA) cases (31/39 with isolates), susceptibilities were as follows: 100% to daptomycin, doxycycline, gentamicin, linezolid, rifampin, telavancin, TMP/SMX, vancomycin; 97% to tetracycline; 42% to levofloxacin; 13% to erythromycin. 3% (1/31) of isolates screened for mupirocin resistance exhibited high-level resistance. 77% (24/31) were susceptible to clindamycin by broth microdilution; however, 7/20 isolates that were clindamycin susceptible or intermediate and erythromycin resistant were found to have inducible clindamycin resistance (55% susceptible and negative for inducible clindamycin resistance). No VISA or VRSA cases were confirmed in 2012.
Bordetella pertussis	In 2012, 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 77 CRE isolates submitted from 76 cases, 29 (38%) were bla_{KPC} positive by PCR including 15 (52%) *K. pneumoniae*, 12 (41%) *E. cloacae*, 1 (3.5%) *E. coli*, and 1 (3.5%) *K. oxytoca*. 17 (59%) were residents of the 7-county metro area. Additionally, 3 isolates from two non-MN residents were positive for bla_{NDM} by PCR: 2 *K. pneumoniae* and 1 *E. coli*. The definition of CRE 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. 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.

19th Annual CME Conference

EMERGING INFECTIONS IN CLINICAL PRACTICE AND PUBLIC HEALTH

New Developments

Friday, November 22, 2013

PRELIMINARY AGENDA

7:00 am	**Registration and Continental Breakfast**
7:40	**Welcome and Introductions**
8:00 8:35	**Carbapenem-Resistant Enterobacteriaceae (CRE)** **Q&A** *Alexander Kallen, MD, MPH, Centers for Disease Control and Prevention – Atlanta, GA*
8:45 9:20	**HIV & Immigrants** **Q&A** *Keith Henry, MD, University of Minnesota*
9:30 10:05	**Novel Respiratory Viruses** **Q&A** *Michael T. Osterholm, PhD, MPH, University of Minnesota*
10:15	***Refreshment Break***
10:35 11:10	**Hot Topics from Minnesota Department of Health** **Q&A** *Richard Danila, PhD, MPH, Minnesota Department of Health*
11:20 11:55	**Emerging Controversies in Hospital Infection Control: Pros and Cons of MRSA Screening and Decolonization** **Q&A**
12:05 pm	***Lunch***
1:00 1:35	**C. Diff-Fecal Microbiota Transplantation (FMT)** **Q&A** *Darrell Pardi, MD, Mayo Clinic*
1:45 2:20	**The Re-Emergence of Pertussis** **Q&A** *Tami Skoff, Centers for Disease Control and Prevention – Atlanta, GA*
2:30 3:05	**Cases from the Travel Desk** **Q&A** *Abinash Virk, MD, Mayo Clinic*
3:15	***Refreshment Break***
3:35 4:05	**Antimicrobial Sterwardship** **Q&A** *Susan Kline, MD, University of Minnesota*
4:15	**Interesting, Unusual and Educational Patient Case Presentations: ID Experts' Differential Diagnosis Discussion Panel** Moderator: *Phillip K. Peterson, MD – University of Minnesota* Panelists: *Jonathan Sellman, MD– University of Minnesota • Abinash Virk, MD - Mayo Clinic •*
5:00	**ADJOURN**

Faculty and Curriculum Subject to Change

19th Annual CME Conference

EMERGING INFECTIONS IN CLINICAL PRACTICE AND PUBLIC HEALTH

New Challenges

Friday, November 22, 2013

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☐ Full-time Faculty	$140	$180
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☐ Resident / Fellow/ Student	$60	$75
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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 8, 2013**. 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. *3381 - mm*

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